CREATING A WHOLE GREATER THAN THE SUM OF ITS PARTS: FOSTERING INTEGRATIVE LEARNING WITH A REFLECTIVE EPORTFOLIO PROCESS

by

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DEDICATION

To Mandy, Matthew, and Elise

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ABSTRACT

This research explores one university's effort to facilitate integrative learning with a reflective ePortfolio process. Integrative learning is conceptualized using a multi-theoretical construct consisting of transfer of learning, reflective practice, and self-authorship. As part of the evaluation of this process, students completed a pre-survey and a post-survey. Two years later, a sample of students responded to a follow-up survey. These surveys contained the same 37 items, which have been reduced to five dimensions of integrative learning.

The study provides strong evidence that engagement in the reflective ePortfolio process leads to integrative learning gains and that these gains are lasting. Students who engaged in the process demonstrated significant growth on all five dimensions of integrative learning. Using a delayed-treatment design to determine causation, the analysis revealed that, for all five dimensions, there was a significant, positive effect associated with engagement in the process. Results from the follow-up survey demonstrated that, for four dimensions, learning gains persisted two years later.

Using three-level hierarchical linear modeling to identify differences in integrative learning gains, the study identified characteristics of students and sites that represent optimal interventions. Students who engaged in deeper reflection both started the process with stronger integrative learning abilities and experienced greater learning gains. Students of different demographic backgrounds experienced similar learning gains, though there were differences related to academic characteristics and co-curricular engagement. First-year students experienced stronger growth than sophomores on the identify knowledge, skills, and values

dimension. On the pre-survey, there was an inverse relationship between academic performance and integrative learning; students in the lowest academic performance quartile reported weaker learning gains. Similarly, students in social sciences and professional fields rated themselves stronger on the professional digital identity dimension and demonstrated weaker growth. Integrative learning gains were positively associated with participation in student organizations and research projects, while students in fraternities and sororities experienced weaker learning gains. Students who had internships rated themselves stronger on the pre-survey and then experienced weaker learning gains. Students in sites with the greatest numbers of students experienced weaker gains, while there were no differences based on length of the process, term, and facilitation type.

Chapter 1: Introduction

In this dissertation, I explore the relationship between one type of assessment, the electronic portfolio (or ePortfolio), and a student outcome known as integrative learning. I was drawn to this topic as a result of my interest in student outcomes assessment and, in particular, its potential to enhance student achievement. As technology has advanced and become increasingly integrated into the lives of college students, ePortfolios represent an opportunity to enrich student learning by providing them with a platform to collect and reflect upon their work and experiences. There are significant gaps in the scholarly literature not only on the influence of ePortfolios on student achievement but also on the impact of assessment as a whole. As a result, this research has the potential to make a meaningful contribution to our understanding of the influence that assessment can have on student achievement.

It was not until after I committed myself to exploring the relationship between ePortfolio engagement and student achievement that I began to recognize the significance of the integrative learning outcome that is central to this research. Championed by the American Association of Colleges and Universities (AAC&U) as an essential learning outcome, integrative learning "is an understanding and a disposition that a student builds across the curriculum and co-curriculum, from making simple connections among ideas and experiences to synthesizing and transferring learning to new, complex situations within and beyond the campus" (AAC&U, 2008). Though students engage in a variety of curricular, co-curricular, and personal experiences, they can fail to understand how these experiences are linked and recognize the common skills and knowledge they develop through these disparate experiences. By making these connections, students have

the ability to create a whole greater than the sum of its parts. The ability to integrate learning is essential as college graduates enter a 21st century workforce that places a premium on knowledge and requires individuals to be able to solve complex problems. Like assessment, integrative learning is a topic that is sorely underrepresented in the scholarly literature given its significance. It is an exciting possibility that this research can contribute to filling substantial gaps in two bodies of scholarly literature.

The remainder of this introductory chapter follows with five brief sections that describe the context of this study. First, I describe the significance of assessment in postsecondary education and explain how ePortfolios fit into the assessment context. Second, I provide a brief overview of student outcomes and define integrative learning as an intended outcome in postsecondary education. Third, I provide background information about MPortfolio, the ePortfolio-based process that is used to facilitate integrative learning at the University of Michigan and is a central part of this study. In the fourth section, I present the research questions that I intend to answer in this dissertation. Fifth, I offer a brief preview of the organization of the dissertation.

Assessment and ePortfolios

Assessment is a process focused on student learning that has formally existed in academia for nearly a century (Ewell, 2002). Many associate assessment with testing and the measurement of student achievement. Although that is not incorrect, the scope of assessment in higher education has grown over the past three decades to encompass more than just engaging in tasks such as taking a test or writing an essay. To put it simply, assessment determines whether students are learning what colleges and universities intend for them to learn (Bers, 2008). What is lost in this definition, however, and should not be overlooked is that a primary goal of

assessment is not simply to measure student achievement but to improve student learning (Angelo, 2002). Palomba and Banta (1999) define assessment as "the systematic collection, review, and use of information about educational programs undertaken for the purpose of improving student learning and development" (p. 4). Not only is assessment a tool for measuring student outcomes, but it also has the potential to influence the extent to which students achieve these outcomes.

In recent decades, assessment activities have become widespread on college and university campuses. However, despite the importance of assessment in the current higher education landscape, the topic has historically been underrepresented in the scholarly literature (Peterson & Einarson, 2000). Though institutions devote significant resources to assessment practices, these efforts are generally directed toward administrative rather than research purposes. Angelo (1999) argued that after two decades of effort devoted to assessment, there was little rigorous evidence of learning improvement. More than a decade later, the relationship between assessment and its impact on student learning remains largely unanswered and the failure to understand this relationship is demonstrated by significant gaps in the research.

Historically, this is a topic on which there has been little empirical research. During the late 1990s through the early 2000s, Marvin Peterson and colleagues conducted a thorough study of institutional support for assessment, producing both scholarly research and practitioner-oriented reports on many facets of assessment at the institution level. They found the research examining the influence of institutional assessment on student achievement to be scant. Of the few existing works that addressed the topic, only a fraction was published in peer-reviewed journals. As recently as 2006, Reason, Terenzini, and Domingo (2006) wrote, "Although we know of no studies of links between institutional assessment and student learning or persistence,

logic suggests they might exist" (p. 152). In *Assessment in Practice: Putting Principles to Work on College Campuses*, a book of practical accounts of the uses and impacts of assessment, Banta (1996) concludes that the most noticeable impacts of institutional assessment efforts are unrelated to the students and that "the number of these cases containing concrete evidence that student performance has improved as a result of assessment is very small" (p. 343). A vast body of descriptive and prescriptive literature on assessment has emerged over the last 30 years (Peterson & Einarson, 2000). Now that institutional leaders have put in the effort to design, implement, and coordinate assessment on campus, what did they actually *do*? How do these efforts shape student learning outcomes?

Portfolios as tools for student learning. Portfolios are a form of authentic assessment used to summarize student ability and track student progress. Traditional paper-based portfolios have long existed in higher education. For decades they have been used to collect student work and demonstrate evidence of student progress, particularly for students in the arts and design disciplines. However, portfolios are not merely a showcase of student work; rather, they aim to contribute to student learning by asking students to reflect on and make judgments about their own work. The use of portfolios as a reflective tool has its roots in writing assessment, where such assessments could account for writing in multiple contexts and for the development of writing ability over time. The notion that the development of a portfolio can contribute to student learning has shifted the emphasis of portfolios, from using them solely as assessment tools to using them primarily as tasks that promote learning (Cambridge, 2010).

Technological advances have facilitated the development of portfolios as flexible, interactive learning tools. Electronic portfolios (ePortfolios) are "electronically stored collections that provide a chronological account of student's learning through the range of work

they produce in traditional or online environments to demonstrate progress toward or

achievement of one or more learning outcome statements" (Maki, 2010, p. 170). While these

assessment tools can be focused on hard skills (e.g., writing and communication), ePortfolios can

also facilitate the development of more abstract outcomes (e.g., integrative learning and

psychosocial development). Regarding the latter set of outcomes, ePortfolios are recognized as

being an effective tool for helping students reflect upon and connect their disparate experiences

so that they can create meaning from their learning (Barrett, 2007; Cambridge, 2008; Clark &

Eynon, 2009).

Student Outcomes

Assessment activities conceivably could influence any number of student outcomes. An

"outcome" refers to an education-related consequence of a student's postsecondary educational

experience (Terenzini, 1996). Like "assessment," there is no single commonly accepted

definition of "student outcomes." How "student outcome" is defined is dependent upon context

(National Center for Education Statistics, 1997). For example, the intended outcomes of students

vary greatly both between institutions and within institutions. Colleges and universities have

unique learning goals and objectives for their students and, even within the institution, students

are expected to achieve different competencies based on their fields of study. While student

outcomes can encompass a broad set of goals and measures (e.g., degree attainment and

earnings), this research addresses a subset of outcomes focused on student learning. Palomba

and Banta (1999) group student learning outcomes into three categories: cognitive (thinking

skills), affective (attitudes and values), and skill (psychomotor skills and performance abilities).

Within each of these categories, there are popular taxonomies that can be used to understand the

development of students and their achievement of these outcomes (e.g., Bloom & Krathwohl,

1956; Chickering, 1969). Terenzini's (1989) taxonomy of assessment approaches (described in detail in the next chapter) adopts a typology put forth by Ewell (1984, 1987) that includes behavioral outcomes (in addition to cognitive, skill, and affective outcomes) that capture what students do, both as college students and beyond. Ewell (1987) explains that the behaviors of current and former students are often manifestations of the knowledge, skills, and values they have developed throughout their college experiences. An example of a behavioral outcome is civic engagement, which could comprise such behaviors as voting and volunteer participation.

  Integrative learning. The outcome that is central to this study, integrative learning, has elements that cut across the multiple classifications of student outcomes: cognitive, skill, affective, and behavioral. Being a relatively new concept, integrative learning may be difficult to understand as its definition has yet to be widely agreed upon and its conceptual basis is still developing. The American Association of Colleges and Universities (AAC&U) has been the principal champion of integrative learning. As a part of its decade-long Liberal Education and America's Promise (LEAP) initiative, AAC&U declared integrative learning to be one of four essential learning outcomes of a college education (the others being 1) knowledge of human cultures and the physical and natural world, 2) intellectual and practical skills, and 3) personal and social responsibility). AAC&U proposed that these essential learning outcomes act as a new framework to guide students' cumulative progress throughout their entire education, from their early schooling through college and beyond to graduate or professional study (AAC&U, 2008). The description of integrative learning provided by Huber & Hutchings (2004) in a report commissioned by AAC&U and the Carnegie Foundation has been instrumental in guiding the discussion of integrative learning in postsecondary education:

One of the great challenges in higher education is to foster students' abilities to

integrate their learning across contexts and over time. [...] The capacity to connect

is central...whether focused on discovery and creativity, integrating and

interpreting knowledge from disciplines, applying knowledge through real-world

engagements, [integrative learning] builds intentional learners...and the habits of

mind that prepare students to make informed judgments in the conduct of

personal, professional, and civic life...[leading to] personal liberation and social

empowerment. (p. 1; as interpreted and organized by Taylor, 2011)

Building upon this (and restating from earlier in this chapter), AAC&U (2008) formally

defines integrative learning as "an understanding and a disposition that a student builds

across the curriculum and co-curriculum, from making simple connections among ideas

and experiences to synthesizing and transferring learning to new, complex situations

within and beyond the campus" (p. 1). Though these definitions have been at the

forefront of our understanding of integrative learning, they merely provide a loose

framework for scholars and institutional leaders to define integrative learning locally.

In addition to the challenge of not having a widely accepted definition, integrative

learning relies on a variety of theoretical foundations and, being a multidimensional construct, is

based on multiple theories at once. The definitions offered by Huber and Hutchings (2004) and

AAC&U (2008) utilize an interpretive (or constructivist) paradigm, emphasizing action and

experiential learning (Dewey, 1938; Kolb, 1984) and reflective practice (Schön, 1983). In the

present study, the construct of integrative learning is based on three theoretical foundations: self-

authorship (Baxter Magolda, 1998, 2001; Kegan, 1994), reflective practice (Schön, 1983), and

transfer of learning (Greeno, Smith, & Moore, 1993; Perkins & Salomon, 1988). Students who

integrate learning according to this construct should be able to reflect on and synthesize their academic and co-curricular experiences so that they are better able to identify and articulate their knowledge, skills, and values and apply their knowledge, skills, and values in multiple settings.

ePortfolios in Action on the University of Michigan Campus

In 2006, the University of Michigan formalized its institutional effort around ePortfolios with the MPortfolio project. A joint effort of the Division of Student Affairs and the Office of the Provost, MPortfolio was established with the aim of creating a model of pedagogy and technology that helps students recognize and articulate what they have learned during their time at the University of Michigan. This effort came as a result of research conducted with student leaders that demonstrated that, though most of these students reported having "extraordinary" learning experiences at UM, they were largely unable to describe what they had learned, why or how it was valuable to them, or how they might apply their knowledge and skills they had acquired at UM once they left the university (Pathways Report, 2006).

Portfolio work has long existed at the University of Michigan within a diverse set of academic units, each with its own unique set of learning outcomes. Some units use portfolios as tools for assessing hard skills, while others employ portfolios that are professionally focused. For example, the Sweetland Writing Center requires students in the Writing 220 course to complete ePortfolios that encourage students to reflect on their work so that they improve their writing skills. Professional portfolios, such as the ones that the School of Education uses for its aspiring teachers, act as a showcase of student work that they can use to demonstrate their skills, abilities, and experiences to potential employers. A third type of ePortfolio, the integrative learning portfolio, compels students to reflect on their disparate experiences (e.g., coursework, co-curricular activities, key personal events) so that they gain a greater understanding of their

knowledge, skills, and values and can articulate a personal philosophy statement. Some academic units incorporate a hybrid model in their portfolio work. For example, the School of Information utilizes an integrative learning portfolio as part of its professionally-oriented Practical Engagement Program (PEP), which enrolls master's students participating in credit-based internships. Students in the School of Dentistry must create an ePortfolio that requires students to reflect and draw connections between their coursework and real world experiences as well as monitor the competencies that they are expected to develop through the programs. The common thread that runs throughout each of these types of portfolio work is that it encourages students to grow through reflection.

It is important to emphasize that MPortfolio is a *process*, through which students reflect upon their experiences so that they have a greater understanding of themselves. The ePortfolio does not stand on its own in this process; there are additional components in this process that are completely necessary. While the ePortfolio tool is a core component of the process, MPortfolio also relies on a curriculum and pedagogy that guide students through reflective activities. In order to generalize beyond MPortfolio to similar efforts at other institutions, I refer to this process as the reflective ePortfolio process. The research presented in this dissertation explores the impact of the reflective ePortfolio process on student achievement.

The Division of Student Affairs (DSA) at the University of Michigan has embraced integrative learning as a desired outcome for undergraduate students at the institution. By developing integrative learning in students, DSA expects that students will be able to make meaningful connections of their experiences, synthesize their learning, and gain a greater understanding of how their skills and knowledge can help them achieve their academic, professional, and personal goals. As a champion of integrative learning on campus, DSA has

been instrumental in promoting integrative learning as "a process for synthesizing learning across multiple experiences, coalescing meaning, and also creating new learning and meaning" (Taylor, 2011, p. 14).

The research presented in this dissertation explores the impact of the reflective ePortfolio process on student achievement. A secondary objective is program evaluation. Though the MPortfolio process has a clearly defined curriculum and pedagogy and the University of Michigan has utilized ePortfolio as an assessment tool for more than a decade, it is hardly a mature program without flaws. This program was introduced only a few years ago and those involved continue to search for ways to understand MPortfolio and improve the program. This study is guided, in part, by the issues facing MPortfolio; a goal of this research is to inform educators involved with MPortfolio and similar reflective experiences as they make decisions about the use of ePortfolios in their work. It is my hope that this research can identify the characteristics of programs that effectively foster integrative learning and the traits of students who might benefit most from the reflective ePortfolio process so that educators have a stronger sense of how they can best structure programs aimed at facilitating integrative learning.

Research Questions

The use of ePortfolios as an assessment tool by colleges and universities has grown substantially. According to the most recent Campus Computing Survey by the Campus Computing Project, the percentage of campuses utilizing ePortfolios has grown from approximately 20% in 2003 to about 50% in 2010 (Green, 2010). As ePortfolios have grown more prevalent, a descriptive body of literature has emerged. This literature tends to describe the rationale for the use of ePortfolios, the ways in which they can be used, the structural aspects of ePortfolios, and their technical aspects. Though there is some evidence of the contributions of

ePortfolios to the achievement of student outcomes, there is a need for additional research

explaining whether this type of tool is associated with the enhancement of student learning. This

study aims to build upon existing research related to ePortfolios and fill in gaps in the body of

empirical research on the relationship between ePortfolios and student achievement.

Specifically, the overarching question addressed in this paper is: *Do ePortfolios foster*

integrative learning? This inquiry will be guided by the following sub-questions:

- Over the course of the reflective ePortfolio process, how does integrative learning change in students?
- What is the causal impact of ePortfolio use on integrative learning?
- What student characteristics contribute to variation in integrative learning through the use of ePortfolios?
- What learning process characteristics contribute to variation in integrative learning through the use of ePortfolios?
- Does the development that students experience persist beyond their initial experiences using ePortfolios?

This study builds on the work done by Peet et al. (2011), who initiated the research on the

relationship between ePortfolio engagement and integrative learning at the University of

Michigan. The present research is an extension of the initial study as it includes new data and

answers a broader range of questions.

As noted above, there is demand in the higher education literature for research on the

influence of assessment practices and policies on student achievement. It is my hope that this

study will diminish the existing gap and improve our understanding of how assessment,

specifically the ePortfolio, contributes to student learning. This research will provide useful

information about the settings in which ePortfolios are particularly successful and the types of

students who benefit from engaging in ePortfolios. The study will also illuminate whether the

learning that students experience persists beyond the initial experience. Finally, since there are

no known studies that test the causal impact of ePortfolios on student learning (and very few that explore the causal relationship between any assessment methods and student achievement), this research study will provide a unique contribution to the scholarly literature in that it will demonstrate whether there is a causal relationship between ePortfolio use and student achievement.

Organization of Dissertation

Since this research is as much about the impact of ePortfolios on student achievement as it is about integrative learning, this dissertation has a structure that includes two literature review chapters. In Chapter 2 of this study, I review the literature on how assessment practices, including ePortfolios, can contribute to student achievement. In addition to a critical review of empirical studies on the relationship between assessment and student achievement, this chapter includes a summary of two theories that can help explain the relationship between engagement in the reflective ePortfolio process and integrative learning. In Chapter 3, I describe the theoretical foundations that comprise the integrative learning construct employed in this study and review empirical research related to integrative learning and these theoretical foundations. In Chapter 4, I describe the methodology and research design that I use in this study. In Chapter 5, I describe the results of my analysis, determining whether there is a causal relationship between ePortfolio engagement and integrative learning as well as exploring the characteristics of individuals and experiences that contribute to variation in integrative learning. Finally, in Chapter 6, I discuss the results and implications of the study and offer suggestions for future research.

Chapter 2: Review of Assessment Literature

In this chapter, I review the literature that will inform my exploration of the relationship between ePortfolio engagement and integrative learning. Due to the limited body of scholarly research that has addressed this topic thus far, this literature review includes a broader set of studies exploring how similar assessment practices—those that are formative and focused on the individual student—can contribute to student achievement. To guide this review, I first define assessment and explain why having agreement about a clear definition of assessment is important to achieving institutional assessment goals. Second, I provide a brief overview of the assessment context. Third, I review Terenzini's (1989) Taxonomy of Assessment Approaches, a helpful system for organizing around assessment at the institution level. Fourth, I review the literature on how ePortfolios and similar assessment approaches can contribute to student achievement. I conclude the chapter with a review of two theories that are useful for explaining the relationship between ePortfolio engagement and integrative learning, Astin's (1970a, 1970b, 1977, 1993) I-E-O Model and Kolb's (1984) Experiential Learning Theory.

Assessment Defined

Since assessment encompasses a broad set of activities, one of the great challenges of approaching issues of assessment in postsecondary education is that "assessment" means different things to different people. To some people, assessment refers to classroom assessment, the in-class exercises (e.g., tests and papers) that indicate whether students have learned course material. To others, assessment refers to indirect measures, such as surveys of students or alumni, that inform program evaluation and planning efforts. In recent years, assessment has

become more frequently associated with standardized direct measures of student achievement, tests that demonstrate the extent to which students develop the types of skills and knowledge undergraduate students are typically expected to develop through a college education (e.g., critical thinking). The widely accepted definitions tend to indicate that student outcomes assessment is a process that is goal driven, empirically based, and improvement oriented (Volkwein, 2010).

From an institutional perspective, it is important that there is agreement about the definition of assessment as colleges and universities develop assessment plans. Terenzini (1989) stresses that the lack of clarity about what exactly assessment means represents a significant threat to the success of an institution's assessment efforts. Institutions should clearly define the goals of their assessment efforts and determine the outcomes to be measured and the methods to be used. According to Peterson and Einarson (2001), "an effective student assessment approach gathers information about selected aspects of students' characteristics, experiences, and achievements and uses this information to shape institutional policies, processes, and practices in ways that lead to improved student performance and institutional functioning" (p. 219). This definition recognizes that assessment entails a comprehensive collection of student information and proposes that assessment should support the dual goals of improved student outcomes and institutional effectiveness. Although improved institutional effectiveness is a valuable outcome of assessment efforts, the form of assessment that is examined in this study is a more narrowly tailored process that is aimed purely at student learning. As a result, the definition of assessment put forth by Palomba and Banta (1999, p. 4) (adapted from Marchese, 1987) and presented in the previous chapter ("the systematic collection, review, and use of information about educational programs undertaken for the purpose of improving student learning and development") is more

appropriate to guide this research. Taking into account the broad set of assessment activities in which institutions engage, this definition suggests that the ultimate goal of assessment efforts is to improve student outcomes.

The Assessment Context

Compared to only thirty years ago, the role of assessment in higher education has evolved dramatically. As a formative activity, assessment has long supported institutional efforts to promote excellence by improving teaching and learning (Ewell, 1991). These efforts have large-scale implications on the desired outcomes of students, which, depending on the institution, include but are not limited to educating knowledgeable graduates, training skilled workers, and producing civically-engaged citizens.

Where the radical change has occurred is related to assessment as a summative activity. Beginning with the release of a series of national reports on the quality of undergraduate education during the 1980s, assessment in higher education has been inextricably linked to accountability (Association of American Colleges, 1985; Ewell, 1991; Ewell, 2002; Ewell 2008; National Governors Association, 1986; National Institute of Education, 1984; U.S. Department of Education, 1983). Over time, this relationship has grown increasingly complex; not only have demands for accountability come from a set of stakeholders, but there has also been a paradigm shift from a focus on instruction to a focus on learning (Barr & Tagg, 1995). Where accrediting associations had previously been satisfied to measure institutional quality based on inputs and resources, these organizations revised their standards to gauge institutional quality based on outcomes and processes (Wergin, 2005; Wright, 2002).

Over the same period, both state governments and the federal government called for colleges and universities to demonstrate that money invested in higher education has been well

spent. At the state level, some states adopted performance-based appropriations, tying funding for higher education to institutional performance (Aper & Hinkle, 1991; Banta, Rudolph, Van Dyke, & Fisher, 1996; Boyer, Ewell, Finney, & Mingle, 1987). At the federal level, former Secretary of Education Margaret Spellings' Commission on Future of Higher Education emphasized the relationship between assessment and accountability by pressing for institutions to produce evidence of student outcomes (U.S. Department of Education, 2006). This emphasis has only grown under the Obama administration, with the introduction of a plan to rate colleges and with federal pressure on regional accrediting bodies to ensure that institutions meet performance standards. Colleges and universities must meet the demands of these external stakeholders or they run the risk of losing accreditation or funding as well as standing in the court of public opinion. As institutions strive to improve teaching and learning on their campuses and to appeal to the increasing demands of external stakeholders, assessment has become a vital activity for colleges and universities.

Organization of Assessment Approaches

Effective assessment is intimately linked to an institution's mission and learning goals (Palomba & Banta, 1999). Accordingly, there is no one-size-fits-all solution and there is a broad range of assessment strategies that institutions can adopt. To account for the variety of assessment strategies, Terenzini's (1989) Taxonomy of Assessment Approaches, visualized in Figure 2.1, organizes assessment practices across three dimensions, each addressing a question about the assessment (Why? Who? What?). The first dimension identifies the purpose of the assessment, which is two-fold: on the one hand, assessment exists for internal improvement of teaching and learning; on the other hand, it exists as a means of being accountable to external stakeholders. This dimension answers the question, "*Why* is the assessment program being

designed?" The second dimension of the taxonomy answers the question, "*Who* is to be

assessed?" It indicates the level at which assessment occurs, the individual student level or the

group level. Where the former might be more useful for instructional purposes, aggregating

individual results to the group level might be more helpful in guiding program reviews. The

third dimension of Terenzini's taxonomy identifies the outcomes to be measured ("*What* is to be

assessed?"). Colleges and universities should carefully choose intended outcomes that align

specifically with their institutional missions (Banta, Lund, Black, & Oblander, 1996).

Mentioned briefly in the introduction, Terenzini's taxonomy of assessment approaches adopts a

typology put forth by Ewell (1984, 1987) with four classifications of student outcomes: (1)

knowledge, (2) skills, (3) attitudes and values, and (4) behaviors.
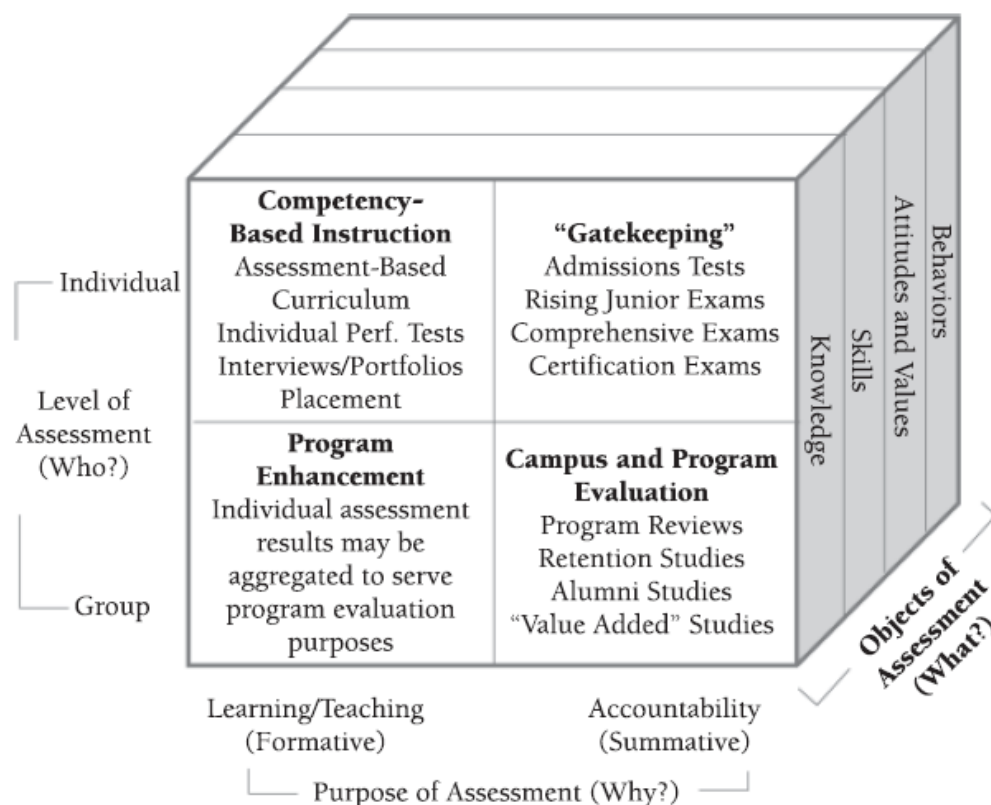
Figure 2.1: Taxonomy of Assessment Approaches (Terenzini, 1989)

The interactions between the first two dimensions form four categories of assessment approaches that guide the organization of this critical literature review: Competency-Based Instruction (Internal/Individual), Program Enhancement (Internal/Group), Gatekeeping (External/Individual), and Campus and Program Evaluation (External/Group). Some would argue that **competency-based instruction** is the purest form of assessment as it focuses on individual students and its primary purpose is to improve learning and teaching. With its student focus and formative goals, the integrative learning ePortfolios that are the subject of this research clearly fit into this category of assessment. As a result, the literature reviewed in this chapter includes research also categorized as competency-based instruction. Terenzini cites the authentic assessment methods practiced at places like Alverno College and King's College as examples of competency-based instruction. In addition to authentic assessment approaches, such as portfolios and performance tasks, examples of competency-based instruction methods include written assignments or exercises that encourage students to reflect upon their development as well as placement exams and other diagnostic tests that can help determine a student's readiness and the appropriate learning sequence. Since this type of assessment approach has the learning of individual students at its core, it is not surprising that the vast majority of research on the relationship between assessment and student achievement explores the influence of competency-based instruction methods.

The **program enhancement** approach is also formative but features individual results aggregated to the group level. Some assessment techniques, such as portfolios and music performances, are essentially impossible to aggregate for judgments related to institutional effectiveness. However, other methods, such as course evaluations and student survey results, can be summarized at the group level to inform efforts to improve programs. Though common

sense says that institutions regularly approach assessment as a means of using data to improve

academic programs and student achievement, little evidence exists in the scholarly literature. I

identified only one empirical study that provided evidence that assessment practices for program

enhancement had any impact on achievement of student outcomes. Smith, Szelest, and Downey

(2004) conducted a study that examined how a multi-method assessment plan was used for

continuous improvement of a university advising center. While the assessment is ongoing and

continuous, initial results revealed that the program improvements resulted in students having a

better understanding of the general education program and that they were achieving intended

learning outcomes.

The purpose of the **campus and program evaluation** approach is to determine the

quality or level of effectiveness of a program, department, school, or institution as a whole. The

data collected through this assessment approach frequently serves the purpose of accountability

to external stakeholders, although it can also be useful for program enhancement and improving

teaching and learning. Thus, there can be considerable overlap between program enhancement

approaches and campus and program evaluation approaches, depending on whether the

assessment serves both formative and summative purposes. Assessment activities that fall within

the campus and program evaluation approach include program reviews, surveys of alumni or

employers, standardized direct measures of student achievement (e.g., the Collegiate Learning

Assessment), and retention studies. For all of the attention that has been given to standardized

value added assessment as a means of satisfying demands for accountability and measuring

student achievement, few studies have addressed whether these initiatives have influenced

student learning and other student outcomes. Banta, Rudolph, Van Dyke, and Fisher (1996), in

their analysis of assessment and performance-based funding in Tennessee, found that evidence of

improvements in student achievement was scant, as students did not demonstrate gains in standardized test performance or scores on licensure exams measuring general and major-specific skills, respectively. Volkwein, Lattuca, Harper, and Domingo (2007), on the other hand, reported significant improvements in nine separate engineering learning outcomes from prior to changes in Accrediting Board of Engineering and Technology (ABET) standards on accountability to after the changes. While these gains are encouraging, it is unclear whether the gains should be attributed to assessment practices and policies rather than concurrent changes.

The fourth category is the **gatekeeping** assessment approach, which serves the purpose of evaluating the abilities of individual students and determining whether they are qualified or not to move beyond their current stage of education. This approach includes assessment activities that control advancement through multiple levels of postsecondary education. Admissions tests, such as the ACT and SAT, act as gatekeepers for entry into postsecondary education, while the rising junior tests that have been adopted in some states determine whether students can advance to the upper level of undergraduate education. For example, each student pursuing an associate's degree or a bachelor's degree at public college or university in South Dakota is required to complete ACT's Collegiate Assessment of Academic Proficiency (CAAP) and perform satisfactorily before he or she can advance from his or her sophomore year to junior year. Similarly, some institutions use a general education or major-oriented comprehensive exam as an assessment tool before students can graduate. In professional fields, this often takes the form of a licensure or certification exam. Though many states have instituted gatekeeping as an assessment approach for accountability purposes (Boyer et al., 1987), the influence of these approaches on the achievement of student outcomes has not been explored in the scholarly literature.

In the development of institutional assessment plans, the use of Terenzini's taxonomy of assessment approaches provides clarity to colleges and universities that should eliminate confusion about the role of assessment on campus and, in turn, bear more useful returns to assessment efforts. For the purpose of this literature review, this taxonomy serves as an organizational tool to account for the vast array of assessment activities that take place on college and university campuses. Though there is some overlap in the uses and methods employed, it effectively compartmentalizes these activities so that the literature can be analyzed in a manageable way.

Review of Research on the Relationship between Competency-Based Instruction Assessment Approaches and Student Achievement

The bulk of the research exploring the influence of assessment on student achievement fits into the category of competency-based instruction. Due to this approach's focus on the individual student for formative purposes, it is not surprising that studies on competency-based instruction produce the most evidence of assessment's influence on student outcomes. Since it is most applicable to the current research, I begin this section with a review of the literature on portfolios, before examining the literature on similar competency-based instruction assessment approaches. These other approaches fall into the following categories: capstone courses, placement tests, problem-based learning, and integrated assessment approaches.

Portfolios. Peet et al. (2011) produced the research that acts as a foundation for the present study. This study explores the relationship between the use of ePortfolios and the development of integrative learning at the University of Michigan. Using a pre-survey/post-survey design, the researchers had students self-report their integrative learning ability by indicating their level of agreement with 37 statements in 12 categories. Factor analysis was used

to categorize these 37 items into 6 dimensions of integrative learning. On average, students demonstrated significant gains across all six factors from the pre-survey to the post-survey. These gains were consistent across all groups of students as there were no significant differences based on class year, gender, race/ethnicity, and survey year. Where there was a difference that was both statistically and practically significant was that gains were pronounced among students who participated in more than one MPortfolio course or program. Additionally, there were differences based on academic field. Students in the natural sciences experienced the greatest gains in demonstrating knowledge gained within and across specific contexts, recognizing and adapting to differences, understanding and directing oneself as a learner, and identifying and discerning their own and others' ethics and perspectives. Humanities students, on the other hand, gained the most in becoming reflexive, accountable, and relational learners.

The consistent and broad gains provide compelling evidence that ePortfolios contribute to the development of integrative learning. The authors recognized that the study was merely "the first step within a much larger research effort that is focused on developing theory, identifying best practices, and creating effective assessment instruments for fostering integrative knowledge and lifelong learning across a wide range schools, disciplines and institutions" (p. 21). With that in mind, there were some clear limitations to the study. Notably, the number of students in the population (N = 620) did not provide enough statistical power to support a robust statistical analysis. The authors utilized an analysis of variance approach that featured, at most, a single set of control variables at a time. Additionally, this research does not include a comparative analysis of students who did not engage in the electronic portfolio experience. Further, the study does not use an experimental or quasi-experimental design that would allow the researchers to establish a causal relationship between the use of portfolios and integrative learning. This research also

relies on student self-reported data rather than direct measures of student achievement. Finally, the study provides limited information about the mechanisms of ePortfolio that contribute to gains integrative learning. The authors suggest building on the initial study with qualitative research to develop an understanding of these mechanisms.

Several other studies have explored the impacts of the use of ePortfolios on student outcomes in postsecondary education, though these studies have been especially lacking in academic rigor. Desmet, Church Miller, Griffin, Balthazor, and Cummings (2008) conducted the most rigorous of these studies and found that, when used to support writing instruction, the use of ePortfolios was correlated with an overall mean increase in the quality of essays, though about a quarter of the students saw declines in quality of their essays. In a similar study focused on secondary students transitioning into higher education, Acker and Halasek (2008) found that student writing improved between the initial draft and the final essay, but they attributed student gains to the quantity and quality of feedback rather than the ePortfolio technology itself. They proposed that it was a useful tool for structuring the learning environment and facilitating the feedback and rewriting processes. Neither of these studies used a control group. There were two other studies that tied student achievement to the use of ePortfolios, but these studies were more descriptive in nature. Crawford (2003) reported that, based on early anecdotal results of ePortfolio implementation at Hocking College in Ohio, the use of portfolios is positively associated with gains in communication skills. Cambridge (2008), in a descriptive article on the use of ePortfolios at George Mason University, indicated that portfolio assessment has been useful in helping students achieve the nine core competencies expected of students in the institution's New Century College, though the article did not report to what extent and in what ways portfolios influenced student achievement.

Capstone experiences. In "Capstone Experiences: Are We Doing Assessment Without Realizing It?", Shaeiwitz (1996) shares an anecdote in which faculty at West Virginia University were pleasantly surprised to learn that they were already engaged in assessment through senior capstone experiences. Though capstone experiences may not intuitively seem like an assessment technique because they often exist in the form of courses or research papers, these experiences have come to be accepted as a form of assessment as they serve as culminating experiences that allow students to demonstrate what they have learned in both their major and general education experiences (Palomba, 2002). There was little empirical evidence tying capstone experiences to positive or negative changes in student outcomes, though students report that their capstone experiences enhanced a variety of outcomes. Students at Portland State University (1999) described how their capstone course helped them develop group and professional skills as well as their appreciation for diversity. At Millikin University in Illinois, senior students identified the University Capstone course as having developed their written and oral communication proficiencies, interpersonal skills, and ethical reasoning and values to a greater degree than their concurrent major course (Brooks, Benton-Kupper, & Slayton, 2004). They did not indicate that critical thinking skills were enhanced through the capstone course as well as the concurrent major course.

Placement tests. Two studies examined the benefits of placement tests as assessment tools, noting that these tests positively influenced the retention outcomes of students. Parker (2005) found that placement exams served as an indicator of likelihood of retention but failed to serve as a strong measure of skills acquisition. Jacobson (2006) found that the use of a placement exam increased course success rates, retention, and enrollment rates in math courses, but reduced completion rates in math courses required for a degree. The puzzling finding that

higher success, higher retention, and higher reenrollment resulted in lower completions of the math course sequence was attributed to students being more likely to start farther back in the course sequence at the lower level. Though students were successful and moved faster through the curriculum, they had farther to go in the course sequence and it did not appear that they would catch up.

Problem-based learning. Pioneered at the McMaster University medical school in Canada in the late 1960s, problem-based learning (PBL) is an authentic assessment approach that is used widely in medical education but relatively sparsely in undergraduate education. To put it as simply as possible, PBL is an instructional approach that uses problems as a context in which students can develop both basic knowledge and problem-solving skills (Banta, Black, & Kline, 2001). Complex and ambiguous, PBL features "a general teaching philosophy, learning objectives and goals, and faculty attitudes and values, all of which are difficult to regulate and are often not very well defined in research reports" (Vernon & Blake, 1993, p. 560). In medical education, multiple meta-analyses of the literature (Albanese & Mitchell, 1993; Dochy, Segers, Van den Bossche, & Gijbels, 2003; Gijbels, Dochy, Van den Bossche, & Segers, 2005; Vernon & Blake, 1993) establish the benefits of PBL, noting stronger skills-related outcomes, such as clinical performance and judgments about patients, in PBL students as well as marginally higher levels of clinical knowledge. PBL students were also found to be more satisfied and intellectually curious than their non-PBL peers. Regarding assessment, according to Barrows (1996), it is essential to PBL that students learn by analyzing and solving real-world problems. There were few studies on the influence of PBL on undergraduate student outcomes and these studies provide mixed results in support of the benefits of PBL as an assessment approach. Two studies examined the outcomes of Samford University's Problem-Based Learning Initiative. Eck

(2002) described how researchers at the university used multiple longitudinal measures to identify differences based on PBL students and non-PBL students. Students in PBL courses had higher self-reported skills gains, but using direct measures they found no significant differences in critical thinking and attitudes at the completion of the program. Eck notes that, despite the lack of conclusive support for the benefits of PBL, assessment data were used for program improvement purposes and he expected to see improvements in student outcomes as the institution refines its use of PBL. In the second study reporting the outcomes of Samford's Problem-Based Learning Initiative, Willis (2002) found that cumulative grades were marginally higher for students taking a PBL course compared to students in the traditional lecture course. PBL students reported that they increased several skills, most notably working effectively on a team. However, not only was this based on self-reported gains, only the perceptions of students in the PBL course were reported and there was no comparative data from those in the traditional lecture course. White, Pinnegar, and Esplin (2010) analyzed reflective papers written by more than 300 students enrolled in PBL courses. They found that the students who learned the most tended to be more compliant and engaged. However, results from students who did not thrive indicated that, despite the growing popularity of PBL, first-year students tend to struggle with the ambiguity and complexity characteristic of PBL courses.

Integrated assessment approaches. Evidence of assessment influencing student outcomes frequently appeared in studies on experiences that integrate assessment approaches deeply within the curriculum. I define integrated assessment approaches as learner-focused educational experiences, such as active and collaborative learning, that have assessment (usually some form of authentic assessment) embedded in the curriculum. By engaging students and having them reflect on their learning, these approaches aim to provide a deeper, more complete

learning experience for students. The review of the literature related to these approaches also yielded several studies on the impact of learning communities on student outcomes (Beachboard, Beachboard, Li, & Adkison, 2011; Rocconi, 2011; Zhao & Kuh, 2004). Though these studies shared similarities in purpose, focus on student outcomes, and structural aspects, the identified studies on learning communities did not examine the use of specific assessment approaches and are consequently not included in the body of literature reviewed below. Specifically, the authors of these studies used national survey data (i.e., College Student Experiences Questionnaire and National Survey of Student Engagement) to determine whether engagement in learning communities was associated with the achievement of self-reported student outcomes, such as personal and social development, practical competence, and overall satisfaction with the undergraduate experience. However, these studies do not explore which specific aspects of learning community engagement are associated with student achievement.

Active and collaborative learning. Several studies established the positive influence of active and collaborative learning on a broad range of student outcomes (Braxton, Milem, & Sullivan, 2000; Kuh, Pace, & Vesper, 1997; Lambert, Terenzini, & Lattuca, 2007; Lo, 2010; Mayhew, Wolniak, & Pascarella, 2008; Mazer, Hunt, & Kuznekoff, 2007; Pike, Kuh, McCormick, Ethington, & Smart, 2011; Strauss & Terenzini, 2007; Umbach & Wawrzynski, 2005; Weissman & Boning, 2003). Active and collaborative learning strategies aim to engage students by intensely involving them in their education (Kuh, Kinzie, Schuh, Whitt, & Associates, 2003), encouraging them to generate rather than simply to receive knowledge. This practice provides students with opportunities to reflect on their learning experiences and apply what they have learned in a variety of settings. Assessment activities associated with active and

collaborative learning include oral presentations, reflective journaling or minute papers, and group projects.

A few studies employing national student surveys found that active and collaborative learning positively predicted multiple student outcomes. Pike, Kuh, McCormick, Ethington, and Smart (2011), using National Survey of Student Engagement (NSSE) data, found a significant positive relationship between active and collaborative learning and self-reported cognitive and non-cognitive outcomes for both first-year students and seniors. In another study using NSSE data, Umbach and Wawrzynski (2005) found that, on campuses where faculty engaged students by using active and collaborative learning, both first-year students and seniors reported greater gains in personal social development, general education knowledge, and practical competencies compared to students at colleges and universities that did not emphasize these practices. Kuh, Pace, and Vesper (1997) analyzed College Student Experiences Questionnaire (CSEQ) data and found that active learning was the predictor that was most strongly associated with self-reported gains in general education, personal-social development, and intellectual skills. Studies by Lo (2010) and Mayhew, Wolniak, and Pascarella (2008) noted a positive association between active learning and learning outcomes. The former found that students engaged by active learning practices were more likely to achieve greater student learning gains and higher levels of student satisfaction, while the latter study illustrated a positive relationship between active learning and life-long learning orientations.

There were also several studies that established that engagement in active learning positively influenced student skills sets. In their studies of engineering students, Strauss and Terenzini (2006) found that active and collaborative learning significantly and positively predicted design and analytical skills as well as group skills, while Lambert, Terenzini, and

Lattuca (2007) found that exposure to active and collaborative pedagogies had a positive, and the largest, effect on the level of students' group skills and a significant positive effect on analytical skills. In an experimental study in which students were randomly assigned to course sections with active learning strategies, Mazer, Hunt, and Kuznekoff (2007) found that students in the treatment group scored better overall on a critical thinking test at the end of the course.

Active and collaborative learning practices were also associated with outcomes associated with academic and social integration. Using Tinto's (1993) theory of student departure, Braxton, Milem, and Sullivan (2000) found that active learning is positively associated with retention, as students with exposure to active learning indicated that they were more likely to return. In another study, Weissman & Boning (2003) noted that there is a direct relationship between active learning and academic development and integration. Based on focus groups about experiences with inquiry courses for first-year and sophomore students, participants indicated that active and collaborative learning strategies enhanced a number of academic integration and development outcomes.

In *Student Success in College*, Kuh, Kinzie, Schuh, Whitt, and Associates (2010) explore a similar concept, which they refer to as DEEP (Documenting Effective Educational Practice). The authors describe institutions with educational practices that they have deemed to be especially effective based on NSSE results. The operative term in their work is used both as an acronym and a descriptor, referring to "deep learning." Deep learning refers to not only the assessment and pedagogical approach but also to the outcome of the experience. This concept is related to active and collaborative learning because active and collaborative learning is one of several approaches that are characteristic of deep learning (other approaches include level of academic challenge, student interactions with faculty members, enriching educational

experiences, and supportive campus environment) (Kuh et al., 2003). Nelson Laird, Shoup, Kuh, and Schwarz (2008) found that seniors who engage more frequently in deep learning activities report larger educational gains, higher grades, and greater levels of satisfaction with their undergraduate experience. The direction and magnitude of these findings were consistent across disciplinary categories. Mayhew, Seifert, Pascarella, Nelson Laird, and Blaich (2012) reported that overall deep learning and integrative learning significantly and positively predicted end-of-first-year moral reasoning scores.

Alverno College. Though it was not featured prominently in higher education journals, I would be remiss not to mention the contributions of Alverno College, a four-year women's liberal arts college in Milwaukee, as it is perhaps the best example of institution-wide authentic assessment. Cited in the aforementioned *Student Success in College* as a DEEP institution, Alverno uses an innovative authentic assessment model that is ability-based and student-focused, incorporating the use of performance assessment and self-assessment tasks to measure and track student achievement in a setting without grades but with narrative evaluations and external assessors. Each student is expected to develop the following eight skills as a part of her liberal arts and professional education: (1) communication, (2) analysis, (3) problem solving, (4) valuing in decision-making, (5) social interaction, (6) developing a global perspective, (7) effective citizenship, and (8) aesthetic responsiveness. Alverno is also notable because few, if any, institutions have been as transparent about their assessment methods and student outcomes as Alverno has. *Assessment at Alverno College*, first published by the Alverno College Faculty in 1979 and revised multiple times since, articulates the college's pedagogical philosophies and provides a detailed account of its practices. The book describes how faculty are recruited and trained and the ways in which they design assessments. The model Alverno uses stresses that

assessments should be developed with a clear focus on outcomes before constructing techniques for instruction or measurement. Additionally, the work includes students' reflections on their experiences with the Alverno authentic assessment model. Alverno actively promotes its model of authentic assessment through books (Alverno College Faculty, 1979, 1985, 1994; Earley, Mentkowski, & Shafer 1980; Mentkowski & Associates, 2000), articles, and the college's Institute for Educational Outreach, which trains educators from all levels on designing and refining an ability-based curriculum as well as theory and practice of performance-based assessment of student learning. Given the Alverno's willingness to spread its philosophy and share its outcomes, it is surprising how small a presence it has in the scholarly literature. The impact of Alverno, however, is well documented in non-scholarly sources. Since 1976, Alverno has engaged in ongoing self-studies of how their practices influence the outcomes of their students. Beginning with the lengthy "Careering after College" (Mentkowski & Doherty, 1983) research report in 1983, Alverno has shared their research in a number of research reports, including "Abilities That Last a Lifetime: Outcomes of the Alverno Experience" (Mentkowski & Doherty, 1984), "Paths to Integrity: Educating for Personal Growth and Professional Performance" (Mentkowski, 1988), and "Connecting Education, Work, and Citizenship: How Assessment Can Help" (Mentkowski & Rogers, 1993).

   In "Abilities that Last a Lifetime," which was published in the non-peer reviewed *AAHE Bulletin*, Mentkowski and Doherty (1984) detail the influence of Alverno's assessment practices on the outcomes of their students by reporting the results of a comprehensive longitudinal study conducted by the college. Using multiple types of data (institutional records, surveys, interviews) across multiple populations (two separate cohorts of students, alumnae, employers) researchers at the college found 12 outcomes of the Alverno experience: (1) students learn

complex abilities, (2) students become self-sustaining learners, (3) students identified curricular elements most important to their learning, (4) students came to value liberal learning, (5) students changed on measures of personal growth, (6) changes included broad generic abilities, (7) student learning styles changed dramatically, (8) students developed moral sophistication, (9) both older and younger students changed their ways of thinking, (10) alumnae and professionals stressed the importance of both intellectual and interpersonal abilities at work, (11) abilities function as an organizing principle for role performance and career satisfaction, and (12) alumnae experienced competence. Researchers at Alverno College have established the benefits of their authentic assessment model and have been champions of this model for the last three decades.

Critique of the Literature. Based on this review of the existing research on how assessment practices can influence student achievement, there are multiple opportunities to strengthen this body of research. Throughout this review of the literature on assessment, I have examined the influence of assessment practices on student outcomes. However, the use of the word "influence" is admittedly a poor choice, as it implies causality. A major limitation of the research is the lack of the use of experimental or quasi-experimental techniques needed to make causal inferences about the influence of institutional assessment on student achievement. The gold standard for establishing causality is a randomized control trial. Only one study (Mazer et al., 2007) employed this experimental design, randomly assigning students to a treatment group (active learning) or a control group (traditional lecture). None of the studies used quasi-experimental techniques, which would allow researchers to make causal inferences in a non-experimental setting. The techniques frequently used in the studies reviewed above (e.g., ordinary least squares regression, hierarchical linear modeling, path analysis, and mean

comparisons of groups not determined by random assignment) are susceptible to selection issues, as they do not control for omitted variable bias. As a result, one cannot conclude that there is not an unmeasured variable producing artificially high or low outcomes. For example, without random assignment or a quasi-experimental design, it is possible that greater gains in active learning settings cannot be attributed to the technique itself but rather to the possibility that students who are more ambitious and motivated are drawn to this type of assessment and pedagogical approach. In order to make conclusive claims about the effect of assessment on student achievement, it is critical to control for omitted variable bias in future research.

Another weakness of the research is the lack of insight it provides on the relationship between student achievement and the interactions between assessment and various student characteristics and institution-level variables. The body of research on institutional assessment and student achievement does not sufficiently identify whether the relationship differs based on demographic characteristics, such as gender and race, and other pre-college traits, such as high school preparation. Regarding institutional characteristics, Peterson and Einarson (2001) examined differences in impacts of assessment on student achievement based on institution type. According to the self-reports of chief academic officers, there were no significant differences based on institution type. None of the studies investigated the relationship of other institutional characteristics.

Though the lack of research on the influence of assessment on student achievement is not as discouraging as previous studies have indicated, there is still a dearth of research on the topic considering the interest in student assessment that has permeated higher education policy discussions in recent decades. Despite this potential contribution, there remains an acute imbalance in the number of research studies on the topic that focus on assessment for the primary

purpose of improvement versus those that focus assessment for the primary purpose of accountability. The vast majority of studies identified in this literature review demonstrate that there are student-focused, formative assessment practices that have a positive influence on student achievement. However, there is little evidence that other assessment approaches benefit students as well. Even if assessment is driven by the need to be accountable to external stakeholders, the ultimate goal of assessment is arguably to improve educational programs and enhance student learning. The lack of studies that provide empirical evidence that the accountability movement has compelled colleges and university to conduct assessment and use that assessment information to improve the outcomes of students is troubling and indicative of a major void in the research on collegiate assessment.

Even the student-focused research that is reviewed above has a considerable limitation. Several of the studies reviewed that provide evidence that assessment practices influence student achievement are based upon the effects of integrated assessment approaches. An example of this is active and collaborative learning, which, while incorporating assessment practices, also incorporates pedagogical techniques. In the body of research on active and collaborative learning, exposure to these practices was frequently measured using factors and scales from student survey responses, which does not partial out the assessment effects from the pedagogical effects. Without this separation, it is impossible to determine whether the changes in student achievement can be attributed to the assessment or the pedagogy.

Another issue with the extant research on assessment and its influence on student achievement is that studies tend to rely on self-reported levels of achievement of student outcomes. Historically, self-reported gains have been used extensively in research in postsecondary education. However, recent research calls into question the validity of self-

reported measures. Porter (2011) analyzed the literature on this topic and concluded that students' self-reported measurements of their own experiences and the outcomes of their college experience fail to meet basic standards for validity and reliability. Other studies have reported mixed support for the validity of student self-reported measures. Anaya (1999) found that student-reported cognitive growth had modest relative validity, while studies conducted by Bowman (2010) and Gosen and Washbush (1999) indicate that self-reported gains had low correlations with direct measures of longitudinal change. Though this is a potential limitation of the existing research, self-reported measures have made essential contributions not only to higher education research but also to a much broader sphere of social science research. Pascarella (2001) and Pike (1995) urge institutions and researchers to exercise caution when using self-reported data and caution seems to be the most appropriate approach for carrying out the present study.

Conceptual & Theoretical Approaches

In her book *Building a Scholarship of Assessment*, Banta (2002) notes that it is still relatively rare for assessment practitioners to utilize a theoretical framework for their work. She hoped that her book would encourage academics and professionals to incorporate theories and conceptual models in guiding their institutional assessment strategies. A theory is "a set of interrelated constructs (concepts), definitions, and propositions that present a systematic view of phenomena by specifying relations among variables, with the purpose of explaining and predicting the phenomena" (Kerlinger, 1986, p. 9). Murnane and Willett (2010) explain that theory is important in guiding empirical research because it provides guidance about the questions to ask, the construct to measure, and the relationships among these constructs. According to Hausser (1980), a theoretical model "can effectively guide the entire assessment

process from planning through analysis" (p. 133). Though they are not one in the same, institutional assessment processes and empirical research share similarities in research design and, as the previous section illustrated, the lessons learned from assessment efforts have a place in the body of scholarly literature on student outcomes. Without the use of appropriate theories to guide assessment research, assessment practitioners and researchers are unable to understand the causal relationships that conceptual frameworks explain. The relationships described by theory do not exist in a metaphorical "black box;" theories are dynamic, flexible, and subject to empirical validation. Studies not grounded in theory, as a result, are inefficient not only because they are not intentional in choice of explanatory variables but also because they fail to test established theory or build new theories through divergent findings.

Though Banta (2002) found that assessment practitioners frequently approach their work without utilizing a theoretical framework, there is a vast collection of theories that can guide assessment efforts. In this section, I review two theories that I believe are especially applicable for understanding how ePortfolios, and the reflective ePortfolio process specifically, can contribute to integrative learning. First, I describe and critique Astin's (1970a, 1970b, 1977, 1993) input-environment-output (I-E-O) model, which is frequently used in higher education research to understand how institutional environments influence the outcomes of students. Second, I describe how Kolb's (1984) Experiential Learning Theory explains how the processes associated with a reflective ePortfolio process can contribute to student learning.

Astin's Input-Environment-Outcome Model. Banta (2002) conducted an informal poll of colleagues and found that, although most campuses did not employ a conceptual framework to guide their assessment efforts, those who did were likely to have implemented Astin's Input-Environment-Outcome (I-E-O) model. Based on organizational input-process-output (I-P-O)

models, the I-E-O model is a traditional systems model that identifies the system's inputs and outputs and the processes that the inputs go through in order to be transformed into the outputs. In the case of Astin's model, the inputs refer to student demographic characteristics, family background, and pre-college academic and social experiences. The environment includes the various programs, policies, cultures, faculty, peers, and experiences that students encounter while they are in college. Outcomes, as described in the introduction, encompass students' knowledge, skills, attitudes, values, and behaviors at the completion of their studies and beyond. According to the model (illustrated in Figure 2.2), inputs both shape outcomes directly and influence outcomes indirectly through the ways in which students engage with the campus environment. Astin's model takes a value-added approach, defining a student's change or growth during college as a comparison of his or her outcome characteristics with his or her input characteristics. Astin (1993) explains that "the basic purpose of the model is to assess the impact of various environmental experiences by determining whether students grow or change differently under varying environmental conditions" (p. 7). Studying the impact of a college education with the I-E-O model can help faculty, administrators, and policy makers identify the programs and policies that best serve students in their achievement of educational outcomes.
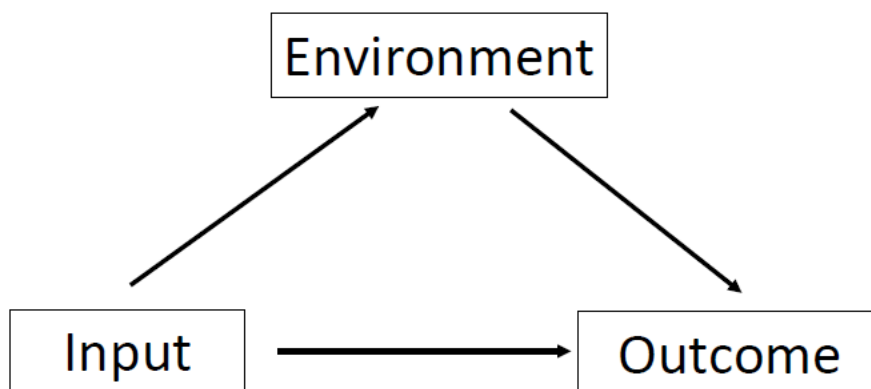
Figure 2.2: Input-Environment-Outcome (I-E-O) Model (Astin, 1970a, 1970b, 1977, 1993)

Though it is separate from his I-E-O model, Astin's (1984) theory of student involvement is an important extension of the research he generated in his explorations of the relationship between campus environments and college student outcomes. Astin's theory of student involvement is consistent with Pace's (1982) theory of involvement. However, where Pace's theory focuses on the quality of student effort, Astin utilizes a broader conceptualization of student involvement. Put simply, based on Astin's (1985) theory, "students learn by becoming involved" (p. 133). The origin of the theory is in Astin's (1975) own work on persistence in college, in which he found that each variable that significantly and positively explained student persistence was likely to increase student involvement and each variable that was significantly and negatively related to student persistence was likely to decrease student involvement (Astin, 1984). Astin's review of the literature produced similar results, as he found variables related to involvement (e.g., campus residency, fraternity/sorority membership, extracurricular participation, and on-campus employment) to be positively associated with a variety of intended student outcomes (e.g., retention, cognitive learning outcomes, and satisfaction). His involvement theory has five basic postulates: (1) involvement refers to the investment of physical and psychological energy in various objects, which can be generalized (e.g., the student experience) or specific (e.g., preparing for an exam); (2) involvement is continuous; different students manifest different degrees of involvement in a given object and the same student manifests different degrees of involvement at different times; (3) involvement has both quantitative (e.g., number of hours spent studying) and qualitative (e.g., the type of approach and quality of effort studying) features; (4) the amount of learning and development is directly proportional to the quality and quantity of student involvement; and (5) the effectiveness of any policy or practice is directly related to the capacity of that policy or practice to increase student

involvement. The final two postulates are of the most interest when designing assessment policies and practices that aim to engage students and enhance student outcomes. Astin stressed the importance of these two postulates, because they focus on the design of more effective educational programs, but acknowledged that they do not truly qualify as postulates because they require empirical verification.

Pascarella and Terenzini (2005) describe Astin's conception of college impact as occupying the middle ground between psychological and sociological explanations of student change. On the sociological side, the campus environment plays an important role in that it presents students with a wide variety of academic and social opportunities and engagement in these opportunities influences students' outcomes. According to Astin (1993), "*the student's peer group is the single most potent source of influence on growth and development during the undergraduate years*" (p. 398, italics in the original). However, though the influence of the environment is important, the onus is on the student to become involved and the extent of his or her involvement is a factor in the amount that he or she changes or grows through his or her college experience. Additionally, the construction of the I-E-O model accounts for the influence of the individual student on the environment. Consequently, student change or growth does not result solely from exposure to the college environment; rather, change and growth are functions of the quality of student effort or involvement with the environment.

Strengths and weaknesses of Astin's Input-Environment-Outcome (I-E-O) model. Astin's I-E-O model has been used as a conceptual framework in a multitude of studies on the impact of college on students. One of the main reasons it has been so widely used is that it is a parsimonious conception of college impact. Containing only three elements (inputs, environment, and outputs), it is easy to understand. For any given outcome, there are only two

possible sources contributing to that outcome: inputs (or student background characteristics) and the student experience with the campus environment. Such a simple model provides researchers with a considerable amount of flexibility, in that they are free to explore how different inputs and environmental variables influence a wide range of student outcomes.

The parsimony and flexibility of the I-E-O model can also be considered weaknesses of the model. Though it can be helpful that the model is flexible enough that it accommodates any number of variables that fall within these classifications, those who utilize the model must determine the appropriate input, environment, and outcome variables. Though Astin's I-E-O model has been the foundation of voluminous research, the model itself does not explain which input and environmental factors influence outcomes nor does it clarify how students achieve the outcomes they attain through a college education. Researchers looking for a model that explores the causal relationships leading to student outcomes would be better served by choosing a conceptual framework with greater specificity.

Similarly, though Astin's I-E-O model and theory of involvement are valuable and widely-used ways of understanding the impact of a college education on students, these concepts probably do not meet generally accepted definitions of theory (Pascarella & Terenzini, 2005). The model fails to provide:

> a detailed, systemic description of the behaviors or phenomena being predicted,
> the variables presumed to influence involvement, the mechanisms by which those
> variables relate to and influence one another, or the precise nature of the process
> by which growth or change occurs. (Pascarella & Terenzini, 2005, p. 54)

Rather than explaining the specific causal mechanisms that lead to students' achievement of a defined set of outcomes, Astin presents a general framework that simply states that college

outcomes are a function of a student's incoming characteristics and his or her experience with the campus environment.

Reflection and Kolb's Experiential Learning Theory. Astin's I-E-O model explains how an institutional environment, broadly, can influence student outcomes. Assessment is a feature of the institutional environment, though it is merely one of many aspects of the environment that students experience during their time at the college. The second theory that I present as a way to explain how assessment can influence student achievement is more directly focused on how ePortfolio assessment, and the MPortfolio process in particular, can contribute to integrative learning. To put it succinctly, MPortfolio is a process that encourages students to reflect upon their experiences so that they have a greater understanding of themselves. Though the ePortfolio tool is a key component of MPortfolio, the process relies at least as much on the curriculum and pedagogy that guide it. At the heart of all three of these components – pedagogy, curriculum, and the ePortfolio tool – is reflection. The curriculum consists of a series of exercises aimed at having students reflect upon their experiences so that they are able to identify their knowledge, skills, and values, understand how the experiences that have developed their knowledge, skills, and values are connected, and be able to apply what they have learned to new settings. The pedagogy, facilitated by faculty, staff, or peers, provides scaffolding and guides the reflective process. Recognized as a reflective tool, the ePortfolio technology allows students to organize and reflect upon their experiences and then highlight what they have learned through the process.

Nearly a century ago, John Dewey (1916) established a link between reflection and learning, positing that reflection is a critical part of the learning process. To paraphrase Dewey, we do not learn from experience; it is by reflecting on our experiences that we learn. Reflection

is an inductive learning process, through which individuals learn from their own experiences. The defining characteristic of inductive learning is that individuals construct theory through their own observations (e.g., case studies or problems) (Prince & Felder, 2006). One example of an inductive learning process from earlier in this chapter is problem-based learning, in which students learn by confronting authentic, real-world problems. The alternative approach is a deductive learning process, in which an instructor explains a theory and then offers supporting examples.

Dewey (1933) defines reflective thought as "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends" (p. 6). Rogers (2001), reviewing and synthesizing prominent conceptualizations of reflection, proposes that reflection is:

> a cognitive or affective process or activity that (1) requires active engagement on the part of the individual; (2) is triggered by an unusual or perplexing situation or experience; (3) involves examining one's responses, beliefs, and premises in light of the situation at hand; and (4) results in integration of the new understanding into one's experience. (p. 41)

Further, Rogers posits that the ultimate intent of reflection is to integrate the understanding one has gained from his or her experiences so that he or she can make better choices or actions and enhance his or her overall effectiveness.

Overview of theory. Kolb's (1984) Experiential Learning Theory is a useful way to conceptualize how the activities of a reflective ePortfolio process could facilitate student learning. Building off the work of Dewey, Kurt Lewin, and Jean Piaget, Kolb developed a cyclical four-component model that aims to explain how individuals learn from their

experiences. According to Experiential Learning Theory, learning is defined as "the process

whereby knowledge is created through the transformation of experience" (p. 38). Accordingly,

though Kolb's model can begin at any one of its four points, it is helpful to conceptualize its start

with the concrete experiences that individuals have at the start of the learning process. During

the second step of the model (reflective observation), individuals make observations about and

reflect upon these concrete experiences. In the third step (abstract conceptualization),

individuals learn from the experience by forming abstract concepts and generalizations. It is

during this step that individuals make connections, conscious or subconscious, between actions

and the effects of these actions. In the fourth step (active experimentation), individuals apply

what they have learned by testing the implications of these concepts in new situations. The cycle

returns to the first stage as individuals have new experiences in which they have applied what

they have learned through the process. Figure 2.3 illustrates this cycle.
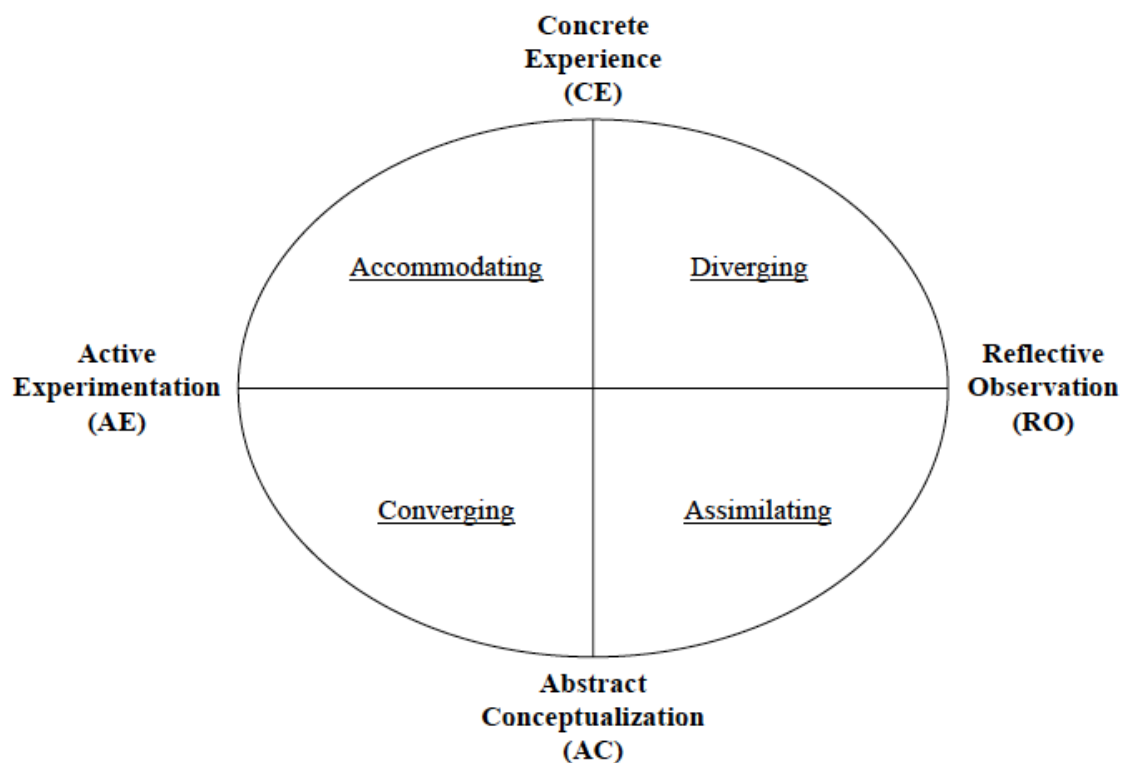
Figure 2.3: The Experiential Learning Cycle and Basic Learning Styles (Kolb, 1984)

This theory is particularly helpful in understanding how students who go through the reflective ePortfolio process can transform the experiences they have at the beginning of the experience to a deeper understanding of themselves at the end. Through the process at the University of Michigan, students are typically asked to identify experiences that are important to them and then reflect on these experiences to develop new knowledge by recognizing what is meaningful about these experiences. For example, when developing a personal Philosophy Statement, students are asked to describe experiences during which they felt "deeply engaged or purposeful." Reflecting on their observations about these important experiences, they are then asked to identify themes so they can identify the meaningful aspects of these experiences. An anecdote that has been compelling to practitioners engaged in this work on the University of Michigan campus is that feedback from employers to Career Services has indicated that students would receive an A-plus on their resumes but are failing their interviews. On their resumes, they have accumulated a strong collection of concrete experiences; however, they have difficulty articulating what is meaningful about these experiences when they meet with employers. The process of developing an ePortfolio helps students go from being able only to cite these concrete experiences to being able to describe the skills and knowledge they have developed through their experiences, how these experiences relate to each other, and how they can apply what they have learned to new settings. Additionally, by teaching students how to reflect and encouraging them to continue to use their ePortfolios as a tool for reflection, students learn to take their newly developed knowledge and begin the cycle again.

Strengths and weaknesses of Kolb's Experiential Learning Theory. The major strength of Kolb's theory is its ability to explain how students can learn through an inductive process such as a reflective ePortfolio. As it relates to this research, it is striking how well it aligns with the

MPortfolio process. As a theory that explains how students can transform their experiences into new knowledge through reflection, Experiential Learning Theory maps out the learning process that students experience while engaging in the reflective ePortfolio process. Further, Kolb proposes that development through the stages of the model is "characterized by increasing complexity and relativism in adapting to the world" (Kolb & Kolb, 2005, p. 195). This development is consistent with the integrative learning goals of being able to make connections and to address complex problems.

Though Kolb's Experiential Learning Theory is remarkably strong in explaining how students can learn through the reflective ePortfolio process, it may be challenging to implement the theory in research. First, much of the existing research employing the theory focuses on the Kolb's learning styles, an extension of the Experiential Learning Theory, or resides outside of postsecondary education (Evans, Forney, Guido, Patton, & Renn, 2010). Second, it can be a challenge to operationalize the theory to understand how and when the mechanisms facilitate the learning that students experience. The theory posits that students can learn by reflecting and transforming their experience. Reflection, though, is a personal and potentially intimate process and it can be difficult to measure the quality and quantity of reflection. Additionally, students can move through the learning cycle at vastly different paces. There may be students who embrace reflection and move through the cycle quickly, while others may not complete the cycle over the course of an academic term but have catalyzed the learning process as they have engaged in personal reflection.

Summary of Chapter

Over the past three decades, assessment has grown to become an essential activity in postsecondary education. This development has been fueled both internally in order to improve

student learning and by external stakeholders as a vehicle for accountability. Due to its various purposes and application at multiple levels (e.g., within the classroom, at the institution level), assessment means different things to different people. Since this research explores the influence of assessment as a formative exercise, the appropriate operative definition of assessment for this study is one that encompasses activities that ultimately aim to improve student learning. With this definition in mind, there are relatively few studies that provide evidence that assessment contributes to improvements in student achievement. Of the studies that do exist, there is only one that can make a causal claim about the relationship between assessment and student achievement. Additionally, the studies exploring this relationship fail to explore differences based on student background characteristics and experiences. Though a small body of literature on the relationship between ePortfolios and student achievement exists, there is a significant need for more rigorous research. Even the most thorough study on the topic suggested that the research was a "first step within a much larger research effort" (Peet et al., 2011, p. 21). The present study has the opportunity to address these weaknesses by determining the causal relationship between ePortfolio engagement and student achievement and exploring how student background experiences and characteristics may vary within this relationship. In order to explain this relationship, I posit that Astin's I-E-O Model and Kolb's Experiential Learning Theory act as appropriate theoretical frameworks for understanding how students learn when they engage in ePortfolio development, specifically as they go through the MPortfolio process. The I-E-O Model is a flexible process model that explains how students change through their engagement in the college environment and is a preferred model for assessment practitioners who use a theoretical framework to guide their work. Experiential Learning Theory aligns remarkably well with the reflective processes that students experience when they engage in the reflective

ePortfolio process. This theory explains how students can transform the experiences they have at the beginning of the experience to a deeper understanding of themselves at the end, when they are expected to be able to recognize their knowledge, skills, and values and be able to make connections across their disparate experiences. This outcome is integrative learning and, in the next chapter, I define integrative learning, review the literature on this topic, and describe the theoretical foundations that comprise the integrative learning construct.

Chapter 3: Integrative Learning

In this chapter, I explore integrative learning, the key outcome of this research. Since this is a relatively new concept and our understanding of it as a student outcome is still developing, I begin this chapter by reviewing prominent conceptions of integrative learning and proposing an operational definition that is appropriate for the present study. After establishing a definition, I will describe why integrative learning is important and an outcome that colleges and universities should seek to have their students achieve. Third, I review the small body of empirical research on integrative learning that has emerged over the past decade. The final section of this chapter consists of a review of three theoretical foundations that contribute to our understanding of integrative learning. In this section, I provide overviews of transfer of learning, reflective practice, and self-authorship and describe how each of these theories relates to how students can develop a capacity for integrative thinking by engaging in reflection.

Integrative Learning Defined

The literature on integrative learning consistently frames the discussion of the topic around the innate desire of humans to make connections and how this characteristic is central to intellectual and emotional development. Integrative learning is more than just making connections between different concepts or experiences; it also involves recognizing and evaluating the connections that we make (Huber, Hutchings, Gale, Miller, and Breen, 2007). The Association of American Colleges and Universities (AAC&U), which has been the champion of integrative learning as an important postsecondary outcome, defines integrative learning as "an understanding and a disposition that a student builds across the curriculum and

co-curriculum, from making simple connections among ideas and experiences to synthesizing

and transferring learning to new, complex situations within and beyond the campus" (AAC&U,

2008, p. 1). By including synthesis as a component, this definition reflects a conception of

integrative learning that requires individuals to do more than tacitly transfer knowledge and

skills acquired from a previous experience to a new problem. This definition also recognizes that

integrative learning is not limited to students' curricular experiences. Rather, integrative

learning incorporates both curricular and co-curricular experiences and the connections and

synthesis of learning from these experiences can then be applied as individuals face future

challenges both within and outside of postsecondary education. Mentkowski and Sharkey

(2011), when describing the development of AAC&U's definition of integrative learning,

underscore its complexity by describing the multiple dimensions of relationships encompassed in

integrative learning: relationships among past, present, and future learning; relationships between

areas of study; and relationships between prior learning and new situations where it could be

used.

Barber (2009), adapting a definition utilized as part of the Wabash National Study of

Liberal Arts Education (King, Kendall Brown, Lindsay, & VanHecke, 2007), presents a

definition that reflects both the breadth of the connections that students make as well as the

explicit process in which students engage as they make these connections:

> Integration of learning is the demonstrated ability to connect, apply, and/or
>
> synthesize information coherently from disparate contexts and perspectives, and
>
> make use of these new insights in multiple contexts. This includes the ability to
>
> connect the domain of ideas and philosophies to the everyday experience, from
>
> one field of study or discipline to another, from the past to the present, between

campus and community life, from one part to the whole, from the abstract to the

concrete, among multiple identity roles-and vice versa. (p. 13)

There is a key distinction that Barber makes when explaining the terms that he uses. Rather than

using the term "integrative learning," he uses "integrative practices" to capture the

intradisciplinary, interdisciplinary, and intercontextual processes that students go through as they

integrate learning. "Integration of learning" is the educational outcome of these processes.

There is merit to Barber's choice of terminology, as learning is a process rather than a product

(Ambrose et al., 2010). However, despite the accuracy of this distinction, I have chosen to use

the term "integrative learning" for this study because it is consistent with the terminology used in

the MPortfolio process and the literature that has informed it.

When formulating my own definition of integrative learning, I considered the various

characteristics of these definitions of integrative learning and whether they would apply to my

own conception. First, a definition of integrative learning should recognize that the development

of habits of mind is a core component. Integrative learning is not based on isolated incidents; it

is "an understanding and a disposition" or a "demonstrated ability." Integrative learners should

be of a mindset in which they seek to apply their knowledge to new settings and seek to make

meaning out of these connections. Second and building upon this, the definition should

incorporate higher order tasks. Integrative learning is not about simple, tacit connections, but

rather it should incorporate higher order tasks such as analysis, evaluation, and synthesis (Bloom

& Krathwohl, 1956). Third, the definition should recognize that making connections across

contexts is an essential characteristic of integrative learning. These connections bridge types of

learning experiences (coursework, co-curricular experiences, personal experiences) and

acknowledge that learning can be applied to a variety of new settings as students, outside of

student life while still enrolled, and after completing their postsecondary experiences. Fourth, the definition should recognize that one's self is inextricable from one's learning and knowledge of the world. This characteristic is missing from the AAC&U definition, but it is especially important considering the relational domains described in the self-authorship literature. Fifth, the definition should focus on the individual broadly and not only as a student. This, too, is inconsistent with the AAC&U definition, which described integrative learning as "an understanding and a disposition that a *student* builds" (italics added for emphasis). However, the path to integrative learning is lifelong and incorporates aspects of individuals' lives outside of the student experience. As a result, the definition should not incorporate the narrow focus of the learner as a student. With these characteristics in mind, I propose the following definition of integrative learning: Integrative learning is a mindset in which individuals seek to explicitly connect, evaluate, and synthesize learning from curricular, co-curricular, and personal experiences, in ways that enable them to apply their knowledge, skills, and values in new, complex settings in their personal, professional, and academic lives and over time.

To develop a deeper understanding of integrative learning, it is helpful to consider the origins of the concept. The idea of connected knowledge is hardly a new one; educating the whole of an individual and developing universal knowledge have been at the heart of liberal education for more than 150 years. Implicit in this idea is that college-educated individuals will have developed habits of mind that allow them to make connections between the disparate areas of knowledge they have acquired through their educations. According to this ideal, arts, humanities, social sciences, natural sciences, and mathematics (not to mention a variety of other subject areas) are interconnected. The individual most frequently associated with liberal education, John Henry Cardinal Newman (1852), envisioned college as a place where "all

branches of knowledge are connected together, because the subject matter of knowledge is intimately united in itself" (p. 99). Though colleges and universities have experienced a vast evolution in the years since Newman expressed this idea, this vision of a college education has persisted. In his recent book, *College: What It Was, Is, and Should Be*, Andrew Delbanco (2013) posits that one of the core purposes of a college education, inextricable from other core purposes, is to develop "the ability to make connections among seemingly disparate phenomena" (p. 3).

In the late 1990s, the concept of integrative learning began to gain traction as a formal intended outcome in postsecondary education. In *About Campus*, William Newell (1999) described his experience working with students as a professor of interdisciplinary studies at Miami University and his surprise when students' conceptions of interdisciplinary study extended beyond the curriculum and incorporated their co-curricular activities, as well.

> It makes little difference to them whether the perspectives are held by an author they read, another student, their professor, or the guy standing beside them in the soup kitchen where they volunteer… Students in general, I find, do not privilege academic disciplines over the lived experience of self and others. Those of us whose professional lives center on the academy, whether in student or academic affairs, tend to accept its value hierarchy as self-evident, but our undergraduate students retain their openness to learning from diverse sources, since they see themselves as only passing through. If we draw on this openness and train them to integrate what they learn from experiential as well as disciplinary perspectives, all students have the potential to become integrative learners. (p. 18)

He explains that integrative learning is a result of the cognitive dissonance that students experience when they encounter different perspectives and face the challenge of synthesizing

what they learn from those encounters. Newell draws upon scholars such as Aronson (1972), Bloom (1956), Perry (1968), Piaget (1969), and Rumelhart (1986) to establish a vision of integrative learning that transforms students into relativistic, higher-level thinkers who connect their learning as they confront complex problems.

Prior to becoming a strong advocate of integrative learning just after the beginning of the 21st century, AAC&U employed the terms, "connected learning" and "intentional learning," to describe how college students should develop the capacity to make connections between different types of knowledge and skills. In its 2002 report, *Greater Expectations: A New Vision for Learning as a Nation Goes to College,* AAC&U laid the groundwork for a future efforts promoting integrative learning as a vital outcome in postsecondary education. Recognizing the challenges that college graduates will face in a complex, global 21st century society, the report promotes the development of intentional learners.

> Intentional learners are integrative thinkers who can see connections in seemingly
> disparate information and draw on a wide range of knowledge to make decisions.
> They adapt the skills learned in one situation to problems encountered in another:
> in a classroom, the workplace, their communities, or their personal lives. As a
> result, intentional learners succeed even when instability is the only constant. For
> intentional learners, intellectual study connects to personal life, formal education
> to work, and knowledge to social responsibility. Through understanding the
> power and implications of education, learners who are intentional consciously
> choose to act in ethical and responsible ways. Able to place themselves in the
> context of a diverse world, these learners draw on difference and commonality to
> produce a deeper experience of community. (p. 21-22)

Though they have similar goals and share common language, AAC&U recognizes "intentional learning" and "integrative learning" as distinct concepts. Intentional learning, at its core, reflects cognitive processes associated with learning being a goal rather than merely being an incidental outcome of an education. According to the AAC&U conceptions of these ideas, intentional learning is key to integrative learning.

In 2004, AAC&U and the Carnegie Foundation issued a statement on integrative learning, proposing that it should be "a cornerstone of a twenty-first century education" that all students should have the opportunity to develop their capacity for integrative learning. This one-page statement recognizes the potentially fragmented nature of an undergraduate education and suggests that integrative learning could be a panacea for this fragmentation as students put together the pieces and establish habits of mind that will help them succeed during their college experiences and beyond. According to the statement, students can demonstrate evidence of integrative learning by connecting the skills and knowledge they have acquired from multiple sources. However, it is more than just discovering the connections; students should also be developing the capacity for deeper thinking. They can demonstrate this by applying theory to practice in various settings, by utilizing diverse and contradictory points of view, and by understanding issues and positions contextually. Though students can develop a vast well of knowledge through their disciplinary studies, it is by making connections between different pieces of knowledge that students can deepen their learning and are more able to address complex, real-world problems. Additionally, in this statement, AAC&U and the Carnegie Foundation point to a variety of learning experiences that can facilitate integrative learning: first-year seminars, learning communities, interdisciplinary studies programs, capstone experiences, individual portfolios, advising, and student self-assessment.

At the same time this statement was issued, Mary Taylor Huber and Pat Hutchings (2004) authored *Integrative Learning: Mapping the Terrain*, a report issued jointly by AAC&U and the Carnegie Foundation. This report defines and explicates integrative learning and makes a powerful case for why it should be recognized as a critical part of postsecondary education in the 21st century.

> "One of the great challenges in higher education is to foster students' abilities to integrate their learning across contexts and over time. Learning that helps develop integrative capacities is important because it builds habits of mind that prepare students to make informed judgments in the conduct of personal, professional, and civic life; such learning is, we believe, at the very heart of liberal education" (p. 1).

This vision of integrative learning is truly in the spirit of liberal education that Cardinal Newman formulated in the 19th century. In this one statement, integrative learning represents a construct that spans the whole of a person, his or her academic life and beyond, and throughout his or her life, developing habits of mind as lifelong learners.

It is not a coincidence that AAC&U became a strong advocate for integrative learning at the time that it did. Though the organization is decidedly oriented toward liberal education, there is language that recognizes the demands of a 21st century economy and understands the responsibility of colleges and universities to meet the needs of employers.

> The workplace, too, has been transformed. The "knowledge society" places a premium on higher education, making college a virtual necessity for American students aspiring to a middle-class style of life. "Flexibility" and "mobility" are the watchwords of the new economy; a career spent with the same employer, or

even in the same line of work, is fast becoming the exception rather than the rule.

(Huber & Hutchings, 2004, p. 2)

Huber and Hutchings note that, despite the growing importance of college graduates being able to integrate learning, colleges and universities are consistently structured in ways that encourage students to view their courses as isolated requirements that they must complete. Institutions should explore the ways they can provide students with opportunities to engage in learning experiences that will allow them to connect the knowledge that they acquire.

In its 2008 report, *College Learning for the New Global Century,* AAC&U advanced its agenda to align its goals with those of the business world by taking account the skills and knowledge that employers seek out of college graduates. In this report, presented by the National Leadership Council for Liberal Education and America's Promise (LEAP), AAC&U established four essential learning outcomes that students should be developing throughout their schooling, from elementary through postsecondary, in order to be prepared to face the challenges of the 21st century. These essential learning outcomes are integrative learning, intellectual and practical skills, personal and social responsibility, and knowledge of human cultures and the physical and natural world. Figure 3.1 displays the Liberal Education Scorecard (Wick & Phillips, 2008), which shows how integrative learning acts as the link between the other three essential learning outcomes. By connecting these domains, individuals can engage in critical thinking and problem solving. In the *New Global Century* report, AAC&U notes that there have been marked shifts in the economic, global, cross-cultural, environmental, and civic arenas of American life and that these changes are intensified by rapid globalization and remarkable innovations in science and technology. These shifts present challenges that require individuals to be adaptable workers and informed citizens who are able to navigate successfully this

increasingly complex and volatile world. The report also presents Seven Principles of

Excellence to guide discussions on educational reform in order to face the challenges described.

These principles, such as "connect knowledge with choices and action" and "assess students'

ability to apply learning to complex problems," emphasize the importance of integrative

learning.

Figure 3.1: Liberal Education Scorecard (Wick & Phillips, 2008)

Integrative learning has become an intriguing, if not critical, educational outcome that colleges and universities should aim to develop in students. Given students' propensities to learn from both their curricular and co-curricular experiences, by helping students connect, evaluate, and synthesize the knowledge and skills they have acquired through various experiences, we have the potential to create a whole that is greater than the sum of its parts. In a society that is increasingly demanding of individuals in both the workplace and in civic life, it is important to educate college students so that they can adeptly face the complex challenges presented to them.

Research on Integrative Learning

As a relatively new concept, the body of empirical research on integrative learning is small and still developing. In this section, I first describe the approaches that have been developed in order to assess integrative learning. Second, I review the extant body of research on integrative learning. I conclude the section with a summary of the strengths and weaknesses of this research.

Approaches to the Assessment of Integrative Learning. AAC&U, as part of its Valid Assessment of Learning in Undergraduate Education (VALUE) initiative, has created a series of rubrics intended to act as frameworks for discussions about a variety of learning outcomes, including integrative learning (Rhodes, 2008). Developed by teams of faculty experts, VALUE rubrics establish the fundamental criteria for learning outcomes and describe indicators of increasing levels of attainment. In the case of integrative learning, there are five criteria outlined in the VALUE rubric: 1) connections to experience, 2) connections to discipline, 3) transfer, 4) integrated communication, and 5) reflection and self-assessment. Using connections to experience as an example, on the advanced (or "capstone") end of the spectrum is a student who "meaningfully synthesizes connections among experiences outside of the formal classroom

(including life experiences and academic experiences such as internships and travel abroad) to deepen understanding of fields of study and to broaden own points of view" (p. 2) On the other end of the spectrum ("benchmark") is a student who "identifies connections between life experiences and those academic texts and ideas perceived as similar and related to own interests" (p. 2). Like all the other VALUE rubrics, the integrative learning VALUE rubric is not intended for grading but rather for evaluating and discussing student learning at the institution level (AAC&U, 2009). It can act as a useful guide for instructors making decisions about curriculum and pedagogy and for researchers carrying out either quantitative or qualitative studies.

Integrative learning has become a part of multiple large-scale studies. Notably, the National Survey of Student Engagement (NSSE) includes a set of questions related to integrative learning in its DEEP Learning section (as referenced in the previous chapter, this acronym represents Documenting Effective Educational Practice). In this section, students are asked how often they engaged in a variety of activities during the most recent academic year. The section includes questions related to the application of knowledge and skills from different contexts to new situations (e.g., working on a paper or project that required integrating ideas or information from various sources, putting together ideas or concepts from different courses when completing assignments or during class discussions). Consistent with AAC&U's statement on integrative learning, one item addresses whether students utilize diverse and contradictory points of view: "including diverse perspectives (different races, religions, genders, political beliefs, etc.) in class discussions or writing assignments." Finally, two items focus on whether students extend their curricular learning beyond the traditional confines of the classroom (i.e., "discussing ideas from readings or classes with faculty outside of class;" "discussing ideas from readings or classes with others outside of class"). The survey prompts students to indicate the frequency of these

activities on a four-point scale, ranging from "very little" to "very much." These items have also been utilized in the Wabash National Study of Liberal Arts Education. These are both large, multi-institutional studies and each has presented conclusions about integrative learning in peer-reviewed journals and for the improvement of academic programs at the institution level.

Empirical Research on Integrative Learning. Multiple studies utilizing NSSE data include integrative learning as an outcome. The first of these studies sheds light on how integrative learning is associated with other collegiate outcomes and whether these relationships vary based on academic discipline (Nelson Laird, Shoup, Kuh, and Schwarz, 2008). Using data from both NSSE and the Faculty Survey of Student Engagement (FSSE), the authors found a positive relationship between engagement in integrative learning activities and personal and intellectual development, student satisfaction, and grades. Regarding differences by discipline, both seniors and faculty reported that there was significantly less engagement in integrative learning activities in hard fields (e.g., biology, mathematics, medicine) compared to soft fields (e.g., psychology, history, economics). Exploring differences based on discipline in the relationship between engagement in integrative learning activities and other outcomes, differences in personal and intellectual development tended to be minimal; the one significant difference was that the positive relationship between integrative learning and personal and intellectual development was significantly greater for students in hard applied life fields (e.g., medicine and pharmacy) compared to those in the hard pure non-life fields (e.g., chemistry and mathematics). Differences based on discipline were more pronounced for the other outcomes: satisfaction and grades. The relationship between engagement in integrative learning activities and student satisfaction was strongest for students in the hard applied non-life fields. For grades, the relationship was strongest for students in the soft pure life and soft pure non-life fields.

Nelson Laird and Garver (2010) built upon the previous study by introducing an additional dimension: whether there is variation between general education courses and non-general education courses. Holding all else constant, faculty teaching general education courses emphasized integrative learning, on average, significantly more than faculty teaching non-general education courses and that there were significant differences based on discipline, particularly for hard applied life fields. The authors recommend that faculty and administrators take into account disciplinary contexts when engaging in curriculum reform, particularly as they consider general education courses.

In another study based on NSSE data, Zhao and Kuh (2004) found that, for both first-year students and seniors, there was a significant positive relationship between experience in a learning community and academic integration. Since this study is based on an older version of NSSE, the scale that it uses to operationalize academic integration is a slightly different scale from the one described above. Academic integration in this version is a three-item scale that includes the questions about the frequency at which students work on papers or projects that require integrating ideas or information from various sources, put together ideas or concepts from different courses when completing assignments or during class discussions, and include diverse perspectives in class discussions or writing assignments. The scale does not include the two items addressing discussions outside the classroom.

Based on data collected through the Wabash National Study of Liberal Arts Education, which uses the same scale as NSSE, Mayhew, Seifert, Pascarella, Nelson Laird, and Blaich (2012) explored the relationship between deep learning approaches and students' moral reasoning at the end of the first year. Controlling for student background, pre-college factors, and first-year coursework there was a significant positive relationship between engagement in

integrative learning activities and moral reasoning. For the other deep approaches, higher-order learning and reflective learning, the relationships with moral reasoning were not statistically significant. Aside from this study, the relationship between integrative learning and moral reasoning is one that is largely unexplored. However, the results support one finding about interpersonal development that was previously generated through research at Alverno College. Mentkowski and Associates (2000) found, through student interviews, that students at Alverno developed an appreciation of differing values because they were consistently asked to examine and discuss them across multiple contexts. Though the study by Mayhew et al. provides evidence that a relationship between integrative learning and moral reasoning exists, even after controlling for other deep approaches, the authors provide little insight into the mechanisms that theoretically explain this relationship other than that a relationship should plausibly exist.

Barber (2012) used longitudinal qualitative data gathered in the Wabash National Study of Liberal Arts Education to investigate integration of learning. He analyzed interviews with 97 students at two liberal arts colleges with the goal of understanding how college students connect knowledge and experiences and so that educators can more intentionally promote the integration of learning. Through this analysis, he found that there were three distinct types of integration. The first, establishing a connection, is characterized by the discovery of similarities between ideas though the ideas remain distinct. In this category, students compare and contrast, use analogies and similes, and make connections between concepts. The second type, application across contexts, is characterized by the use of knowledge from one context in a different context. This type of integration often appeared when students described how they used skills or knowledge that they acquired in high school in collegiate settings. The third type, synthesis of a new whole, is characterized by the creation of new knowledge by combining insights. Students

who exhibited this type of integration used language such as "incorporate," "adapt," "collaborate," and "interpret." The students in the study most frequently fell into the second category, application across contexts, and Barber also found that students were more likely to demonstrate synthesis in the second year of the study compared to the first.

In another paper based on the data collected through the Wabash National Study, Barnhardt, Lindsay, and King (2006) used a mixed-methods approach to improve our understanding of how college students integrate learning. For the quantitative analysis, the researchers employed a seven-item scale to serve as a measure of integration of learning. This scale was comprised of items similar to those in the five-item NSSE integrative learning scale and there are two items that appear on both scales. The scales differ in that the NSSE scale has a stronger emphasis on discussions, with the assumption that discussing ideas inside and outside of the classroom is an indicator of integration of learning. The scale utilized in this study does not emphasize discussions, but rather it includes items that directly address the connections students make from different experiences. It also includes one item that goes beyond the behaviors of students and the connections that they make and addresses the highest order of integrative learning (according to the AAC&U VALUE rubric): synthesizing and organizing ideas, information, or experiences into new, more complex interpretations and relationships. The results of the analysis revealed that interventions such as experience in a learning community, diverse interactions, and integrative assignments were significantly and positively associated with integration of learning. Additionally, sociocultural values and intercultural values and attitudes were also significant, positive predictors of integration. A student's class year was also a strong predictor of his or her level of integration, with the authors proposing that the "first year is the most critical time to provide students with opportunities to become integrative learners" (p.

18). The qualitative results of the study generally supported the quantitative findings. In particular, the interview data brought to life the considerable differences based on class year, with seniors demonstrating the most evidence of integration.

A recurring theme in the empirical literature on integrative learning is that educators can create settings and interventions that may effectively facilitate integrative learning. Melendez, Bowman, Erickson, and Swim (2009) explored the impact of one intervention, a short-term multidisciplinary problem-solving experience at the United States Military Academy, on students' capacity to integrate learning. This experience was seven days long, incorporated multidisciplinary activities, and explicitly focused on the connections between mathematics and biology. The goal of this effort was "to create an integrative learning experience (ILE) that better prepared our students to respond effectively to the uncertainties of a changing technological, social, political and economic world" (p. 132). Unfortunately, the results reported in the study were entirely descriptive. The authors noted that students generally had a positive experience, though there was not evidence whether the intervention resulted in the enhancement of students' integrative learning or any other educational outcomes. Faculty indicated that the experience was initially unsettling, as they were forced to approach their teaching in a new way. However, they quickly adapted and, in the end, reported that they experience was positive. Though this article did not provide meaningful quantitative evidence supporting the experience, it is a good example of the types of interventions that colleges and universities can pilot as they try to facilitate integrative learning.

Critique of Research on Integrative Learning. To summarize the empirical research on integrative learning, it is helpful to revisit briefly the study by Peet et al. (2011) that acts as a foundation for the present study. Though I described it in depth in the previous chapter, it has

integrative learning as an outcome and, given its high level of relevance to the present study, it is valuable to judge it against other research on the topic. Recalling the previous chapter, the focus of the study is an educational intervention featuring an integrative learning ePortfolio. Using a pre-survey/post-survey design, 37 survey items were reduced to 6 dimensions of integrative learning. From the pre-survey to the post-survey, students experienced significant, positive changes across all 6 dimensions. There were no significant differences based on class year, gender, race/ethnicity, and survey year, though students who had multiple experiences had greater gains and students with majors in the natural sciences tended to experience greatest gains, on average, compared to students in other fields of study.

Comparing this study to the other research on integrative learning that I have reviewed in this chapter, it shares many of the same limitations. Like the research based on NSSE data, this study relies on self-reported data, makes only correlational claims about the impact of the treatment, and does not include students who did not receive the treatment in the analysis. At the same time, the study by Peet et al. has several advantages over other empirical studies on integrative learning. First, comparing the instrument used to the scale employed in the studies using NSSE data, the research conducted by Peet et al. utilizes a far more nuanced, multidimensional construct representing integrative learning. The NSSE scale includes a series of items that represent behaviors through which students may be able to integrate learning, though it is not certain that they actually do. For example, a student could indicate that he or she frequently discusses ideas or readings from class with others outside of class; however, there is no indication of whether this student engaged in the processes associated with integrative learning. This is a threat to the validity of the instrument. Alternatively, the instrument used by Peet et al. is more closely aligned with the actual processes that students go through as they

demonstrate evidence of integrative learning. When a student indicates that he or she can provide evidence of the specific ways in which he or she has applied the knowledge/skills he or she has gained in one experience to other situations or contexts, the student is evaluating himself or herself on a behavior that is directly representative of whether he or she is integrating his or her learning. Of course, one could still contest the validity of the results due to the use of self-reported data. However, this is an opportunity for educators and researchers to use ePortfolio artifacts to support (or challenge) the evidence of integrative learning produced by self-reported data. If students truly can provide evidence that they are applying their knowledge and skills from one experience to different contexts, then their ePortfolios should reflect this ability.

Theoretical Foundations of Integrative Learning

In the previous chapter, I reviewed two theories, Astin's I-E-O model and Kolb's Experiential Learning Theory, that can enhance our understanding of how the reflective ePortfolio process can contribute to integrative learning. Similarly, in order to understand integrative learning more deeply, it is helpful to review the underlying constructs that explain how individuals integrate learning. From its conception, integrative learning has been conceptualized as a multidimensional construct based on prominent theories of learning and development. Since the idea of integrative learning is still developing, there is ambiguity about the appropriate theoretical foundations. As a result, the conception of integrative learning and how to assess integrative learning are regularly up for debate.

For this dissertation, I have chosen to focus on three theories that I feel best explain the processes that students go through as they demonstrate how they integrate learning. The first, transfer of learning, explains the process of connecting knowledge and skills acquired in a prior experience to new, different problems and situations. Individuals regularly transfer their learning

from one setting to another, frequently without realizing that they are doing it. Tacit transfer may be characteristic of transfer of learning, but it is not representative of integrative learning. According to the conception of integrative learning that I am using in this dissertation, the transfer of learning from prior experiences to new, different settings is an explicit cognitive process. The second theory, reflective practice, explains this distinction. Reflective practice is one's effort to make tacit knowledge explicit. Engaging in the introspection associated with reflective practice forces individuals to challenge their tacit assumptions and identify discrepancies between their thoughts and behavior. This process can lead to cognitive dissonance, which leads to the third theory, self-authorship. Where transfer can explain the breadth of individuals' application of knowledge and skills to different situations, self-authorship can explain the depth that is required of individuals as they face complex problems. When cognitive dissonance occurs, individuals who may have previously taken perspectives at face value must now reassess diverse views when it is unclear what the correct answer may be. In the remainder of this chapter, I review these three theories, describe how they fit into the multidimensional construct of integrative learning, and explain how the outcomes associated with these theories might be developed through the MPortfolio process.

Transfer of Learning. Definitions and descriptions of integrative learning frequently refer to the power of being able to make connections between different ideas and experiences. Transfer of learning is a cognitive activity based in the field of psychology that can explain how humans make connections between disparate phenomena. The study of transfer focuses on how people know and then apply their knowledge. Broadly, transfer is "the degree to which a behavior will be repeated in a new situation" (Detterman, 1993, p. 4). More specifically, when referring to transfer of learning, educational psychologists recognize it as an individual's use of

past learning when he or she learns something new and his or her application of that learning to both similar and new situations (Haskell, 2001).

Transfer is a concept that is, on the surface, quite simple and an activity that is essential to our abilities to learn, think, and solve problems. In fact, transfer is such an integral part of the learning process that Perkins and Salomon (2012) pose the question, "What counts as transfer of learning in contrast with just plain learning?" (p. 249). To answer this question, Perkins and Salomon acknowledge that all learning involves transfer to some extent; in order to support a claim that learning has happened, one must take into account the learner's baseline of knowledge when they begin the learning process. Where there is a distinction is how transfer contributes to learning. One perspective of transfer is that it is always part of learning and its involvement is merely a question of degree (how much later, how far elsewhere, how different are the conditions). However, most researchers of the topic conceptualize transfer as a process that can have varying influences on learning. In some situations, learning in one context can improve performance in another context (*positive transfer*), while in other situations learning in one context can negatively impact performance in another (*negative transfer*). Additionally, there are many situations in which prior learning has no influence on performance in a different context (*failure to transfer*) (Haskell, 2001). In short, though transfer applies to all learning situations, it is not a given that transfer or learning will happen and, if transfer occurs, it will not necessarily have a positive influence on learning.

Within the broad context of transfer of learning, there are different types of transfer that distinguish the cognitive processes that individuals use. The most common distinction is between *near transfer* and *far transfer*. These terms refer to the similarities and differences between contexts and/or performances. When an individual engages in near transfer, he or she

applies prior knowledge from a situation that is nearly identical to his or her current situation.

Far transfer, on the other hand, refers to the process of making connections between contexts or

performances that are quite different. Near transfer and far transfer are not a dichotomy but

rather a continuum that represents situations that are progressively similar or different from the

original learning experience. It is important also to recognize that context and performance are

both important variables when distinguishing near transfer and far transfer. For example, a

student who has learned basic arithmetic using simple math problems using only numerals in

class and on his or her homework should be able to use near transfer to apply this knowledge on

a test that uses the same types of problems in the same format; here the variation is between

class/homework and the test with all other elements being identical. If the test included word

problems instead of problems that were purely numeric, it introduces variation in the

performance task. Stretching the student's ability to transfer further, changing the context to a

real-life situation in which the student must split a bill at a restaurant requires him or her to apply

the principles that he or she has learned to a different context and so that he or she can carry out

a different type of task. On the furthest end of the continuum, individuals connect seemingly

unrelated learning experiences when performing tasks that are unlike those performed during the

initial learning experience.

   Detterman (1993) highlights several other important characteristics of transfer of

learning. One dimension of transfer that is useful to consider is the distinction between specific

and non-specific (or general) transfer. Specific transfer refers to situations in which the learner

transfers the contents of learning to new situations, while non-specific transfer refers to situations

in which the learner transfers general skills or principles to the new situation. Using the learning

of state capitals as an example, if a student were to use his or her knowledge of the state capitals

to a future geography or civics course, then he or she would be using specific transfer. On the other hand, if the student developed a principle or technique for memorization that he or she could apply to future situations in which they must memorize something (e.g., poetry, music) then it would be an example of non-specific transfer. In the latter case, the content of the original learning experience has no influence on the application of learning in the new situation. Another distinction that Detterman describes is between the deep and surface structure similarities of a situation. To describe the distinction between deep structures and surface structures, he uses the differences between the dashboards of cars and planes as an example. Comparing car dashboards, though there are differences in the ways that the dashboards present information, the information presented is essentially the same. In this case, the deep structure is the same, but the surface structure is different. When comparing car dashboards to plane dashboards, both types of dashboards present information in similar ways. However, the information that car dashboards and plane dashboards present is quite different. In this case, the surface structure is similar, but the deep structure is different.

Taking all of these distinctions into account, Detterman (1993) suggests that researchers are most concerned with far, non-specific transfer of deep structure rather than near transfer of surface structure. Since the former type of transfer is characteristic of "highly intelligent behavior and an important adaptive mechanism of the human species" (p. 6), it is of particular interest to faculty, researchers, and administrators in postsecondary education. In higher education, the ability to make simple connections between nearly identical concepts is a basic expectation we have of our students. Far transfer of deep structure may be most useful in preparing students to address the complexities described in the integrative learning literature. This type of transfer, however, is the most difficult type of transfer to occur.

Given that transfer of learning is a foundational component of our learning processes and essential to our ability to apply what we have learned to real-life situations, finding ways to facilitate the transfer of learning should be a priority for all types of educators at all levels of schooling. Haskell (2001) suggests that "the aim of all education is to apply what we learn in different contexts, and to recognize and extend that learning to completely new situations" (p. 3). The significance of transfer is amplified because it is a concept that cuts across all educational domains, curricula, and methods. Desse (1958) claimed, "There is no more important topic in the whole psychology of learning than transfer of learning…practically all educational and training programs are built upon the fundamental premise that human beings have the ability to transfer what they have learned from one situation to another" (p. 213).

Despite the importance of transfer, there is ample research demonstrating that students frequently fail to transfer learning either in classroom settings or in real life situations (Goldstone & Day, 2012). Ambrose and colleagues (2010) cite two main reasons that students may fail to transfer relevant prior knowledge and skills to new learning experiences. The first reason, known as overspecificity or context dependence, is that individuals may associate their prior learning too closely with the context in which they learned it. As a result, it does not occur to them to apply their prior learning to the new situation or, if it does occur to them, they may not know how to apply it to the new context. To use a remarkable example, Perkins (2009) studied how physics students who learned how to calculate how long it would take a ball to fall from the top of a tower to the ground applied this knowledge when presented with a similar question that instead asked students to determine how long it would take for a ball to fall to the bottom of a well. Rather than applying the principles from the prior learning experience, students complained that they had not seen any problems about wells. Second, transfer may fail to occur

if individuals have an incomplete understanding of the underlying principles behind the relevant knowledge and skills they have acquired through prior experiences. To use the terminology above, when an individual has a strong understanding of the surface structure but weak knowledge of the deep structure, he or she knows what to do but is unable to grasp why he or she is doing it. In such a situation, the individual may have difficulty applying the prior knowledge appropriately to the new learning experience.

Educators who promote the practice of teaching for transfer propose a number of remedies to the potential pitfalls that students face and strategies for encouraging transfer within and beyond the classroom. Perkins and Salomon (2012) suggest that there are three bridges for transfer of learning: detect, elect, and connect. An individual must first *detect* a relationship between the concept that he or she had learned previously and the challenge presented in the new situation, *elect* to explore this relationship, and then *connect* prior knowledge to the specific characteristics of the new situation. Connecting does not only entail identifying similarities between situations but also includes recognizing insightful contrasts between the situations. Perkins and Salomon emphasize that one cannot assume that an individual is conscious of any or all of these processes as they occur; considerable transfer occurs automatically. However, despite transfer frequently being a tacit process, there is much that educators can do to catalyze transfer. An additional distinction is low-road transfer and high-road transfer (Salomon & Perkins, 1989). Low-road transfer, also known as reflexive transfer, depends on pattern recognition and the reflexive triggering of routines when conditions in the new situation are similar to those in the original learning context. High-road transfer, on the other hand, involves the search for connections through deliberate reflective processing. Perkins and Salomon (1988) suggest strategies for facilitating both of these types of transfer. For low-road transfer, they

recommend that instructors introduce new concepts that are very closely related to concepts that they have recently taught so that students can make small, sequential steps as they transfer and build upon earlier concepts. They call this approach "hugging," because the new concepts are closely aligned with (or "hug") the prior concepts. For high-road transfer, Perkins and Salomon suggest using an approach in which instructors facilitate the transfer process by "bridging" the gaps between seemingly disparate concepts. Instructors help students make connections by explicitly identifying and emphasizing the deep, underlying principles behind the concepts that they expect students to connect. Considering the high-road/low-road distinction in the context of the three bridges (detect, elect, and connect), Perkins and Salomon (2012) note that motivation can be a significant factor. Due to the cognitive effort required in situations of high-road transfer, individuals must be sufficiently motivated to engage in such deliberate reflective processing. This is generally not the case for situations involving low-road transfer, which is inherently driven by individuals' habits. Motivation may be a factor in low-road transfer, but it tends to relate to an individual's eagerness to engage in an unfamiliar task rather than his or her willingness to expend the cognitive energy needed to transfer knowledge.

Ambrose and colleagues (2010) offer practical suggestions for how faculty can teach students in ways that encourage them to master the material and be able to transfer their learning to other settings. They identify three broad strategies for faculty to use and, though they do not explicitly reference the elements of transfer, these strategies generally align well with the teaching for transfer literature. First, they suggest that faculty use techniques that expose and reinforce component skills, a process that may help students uncover the deep structures of concepts and detect possible connections between concepts. By deconstructing complex concepts and tasks into smaller components, faculty can identify areas of weakness in instruction

and more systematically teach complex concepts to students. A helpful tactic when doing this is to collaborate with teaching assistants and colleagues both within and outside one's discipline in order to identify any blind spots (pieces of information that faculty assume students to have) that he or she may have as a result of his or her expertise on the topic. The second broad strategy is to build fluency and facilitate integration. In other words, by ensuring that students have the ability to complete basic tasks quickly and correctly, they are less likely to dedicate unnecessary time to these tasks at the expense of work on more complex concepts. Additionally, they recommend that faculty explicitly include integration in their performance criteria. Tying this back to the teaching for transfer literature, it is not unlike bridging, as faculty play an active role in facilitating the connections that students are expected to make. The main difference is that faculty, though they explicitly include integration as a performance criterion, do not necessarily emphasize the principles behind the concepts. Ambrose and colleagues more directly allude to bridging in the third broad strategy, helping students learn when to apply what they have learned. They recommend a number of ways that faculty can facilitate students' connection-making processes and transfer of learning. Examples of these techniques include clearly and explicitly explaining the contexts in which particular skills are or are not applicable, giving students opportunities to apply skills or knowledge in diverse contexts, and specifying skills or knowledge and asking students to identify contexts in which they apply.

Transfer of learning, integrative learning, and the reflective ePortfolio process. There are striking similarities between integrative learning and transfer of learning. On the surface, both concepts focus on an individual's use of prior knowledge as they create new knowledge. As evidenced by the multi-theoretical construct that represents integrative learning, transfer of learning is one component of a complex process in which individuals engage as they integrate

learning. To highlight the key difference between the two concepts it is helpful to deconstruct the definition of integrative learning proposed earlier in this chapter. The definition highlights attributes of transfer, including "explicitly connect" and "apply their knowledge, skills, and values in new, complex settings." Additionally, by specifying the spanning of "curricular, co-curricular, and personal experiences" and "personal, professional, and academic lives and over time," this definition emphasizes the far transfer that we expect students to do in higher education. The key difference between the two concepts is that transferring learning and synthesizing experiences leads to developmental changes. At the end of the transfer process, the student has developed "a mindset;" this person is not the same as he or she was at the start of the process. This added dimension makes integrative learning a more complex concept, in ways that I will describe in greater detail as I introduce reflective practice and self-authorship later in the chapter.

The literature on transfer of learning is essential to our understanding of integrative learning because it deepens our understanding of the type of transfer students need to be doing in order to develop the understanding or disposition needed to address the complex problems they will face throughout their lives. Though there is an expectation that college students can reflexively engage in near transfer connecting surface structure similarities, the work that educators do to promote integrative learning focuses on the more difficult task of encouraging students to engage in transfer that is far and forces students to consider the deep structures and underlying principles behind concepts. This type of high-road transfer is essential for transforming students into integrative learners.

Understanding the characteristics of transfer required by integrative learners is helpful for identifying interventions and strategies for promoting integrative learning. The reflective

ePortfolio process is an educational intervention specifically aimed at transforming students into integrative learners. Drawing on the teaching for transfer literature, an example of bridging in the reflective ePortfolio process is how faculty, staff, and peer facilitators listen to students discuss powerful learning experiences, help students deconstruct these experiences by identifying the knowledge, skills, and values that emerge from these discussions, and provide an environment (the ePortfolio), in which students can visually connect these learning experiences and develop a greater understanding of themselves. From a program evaluation perspective, having intimate knowledge of the ways in which students transfer learning and the strategies that educators can use to enhance this activity can be invaluable resources for program improvement.

   Reflective Practice. Another theory that can add to our understanding of integrative learning is reflective practice (Argyris & Schön, 1974; Schön, 1983; Schön, 1987). Though it does not feature as prominently as transfer (or self-authorship, for that matter) in the integrative learning literature, reflective practice potentially serves as an important link between these two theories and makes a significant contribution of its own. As alluded to at the start of this section on theoretical foundations, reflective practice can facilitate the intentional and effortful identification of connections required by high-road transfer. Additionally, as individuals engage in reflective practice, they may experience cognitive dissonance, which leads to development consistent with self-authorship. On its own, by educating reflective practitioners, we are preparing students to confront the complex problems that the AAC&U frequently describes in its literature on integrative learning. Having roots in literature on professional organizations, reflective practice establishes compelling connections not only between reflection and student learning but also between reflection and professional success. Mentkowski and Sharkey (2011) make a strong argument that the ability to reflect (and reflect well) is an important factor in a

student's ability to be an integrative and intentional learner. Drawing on their research at Alverno College, they found that students who engaged in self-reflection that was "perceptive, insightful, and adaptive" indicated that they learned how to engage in the process of self-assessment: how "to observe their performance, interpret and analyze it, provide their own feedback and seek that of others, and judge its effectiveness in relation to criteria that afford a picture of their developing abilities" (p. 98). Additionally, they demonstrated characteristics of lifelong learning and the ability to evaluate themselves based on criteria they formulated on their own. Looking beyond the undergraduate experience, Mentkowski and Sharkey highlight evidence that transfer of college learning to workplace settings is dependent upon whether an individual has developed a web of relationships linking thinking and action (Rogers and Mentkowski, 2004; Schön, 1987).

At the core of reflective practice is the idea of tacit knowledge. Tacit knowledge refers to the things that an individual knows intuitively and remain unarticulated. Attributing the concept to Polanyi (1967), Argyris and Schön (1974) describe tacit knowledge as "what we display when we recognize one face from thousands without being able to say how we do so, when we demonstrate a skill for which we cannot state an explicit program, or when we experience the intimation of a discovery we cannot put into words" (p. 10). In all of these examples, there is a sense of knowing coupled with the failure to express what it is that one knows. It is not necessarily that this knowledge is ineffable, but rather that we have internalized this knowledge to the point that it is second nature. Reflective practice assumes that an individual's tacit knowledge is frequently inconsistent with the ideas that he or she expresses externally. Concerned with the potential negative impact that this inconsistency may have on professional organizations, Argyris and Schön developed the concept of reflective practice with the goal of

introducing a new epistemology of practice focused on improving professional knowledge through reflection-in-action (thinking about what one does as he or she does it). To put it simply, reflective practice is our effort to make tacit knowledge explicit.

To explain the discrepancies between tacit and explicit knowledge, Argyris and Schön (1974) describe two theories of action: espoused theories of action and theories-in-use. Espoused theories of action refer to the conscious values and beliefs that a practitioner claims to guide his or her actions. Since these ideas can change fairly easily with the introduction of new information, espoused theories are relatively malleable. As a result, educational programs can play a significant part in shaping espoused theories. "While it is relatively easy to develop new ways of thinking, these ideas often remain distanced from and independent of our practice" (Osterman & Kottkamp, 2004, p. 9). Theories-in-use, on the other hand, are subconscious and influence our behavior directly and consistently. These theories develop over time, through acculturation, as society shapes our understanding of the world. As they grow more deeply embedded, individuals cease to question their actions and, as a result, may be unable to describe the rationale behind their behaviors and comprehend the true impact of their actions. An additional consequence is that theories-in-use may result in behaviors that are rote and thoughtless, making individuals ill equipped to address complex problems due to the simplicity of their decision-making processes (Osterman & Kottkamp, 2004).

Argyris and Schön (1974) elaborate on theories-in-use by describing two antithetical models of action. Model I, despite being pervasive in organizations throughout society, fosters the development of organizations characterized by defensive relationships, unilateral action, and resistance. Since organizations value personal determination and rationality, individuals tend to employ decision-making processes that are largely internal and based on personal assumptions.

Additionally, in an attempt to achieve consistency with societal norms about rationality, individuals suppress emotion in their decision-making. This results in defensive action aimed at establishing and maintaining control and avoiding conflict. This type of behavior causes us to withhold information, which, in turn, inhibits inquiry and constructive collaboration with others. Such a culture promotes the idea that problems are "indicators of personal weakness or failure, and discussion of problems is personally demeaning and unlikely to have positive effects" (Osterman & Kottkamp, 2004, p. 67). Argyris and Schön (1974) emphasize how problematic the influence of Model I beliefs can be; by promoting competition rather than collaboration, this culture hinders organizational effectiveness.

Model II organizations, on the other hand, are characterized by open communication, collaboration, and trust. These characteristics create an environment in which inquiry and problem solving to achieve common goals are valued. Rather than focusing on preserving control for oneself and letting one's internal assumptions guide action, Model II behaviors are aimed at learning from and protecting others. This shared responsibility results in minimally defensive relationships and learning-oriented norms. Ultimately, organizations with Model II theories-in-use should achieve increased long-run effectiveness (Argyris & Schön, 1974)

Argyris and Schön (1974) use a concept called learning loops to explain how individuals can alter theories-in-use from Model I to Model II. There are two types of learning loops, single-loop learning and double-loop learning, and both describe how individuals in organizations approach problem solving. "In the context of theories-in-use, a person engages in single-loop learning, for example, when he learns new techniques for suppressing conflict. He engages in double-loop learning when he learns to be concerned with the surfacing and resolution of conflict rather than with its suppression" (Argyris & Schön, 1974, p. 19). An attribute of Model I, single-

loop learning is characterized by problem solving actions that are consistent with existing organizational values and expectations. This type of learning preserves environmental conditions and organizational change is superficial and temporary. Double-loop learning, on the other hand, focuses on changing the underlying beliefs of the organization to get to the root of the problem. In other words, single-loop learning merely addresses the symptoms, while double-loop learning focuses on changing the environment in order to cure the disease. By using double-loop learning rather than single-loop learning, individuals can alter their theories-in-use from Model I to Model II.

     Reflective practice, integrative learning, and the reflective ePortfolio process. Reflective practice is designed to help individuals and organizations address the complex problems described in the AAC&U's literature on integrative learning. Revisiting the AAC&U definition, there is a minor connection between reflective practice and "an understanding and a disposition" that prepares students for "new, complex situations." This connection grows stronger after examining the integrative learning VALUE rubric, which includes reflection as a criterion for success. In the integrative learning VALUE rubric, students who are adept at reflection must be able to recognize and confront complex contextual factors like ambiguity and conflict. Schön (1983) explains that there is a "crisis of confidence in the professions" and being able to deal with complexity, ambiguity, and instability is a central aspect of practice. Schön describes an artistry of reflective practice that must be mastered. Even with specialized training and expertise, complexity and uncertainty remain and being able to address these challenges requires individuals who can not only solve problems but also go to a deeper level and find the problem. By reflecting on our learning to make tacit knowledge explicit and altering theories-in-use

through approaches like double-loop learning, individuals can improve the ways in which they address complex problems.

Reflective practice also serves as an important bridge between integrative learning's other two theoretical foundations, transfer of learning and self-authorship. As explained above, integrative learners must do more than tacitly transfer their knowledge between contexts. Looking back to the transfer literature, the high-road transfer required of integrative learners involves an active search for connections through reflection. If instead individuals transfer their tacit, underlying principles without questioning their assumptions, they may suffer the same problems that plague individuals who rely on espoused theories and Model I theories-in-use (Argyris & Schön, 1974). Though reflective practice is a valuable activity, it can be jarring for those engaged as they are forced to confront discrepancies between their espoused theories and their actual behaviors. This experience results in cognitive dissonance (Festinger, 1957). Though it can be distressing for individuals to realize that their beliefs and actions are incongruous, the experience also can serve as a catalyst in one's journey toward self-authorship. When students experience cognitive dissonance, it helps them move from dualistic, black and white thinkers to multiplistic thinkers who recognize that different people can have different perspectives (Evans et al., 2010; Perry, 1968).

The reflective ePortfolio process facilitates reflective practice through prompts in the curriculum that encourage students to challenge their underlying principles. For example, an important exercise in the MPortfolio process is called generative listening (also known as Generative Knowledge Interviewing). This exercise consists of a student discussing one or more key experiences and why they were important to this person. The listener, rather than engaging

actively, listens specifically for the speaker's core competencies. Melissa Peet (2012), who pioneered this process, explains how it can be even more powerful than self-reflection:

> Reflection on our experiences can provide some access to our tacit knowledge, but it is not enough. Reflection cannot reach the vast amount of knowledge, skills and capacities possessed unconsciously. The goal of a Generative Knowledge Interview is to uncover the extraordinary knowledge, skills and capacities people have gained from learning to respond to the demands of everyday life. These interviews reveal what people have gained from solving problems, working with different types of people, adapting to different organizations, negotiating competing interests within relationships, and so on. When recognized and understood, this knowledge can be fundamentally empowering to both individuals, and the organizations in which they work. (p. 63)

What is remarkable about this process is that the listener will hear obvious and important things about the speaker's key experiences that have never occurred to the speaker at all. Using an example from personal experience, I engaged in this activity as a listener with one of my colleagues. She spoke of deeply impactful experiences working with battered women and how these experiences led her to a career focusing on supporting oppressed people by helping them cope with trauma and improve their mental health. There was a recurring theme that emerged as she spoke: throughout her key experiences, she used the arts to support the populations with whom she was working. This was clear as day to me as a listener, but it was a connection that she never made, not before and not even while she was speaking explicitly about these experiences. As I made the connection for her, it was like a light bulb went on in her head, as she could not believe that she had never seen this connection before. We take for granted that

our espoused theories guide our actions. The reflective ePortfolio process, at a minimum, should help students realize that these two things are frequently misaligned and, optimally, provide them with the tools to transform their tacit knowledge to explicit knowledge on their own.

      Self-Authorship. The third theoretical foundation explaining integrative learning is self-authorship. Earlier in this chapter, I described the distinguishing characteristic between transfer of learning and integrative learning. To reiterate, transfer captures the connections and applications of learning across settings; integrative learning is a more complex concept because it also incorporates the development that individuals experience through the process of connecting and reflecting upon learning. Self-authorship can explain the developmental component of integrative learning. Focusing on the ways in which individuals make meaning in their lives, self-authorship explores how individuals understand the world and their abilities to confront the complexities and challenges of modern life. Additionally, self-authorship aims to explain the multi-dimensional development that individuals experience as they encounter new problems and their consciousness evolves.

      Like transfer of learning, self-authorship has its roots in psychology, with the former emerging from cognitive psychology and the latter from developmental psychology. Specifically, self-authorship is a constructive-developmental theory, focusing on how individuals grow or change in the ways they make meaning (Kegan, 1994). Since it builds off the work of constructivist philosophers like Jean Piaget, self-authorship assumes that students take an active role in the learning process and that the learning environment is a central element in the construction of meaning. Observing that existing developmental theories incorrectly compartmentalized development into discrete domains, Robert Kegan introduced self-authorship as a concept that recognizes that the development of cognitive, intrapersonal, and interpersonal

domains is interconnected. In his book *In Over Our Heads: The Mental Demands of Modern Life*, Kegan (1994) argues that the expectations of today's society, in both the workplace and life at home, can be overwhelming and individuals must develop more advanced ways of knowing in order to meet these high expectations.

Kegan (1994) uses five "orders of consciousness" to explain the progressively complex ways of knowing. Of the five orders of consciousness, only Order 3, Order 4, and (to a lesser extent) Order 2 apply to college student development. Children move from Order 1, which is characterized by thinking that is fantastic, illogical, and egocentric, to the more logical and organized Order 2, in which individuals begin to develop a sense of self. A defining attribute of Order 2 is that individuals make meaning by constructing "durable categories," the classifications we give to people, physical objects, and emotions to distinguish them from ourselves. Individuals in this order are motivated by their own self-interest and, as a result, they often fail to consider how their actions might impact others. As individuals begin to connect durable categories to each other, they move into Order 3. "The primary capacity of [Order 3] is the ability to experience the self in relation to a given category rather than as the category itself" (Love & Guthrie, 1999, p. 70). Order 3 individuals can not only construct their own points of view but they can also recognize that others have their own points of view. However, individuals at this level of development still look to others to tell them what to do and how to think. Kegan (1994) notes that in Order 3, relationships with others serve "as sources of internal validation, orientation, or authority" (p. 5). The transition from Order 3 to Order 4 is the main transformation of consciousness in adulthood and represents an individual's evolution to self-authorship (Love & Guthrie, 1999). In Order 4, an individual's locus of meaning making becomes internal, giving him or her the capacity to determine his or her own values and beliefs.

At this stage of development, individuals now have the ability to consider multiple perspectives, to construct their own belief system by synthesizing and evaluating multiple viewpoints, and to reflect on their own values and beliefs. Kegan (1994) proposes a fifth order, characterized by a heightened understanding of social systems, that very few people ever achieve and never before they reach the age of forty.

Baxter Magolda (1992, 1998, 2001) applied this approach to human development to college students specifically. Based on multiple decades of research on the development of college students, she established a four-phase model of students' paths on the "journey toward self-authorship" (Baxter Magolda, 2001, p. 5). It is important to note that this model is not a linear, stage-based model; Baxter Magolda and King (2012) use the imagery of interwoven strands of ribbons representing the variable and unpredictable pathways toward self-authorship. Like Kegan's orders, these four phases describe an individual's progression from external meaning making to internal meaning making. Phase 1, Following Formulas, is the most externally oriented phase, in which one's construction of beliefs and values is based on the perspectives of external sources. The second phase, Crossroads, arrives when the individual begins to question his or her beliefs and recognizes the need to evolve these beliefs in order to suit the changes in his or her life. It is during this phase that individuals establish the need develop a sense of self, which leads to a newfound emphasis on internal thought and skepticism of external perspectives. The third phase, Becoming the Author of One's Own Life, is similar to Kegan's fourth order of consciousness. It is in this phase that the individual develops the ability to choose his or her own values and beliefs and stand by these beliefs when confronted by conflicting external perspectives. During the fourth phase, Internal Foundation, individuals solidify their belief systems so that they have a strong sense of self. Baxter Magolda (2008)

revisited the later phases of self-authorship as her longitudinal study continued as participants advanced into their thirties. This extension of the work revealed three elements of self-authorship. Individuals enter the Becoming the Author of One's Own Life phase by *trusting the internal voice*, the process during which individuals realize that they have control over their own understanding and become confident of their internal voices. Aligned with the start of the Internal Foundation, *building an internal foundation* is establishing the "core of one's being" (p. 280). The third and final element of self-authorship, occurring in the Internal Foundation phase, is *securing internal commitments*. It is at this point that individuals integrate "their internal foundations with the realities of the external worlds, which led to a sense of freedom to live their lives authentically" (Evans et al., 2010).

Baxter Magolda (1999) emphasizes that the cognitive, intrapersonal, and interpersonal domains are important parts of the development that individuals experience on the journey to self-authorship. "Self-authorship means believing one can construct knowledge claims, make one's own inner psychological life, and regulate relationships with others to maintain one's own identity. Genuine self-authorship occurs when one reaches self-authorship in all three dimensions" (p. 39). The cognitive (or epistemological) dimension of self-authorship examines the basis of our beliefs and poses the question, "How do I know?" Individuals in the early stages of cognitive development assume that knowledge is certain and see the world in black and white, right and wrong. As they develop, they begin to recognize the complexity of diverse perspectives and values, first acknowledging that varying perspectives exist and eventually being able to analyze and compare conflicting opinions to understand that different viewpoints are not necessarily equally valid (Perry, 1968). The intrapersonal domain focuses on one's identity and prompts the individual to answer the question, "Who am I?" Early intrapersonal development is

characterized by a lack of awareness about one's own social identity (e.g., race/ethnicity, class, sexual orientation) and a lack of understanding about other cultures. As individuals develop intraculturally, they form an internal, personal identity that is distinct from the external identity that others project upon them and begin to recognize the legitimacy of other cultures (King & Baxter Magolda, 2005). The interpersonal domain explores our relationships by asking, "How do I relate to others?" It is in this domain that individuals must confront moral and ethical ambiguity. Development in the interpersonal domain spans from judgments and values based on external societal expectations, at the lowest level of development, to defining personal values based upon principles that one has determined internally, at the highest level of development (Kohlberg, 1976).

Self-authorship, integrative learning, and the reflective ePortfolio process. Like the AAC&U literature on integrative learning, Kegan's conception of self-authorship is aimed at preparing individuals to navigate the complexities of adult life in today's society. Drawing the two bodies of literature together, it is not enough for individuals to make simple connections between concepts; they must be able to synthesize and evaluate varying concepts and perspectives. In order solve complex problems, individuals must be able to make valid evaluations of multiple perspectives, have a secure, personal identity developed internally, and be able to make moral and ethical judgments based on one's own principles rather than those determined by societal expectations. These qualities require an internal locus of meaning making, one that is developed through the process of integrating learning. As noted above, connecting learning and reflecting upon it can result in cognitive dissonance. It is this cognitive dissonance that makes individuals realize that knowledge is not certain and that our conceptions of self and relationships with others should not be formed solely by the expectations of others.

To explore the intersection between MPortfolio and self-authorship, it is helpful to refer to the Learning Partnerships Model (LPM) (Baxter Magolda & King, 2004), a pedagogical model built on the assumption that a major goal of learning is self-authorship. This model aims to provide a framework for environments that successfully promote self-authorship. According to the LPM, there are three assumptions that challenge students and three principles that provide support to students. The assumptions that challenge students align with the three domains of self-authorship. Successful environments portray knowledge as complex and socially constructed (cognitive), assume that the self is central to knowledge construction (intrapersonal), and share authority and expertise between partners (interpersonal). Balancing these three assumptions that challenge students are three principles for supporting them: validating learners' capacity to know (cognitive), situating learning in the learner's experience (intrapersonal), and defining learning as mutually constructing meaning (interpersonal). This is the type of scaffolding that MPortfolio provides. As an inductive learning process, the learner generates new knowledge from his or her own experiences and the process implicitly validates the learner since knowledge construction is based on these personal experiences. Further, the shared experience of guided reflection and generative listening helps create an environment in which learning can be mutually constructed. By embracing these principles, the reflective ePortfolio process can be an ideal environment in which educators can foster student development.

Summary of Chapter

Championed by the AAC&U as an essential learning outcome in postsecondary education, integrative learning is a promising pathway for preparing individuals to confront complex problems successfully in a rapidly changing and increasingly global society. After reviewing two prominent definitions of integrative learning, I have defined integrative learning

as a mindset in which individuals seek to explicitly connect, evaluate, and synthesize learning from curricular, co-curricular, and personal experiences, so that they can apply their knowledge, skills, and values in new, complex settings in their personal, professional, and academic lives and over time. This is hardly a new concept, as connecting different types of knowledge has been a significant concept in higher education for more than a century and a half. In recent years, though, there has been a greater sense of urgency around this concept as college graduates enter a workplace that increasingly emphasizes knowledge and the flexibility to move from one position or role to another. AAC&U, in particular, has promoted integrative learning as an outcome and, in its VALUE rubric, provided a framework for assessing integrative learning. Unfortunately, there is still relatively little research exploring integrative learning as an outcome. As a result, educators have insufficient information about how to structure interventions that can effectively facilitate integrative learning. The few studies that do explore integrative learning tend to use simple instruments that focus on behaviors that might be indicative of integrative learning rather than employing a more nuanced instrument that directly addresses aspects of integrative learning. Finally, in this chapter, I explain how transfer of learning, reflective practice, and self-authorship serve as theoretical foundations of a multidimensional construct of integrative learning. Though each of these theoretical foundations is important on its own to our understanding of how individuals can thrive as learners, workers, and citizens, together they reveal how integrative learning can be a powerful means to developing individuals so that they are prepared to address the complexity of the modern world.

Chapter 4: Methodology

In this chapter, I describe the methodology that I employ in order to answer the research questions outlined in the introduction. This chapter is organized into nine sections. First, I provide additional detail about the study's research questions. Next, I describe the sites, the courses and co-curricular experiences, that have engaged in MPortfolio and have participated in this study. In the third section, I provide a description of the Integrative Learning Self-Assessment, the instrument that I used to measure integrative learning. In the fourth section, I describe both the correlational and causal designs that I employed in the study. In the fifth section, I specify the variables that I used in the study. In the sixth section, I describe the samples used in my analyses. In the seventh section, I detail the analytical approaches I used to generate the results that I share in the next chapter. In the eighth section, I summarize the limitations of the research. In the ninth section, I conclude with a summary of the chapter.

Research Questions

The overarching question addressed by this research is: *Do ePortfolios foster integrative learning?* Accordingly, all of the research conducted in this study is designed to answer this central research question. Using a pre-/post-survey design, I will investigate whether integrative learning changes between when students start the reflective ePortfolio process and the end of the process. In addition to producing practical findings with implications for educators, I expect that answering this research question will result in contributions to both the body of literature exploring the influence of assessment on student achievement and also the emerging body of literature on integrative learning.

In order to organize the research in a manageable way and to develop a more fully formed understanding about specific aspects of the reflective ePortfolio process, a series of sub-questions will guide the inquiry proposed in the overarching research question. The first sub-question *("Over the course of the reflective ePortfolio process, how does integrative learning change in students?")* explores the relationship between engagement in the reflective ePortfolio process and integrative learning. Looking only at students who engage in the process, how does integrative learning at the end of the experience compare to how it was at the beginning of the experience? Do students change positively and significantly? Answering this sub-question provides basic insight into how students change through their engagement in the reflective ePortfolio process.

Though the first sub-question is useful for determining whether students change over the course of this process, the analysis related to this sub-question can only provide insight into the correlational rather than the causal relationships associated with ePortfolios and integrative learning. The goal of the second sub-question (*"What is the causal impact of ePortfolio use on integrative learning?"*) is to determine whether the relationship between engagement in a reflective ePortfolio process and integrative learning is causal. In other words, can one plausibly attribute the development of integrative learning to this particular experience rather than all of the other curricular, co-curricular, social, and personal things happening in the lives of college students? Previous research at the University of Michigan has demonstrated that students experience positive changes in integrative learning over the course of the MPortfolio experience (Peet et al., 2011). However, without a control group, this research does not demonstrate whether the gains associated with MPortfolio are any different from the changes that the students may have experienced without engaging in the MPortfolio process. As noted in the literature

review, causal studies are largely absent from the assessment literature, so the present study could contribute to filling this substantial gap.

The third sub-question (*"What student characteristics contribute to variation in integrative learning through the use of ePortfolios?"*) explores whether some students develop integrative learning more (or less) than other students. Understanding the differences in integrative learning may be helpful in determining that the process is well suited for certain types of students and that other types of students are not experiencing the learning gains one might expect. For example, the analysis could reveal that engaging in this process is especially beneficial for first-year students but not for seniors or that engineering students do not experience significant learning gains. Ideally, this process fosters students' development of integrative learning equally, without any differences by gender, race, and other important background characteristics. However, it is possible that these differences do exist and it is helpful to recruit students who would really benefit from the experience and to identify students who are at-risk for having inferior learning experiences.

The fourth sub-question (*"What learning process characteristics contribute to variation in integrative learning through the use of ePortfolios?"*) aims to determine whether experiences with certain characteristics more strongly facilitate integrative learning and to identify effective practices for developing integrative learning through ePortfolio usage. At the University of Michigan, MPortfolio exists as part of a variety of curricular and co-curricular experiences. For example, the Division of Student Affairs' First-Year Experience course is 1-2 credit course that has MPortfolio as its focus. First-year undergraduate students select this course, which is facilitated by their Resident Advisors, because they want to engage in the process of reflecting on their experiences, developing goals, and creating a personal ePortfolio. At the graduate level,

the School of Information's (SI) Practical Engagement Program is an experience in which nearly all SI master's students engage during while doing an internship during the summer between their first and second years. The program contains a reflective ePortfolio component and is conducted entirely online, including the sharing and peer review of student reflections. There are stark differences between these types of experiences and taking advantage of the variation between the different types of experiences should shed some light on what settings and practices are effective.

Finally, the purpose of the fifth sub-question (*"Does the development that students experience persist beyond their initial experiences using ePortfolios?"*) is to determine whether the learning that students experience through the MPortfolio process stays with them years after the initial experience or whether it fades away over time. The research design employed in this study is a pre-/post-survey design, with surveys administered at the start of the process and again at the end. With this design, it provides evidence about how students change over the course of the experience but does not demonstrate whether students retain what they learn beyond this experience. The present study also includes a follow-up survey two years after the completion of the experience to determine whether the changes persist. This has the potential to be a compelling contribution to the research since implicit in the integrative learning outcome of this study are habits of mind that students should carry with them through their lives.

Description of Sites

In this section, I provide descriptions of the various MPortfolio experiences that are represented in the current research study. The use of reflective ePortfolios has existed as a part of a variety of student experiences at the University of Michigan. I refer to the curricular and co-curricular experiences in which students can engage in MPortfolio as "sites." Since 2009, the

MPortfolio research team has offered educators at each University of Michigan site the opportunity to participate in MPortfolio research activities. Participation in the research provides educators with data that they can use to improve their programs, while the analysis of data across experiences improves our broader understanding of integrative learning and how the use of reflective ePortfolios can facilitate the development of this important outcome. There are sites that have been a part of the research since its inception; some sites have participated in some years but not others. Finally, some educators involved in MPortfolio have elected not to participate in research activities for their sites.

Over the past few years, the Division of Student Affairs has adopted integrative learning as a key intended outcome of the student experience. The Division of Student Affairs has also driven both the research agenda and the research activities associated with MPortfolio. As a result, much of the data collected for this dissertation comes from students who have engaged in MPortfolio experiences offered by the Division of Student Affairs.

Rather than highlighting just a selection of the sites, I have elected to provide at least a brief description of all of the sites involved in the research. The rationale for this is that the characteristics of each site are important for answering the fourth sub-question (*"What learning process characteristics contribute to variation in integrative learning through the use of ePortfolios?"*). In order to explore how characteristics of the learning process are associated with the development of the integrative learning outcome, it is essential to understand the features of each site (e.g., facilitation type, number of students).

UC 421: ResStaff Class. In this study, the MPortfolio experience that has the largest number of students participating each year is UC 421, a 3-credit course for training new Residence Staff. The vast majority of students in this course are sophomores who have been

hired by University Housing to be Resident Advisors during their junior and senior years, though there are also some students who have been hired to serve as Diversity Peer Educators and Peer Academic Success Specialists. Led by faculty and staff affiliated with University Housing and the Program on Intergroup Relations, the course has four emphases: (1) identity development, (2) building inclusive communities, (3) the role of power and privilege in intergroup relations, and (4) being an ally for all residents. Each year, nearly 200 students take this course during the Winter term. In addition to meetings of the entire group, students meet in small groups that are facilitated by faculty, staff, and a few current members of the student Residence Staff. These groups typically consist of about 15 students and two facilitators. It is in these intimate small groups that students share their reflections on identity, community, multiculturalism, and their experiences. All students in the course are required to complete an ePortfolio aimed at integrating curricular and co-curricular experiences so that students have a stronger understanding of themselves and are better prepared to serve as ResStaff. UC 421 is a Division of Student Affairs course.

Psych 322: First-Year Experience Course. Psychology 322, also known as the First-Year Experience Course, was introduced as a pilot course by the Division of Student Affairs during the Winter 2011 term. This 1-2 credit course is a unique experience for first-year students, as class meetings are facilitated by the students' Resident Advisors and occur in the residence halls. Interviews with Resident Advisors who have led the course have suggested that peer facilitators have ways of connecting with students that faculty or staff might not. One interviewee nicely described the benefit of the peer-to-peer facilitator relationship:

> I think just having someone that is within a couple years of their own age was really
>
> helpful. I was a junior at the time I was teaching this… having someone who is so close

age-wise to you allows you to open up a little bit more. I've always felt going into

professor's office hours that I have to keep my conversations strictly academic, that I

can't talk about my own interests and where I want to go in…But having someone their

own age who would understand what they are going through who was a freshman just a

few years ago I think that really helped them learn about this and our approach to

teaching it.

This type of relationship is especially valuable in a setting where we are asking students to

reflect on personal experiences. Having such a high level of comfort with a facilitator could

encourage students to engage in ways that they might not otherwise.

While this course is based on the same curriculum and pedagogy that guides other

Division of Student Affairs MPortfolio experiences, the First-Year Experience course has a

stronger emphasis on developing and evaluating goals. Another distinct characteristic of this

course is that it is the only MPortfolio experience in this study in which students select the

experience so they can engage in MPortfolio. For example, students who engage in MPortfolio

through UC 421 do so because they aspire to be part of the Residence Staff. However, students

who engage in MPortfolio through the First-Year Experience Course do so because they want to

participate in MPortfolio. Resident Advisors market the course to their residents as an

opportunity to participate in MPortfolio so that they can develop personal goals and have a

greater understanding of themselves. According to the course description:

In this class, students are not only given the opportunity but are expected to reflect upon

and examine their goals and experiences. This examination will explore student values

and life themes. Using that information, students will create an online portfolio that

contains their goals, a philosophy statement about their motto in life, and a few

meaningful experiences from their past…By the end of the class, each student will have a clear idea of who they are, what they value and why, and how it applies to their lives at the University of Michigan and beyond.

During the 2013-14 academic year, about 50 students took this course during the Fall term and about another 50 took the course during the Winter term. While the Resident Advisors are responsible for leading the course (including teaching, providing feedback, and grading), Professor Patricia Gurin oversees the course, provides guidance to the Resident Advisors, and makes the final determinations about course grades. Recognizing the First-Year Experience Course as a way to scale up and engage a large number of undergraduates in MPortfolio, the Division of Student Affairs intends to expand this course considerably over the next few years.

Intergroup Relations (IGR). Founded in 1988, the Program on Intergroup Relation (IGR) is a social justice education program at the University of Michigan. With a mission of pursuing social justice through education, IGR offers academic courses, workshops, and resources to engage students, faculty, and staff so that they learn about the complexities of living in a multicultural society. IGR also produces research and engages in outreach activities in order to develop a greater understanding of the relationship between social conflict and social justice. IGR has two courses in which students engage in MPortfolio: The IGR Capstone (UC 470: Social Justice in the Real World) and the IGR Practicum (UC 321: Practicum in Intergroup Dialogue Facilitation). Both IGR courses fall under the umbrella of MPortfolio experiences offered by the Division of Student Affairs.

Offered only to seniors, the IGR Capstone is a course that focuses on social justice and social change and asks students to consider how they might engage in these types of issues after they graduate. Due to its personal nature, a key aspect of the course is having students reflect

and explore their values, skills, and future plans. This reflective component makes it a natural fit to incorporate MPortfolio. Each year, 15 to 20 students engage in MPortfolio through the IGR Capstone during the Fall term.

The IGR Practicum is part of a course sequence aimed at training students to facilitate intergroup dialogue. By participating in this course, students are expected to attain the skills and knowledge necessary for facilitating multicultural group interactions. The course addresses such topics as prejudice, stereotyping, privilege, oppression, social identity, and group development and the intended learning outcomes of the course include basic group facilitation skills, group dynamics, conflict intervention, intergroup communication, and community building. In order to be an effective facilitator of multicultural groups, students are expected to have a strong understanding of themselves, including their own identity, knowledge, skills, and values. MPortfolio has been identified as a tool that can support students as they reflect and explore these aspects of themselves. Each year, approximately 25 students engage in MPortfolio through the IGR Practicum.

Living Arts. Living Arts is an interdisciplinary residential community on the University of Michigan's North Campus. In this living-learning community, undergraduates in the arts, architecture, engineering, and other fields explore innovation, creativity and collaboration through weekly classes, monthly workshops, and collaborative projects. Approximately 80 students participate in Living Arts each year. During the 2011-12 academic year, Living Arts introduced MPortfolio as component of the program. Due to changes in staffing, the MPortfolio component was not included during the 2012-13 and 2013-14 academic years, although the educators running the program expect to reintroduce MPortfolio to the program in the future. Though Living Arts is a collaborative venture that is co-sponsored by the College of

Engineering, the School of Art and Design, the School of Music, Theatre and Dance, and the

Taubman College of Architecture and Urban Planning, the Division of Student Affairs considers

it to be one of its own MPortfolio experiences because the residential component of the program

is tied to its University Housing unit.

Other Division of Student Affairs MPortfolio Sites. In an effort to expand the reach of

MPortfolio to students, the Division of Student Affairs offered grants to units interested in

engaging in integrative learning work during the 2012-13 academic year. These grants could be

used to offer stipends to participating students and to cover administrative costs associated with

introducing this work to students. Three Division of Student Affairs programs introduced

MPortfolio to small groups of students: (1) Ginsberg Project Community, (2) the Michigan

International Internship and Service Program, and (3) the Sexual Assault Prevention &

Awareness Center.

The Ginsberg Center for Community Service Learning has a mission of engaging

students, faculty, and community members in learning together through community service and

civic engagement in a diverse, democratic society. In a collaboration with the Sociology

department, the Ginsberg Center offers Project Community, a course in which students

complement their academic readings and discussions by serving with local organizations. In Fall

2012, six students taking the Project Community course created a joint ePortfolio that

incorporated reflections on their own experiences and learning.

Offered by the University of Michigan's International Center, the Michigan International

Internship and Service Program (MIISP) is a program for undergraduate students who are

interested in doing an internship or service project abroad during the summer. Students who

participate in MIISP prepare for their international experience by engaging in workshops

throughout the academic year before their summer international internship experience. While

they are abroad, students are expected to maintain a blog about their experiences. In Fall 2012,

the program added a third phase in which students create a reflective ePortfolio and act as peer

advisors for the next cohort of MIISP students. During the 2012-13 and 2013-14 academic

years, a total of 13 MIISP students engaged in MPortfolio.

Sexual Assault Prevention & Awareness Center (SAPAC) provides educational and

supportive services related to sexual assault, intimate partner violence, sexual harassment, and

stalking to the University of Michigan community. The organization's activities include

promoting healthy relationships, teaching non-violence and equality, supporting survivor

healing, and fostering a respectful and safe environment for all members of the university

community. During the 2012-13 academic year, SAPAC engaged in MPortfolio work for the

first time by having its student co-coordinators participate in reflective activities with each

student co-coordinator creating an ePortfolio. During the 2012-13 and 2013-14 academic years,

a total of 11 SAPAC students engaged in MPortfolio.

During the 2013-14 academic year, the Ginsberg Center and the International Center both

expanded their integrative learning activity by introducing the MPortfolio process to two other

co-curricular experiences. Ginsberg Fellows is a year-long community engaged leadership

program in which a small cohort of students participates in training and mentorship and engages

in intentional reflection. The International Center Student Council (ICSC) is an advisory group

that gives international students the opportunity to identify and examine issues that are of

particular importance to the international student community. In addition to striving to achieve

their stated goals (i.e., community engaged leadership and serving the international student

community), these programs build time into their group meetings to engage in reflective

activities and require students to develop personal ePortfolios. In their first year incorporating MPortfolio, Ginsberg Fellows and ICSC engaged 4 and 11 students, respectively, in the reflective ePortfolio process.

Finally, the Division of Student Affairs recognizes the Michigan Research Community (MRC) and Women in Science and Engineering (WISE) programs as DSA MPortfolio experiences. MRC is a residential program in which first-year students partner with a faculty member on a research project. WISE is a program aimed at increasing the number of females who pursue degrees and careers in science, technology, engineering and mathematics. These programs have incorporated MPortfolio in the experiences of their students for several years. However, their participation in the MPortfolio research was only during the 2010-11 and 2011-12 academic years.

School of Information. All students in the School of Information's Practical Engagement Program (PEP) are required to complete a reflective ePortfolio. A part of the School of Information's professional master's program, PEP aims to help students take the knowledge and skills they have learned in the classroom and apply them to specific problems outside the classroom. This work is typically aligned with a summer internship between the first and second year of a student's master's program. What is unique about this experience relative to other ePortfolio experiences on the University of Michigan campus is that, since students are off-campus while they are working in their internships, the reflections, sharing with classmates, and feedback are all online. The School of Information participated in the MPortfolio research in 2012. PEP still includes a reflective component but has moved away from using ePortfolios as an assessment tool since so many of their students already had their own ePortfolios.

Undergraduate Research Opportunity Program (UROP). Founded in 1988, the Undergraduate Research Opportunity Program (UROP) partners students with faculty, staff, research scientists, and graduate student researchers across the University of Michigan community to work on research projects. Each year, about 1,300 undergraduate students and more than 700 faculty participate in the program with all of the university's colleges and schools represented. Though most students participate in the program for one year, some students continue onto a second year as a part of the UROP Research Scholars program. As Research Scholars, students continue work on their research projects and participate in seminars focusing on identifying and pursuing academic and career goals. During the Fall term, students develop individual academic plans and develop their ePortfolios during the Winter term. UROP's Changing Gears program also has an ePortfolio component. A program specifically for students who have transferred to the University of Michigan from a community college, Changing Gears partners students with faculty who not only provide them an opportunity to do research but also serve as mentors and offer professional support. Like the students in the Research Scholars program, Changing Gears students are expected to create a personal ePortfolio during the Winter term. Each year, approximately 100 Research Scholars and 60 Changing Gears students participate in their respective programs and create ePortfolios.

Sweetland Writing Center. The Sweetland Writing Center exists to support all types of writing for University of Michigan students at all levels. In addition to providing consultation and tutoring to students, Sweetland offers a Minor in Writing. As part of the minor's Writing 220 gateway course, students create ePortfolios that aim to showcase the range and quality of their work. During the 2009-10 academic year, 84 students both created ePortfolios through Sweetland and participated in the MPortfolio research. Though there continues to be an

ePortfolio component to the Minor in Writing, Sweetland has not participated in the research since the initial year (2009-10).

University of Michigan-Dearborn School of Education. In addition to the MPortfolio activities on the University of Michigan's Ann Arbor campus, students in the College of Education, Health, and Human Services (CEHHS, formerly School of Education) at the University of Michigan's Dearborn campus also engage in MPortfolio, using the same curriculum and pedagogy. The CEHHS MPortfolio initiative has three goals: (1) to strengthen and support integrative learning across the curriculum, (2) to support accountability/accreditation, and (3) to promote life-long learning by providing access to MPortfolio tools beyond graduation. At the time that UM-Dearborn participated in the MPortfolio research, it was the expectation that all CEHHS students would engage in MPortfolio. After participating in the research in 2009-10 and 2010-11, UM-Dearborn withdrew from the research.

Other Non-DSA MPortfolio Sites. Two smaller sites outside of the Division of Student Affairs have been part of the research for several years and continue to participate presently. The first is tangentially related to the Division of Student Affairs since it is a course taught by Dr. Simone Himbeault Taylor, Associate Vice President for Student Affairs, in the School of Education. In *Foundations for Student Affairs Educators*, students explore strategies for managing programs and services designed to meet the needs of students in postsecondary education. The course requirements include engaging in reflective exercises and creating an ePortfolio. Approximately one dozen students take this course each year. Second, each year 3 to 5 student employees from the Office of New Student Programs and the Arts at Michigan program create reflective ePortfolios and participate in the research. Other non-DSA

experiences that have engaged in MPortfolio and participated in the research include English 125

(N = 12, in 2009-10) and the School of Social Work (N = 42, sporadically across all five years of

the research).

       Summary of Sites. In total, 1,600 students engaged in MPortfolio and completed both

the pre-survey and the post-survey. These students represented 18 sites that included both

curricular and co-curricular experiences and featured a wide range of enrollments, a variety of

process lengths, and different approaches to facilitation. This variation can potentially provide

insights into effective approaches to engaging students in the reflective ePortfolio process and

fostering integrative learning. Later in this chapter, in the sections describing the variables used

and the analytic samples, I provide additional information about how I accounted for site

differences in order to explore the relationship between learning process characteristics and

integrative learning. Additionally, Appendix A presents information about how the specific

features of each site are operationalized in the research.

The Survey Instrument: The Integrative Learning Self-Assessment

       As noted above, this study employed a pre-/post-survey design. Students completed a

pre-survey at the start of the MPortfolio experience and a post-survey at the end. This approach

allows researchers to measure the extent to which students change over the course of the

experience. In most cases, the process lasts one semester, though the MPortfolio experiences

represented in this study range from as short as six weeks to as long as two semesters. In order

to answer the sub-question that asks whether the changes that students experience persist beyond

the initial MPortfolio experience, students who engage in MPortfolio through the Division of

Student Affairs receive a follow-up survey two academic years after their initial MPortfolio

experience. The remainder of this part of this section describes the common items that appear on the pre-survey, post-survey, and follow-up survey as well as the unique features of these surveys.

Measure of Integrative Learning. The main instrument that I used to answer the research questions of this study is the Integrative Learning Self-Assessment. Described briefly in the literature review, this survey instrument is based upon the AAC&U integrative learning VALUE rubric and has been utilized in MPortfolio research efforts since 2009. A team of researchers at the University of Michigan, comprised of Simone Himbeault Taylor, Malinda Matney, Patricia Gurin, Melissa Peet, Steve Lonn, and Tiffany Marra, designed the Integrative Learning Self-Assessment to measure the conceptual dimensions of integrative learning. When administered at different points in time, this self-assessment allows researchers to measure the changes that students experience in multiple dimensions of integrative learning over the course of a learning experience. The core of the survey is composed of 37 statements in 12 categories with which students are asked to indicate their level of agreement on a five-point Likert scale (from "strongly disagree" to "strongly agree"). The categories are listed below:

- Recognize personal strengths and challenges

- Identify personal values and beliefs

- Explore personal background, social identities, and perspective

- Work across social and cultural differences

- Recognize knowledge and skills gained from different types of learning experiences

- Transfer and apply knowledge and skills to new contexts

- Work within my passion, interests, and sources of curiosity

- Develop an on-line professional identity

- Work effectively in groups or teams

- Evaluate and modify my work

- Work with others to make a difference

- Engage in ethical decision-making and actions

Table 4.1, on the next three pages, presents the 37 statements in the order that they appear on the survey, organized by the 12 categories.

Table 4.1: Categories and Items on the Integrative Learning Self-Assessment
Category / Survey item
Recognize personal strengths and challenges
1. I can identify my strengths and the challenges (e.g., gaps in my knowledge) I encounter in specific learning or work situations (e.g., in writing a paper or doing research).
2. I make choices to enhance my strengths and address my gaps/challenges in specific work or learning situations (e.g., going to office hours when I am struggling to understand something).
3. I can provide evidence (i.e., in an essay, story, PowerPoint, or ePortfolio) of how I have expressed my strengths and/or taken action to address my challenges in specific situations.
Identify personal values and beliefs
4. I can articulate specific examples of my personal values and beliefs (e.g., believing in values such as "self-motivation" or "contributing to the well-being of others").
5. I can identify examples of how my personal values and beliefs influence my learning, decisions, and actions (e.g., in the subjects I have chosen to study, or the groups I have chosen to join).
6. I can provide evidence (i.e., in a reflective essay, video, or an ePortfolio page) of how my personal values and beliefs have informed my decisions and actions.
Explore personal background, social identities, and perspective
7. I am aware that my background and social identities (e.g., my race, gender, nationality, social class, religion, sexual orientation) influence my perspective - how I see the world and make sense of things.
8. I can identify specific experiences (e.g., moments in my classes or in social situations) where I have learned about the strengths, limitations, and/or biases inherent in my own perspective.
9. I can provide evidence (i.e., a reflection essay, PowerPoint, or an ePortfolio page) of the knowledge and insights I have gained regarding the strengths, limitations, and biases within my own perspective.
Work across social and cultural differences
10. I recognize how interacting with people from backgrounds and cultures different from my own enhances my work and learning.
11. I actively seek to understand the views of people with backgrounds and perspectives different from my own.
12. I can demonstrate (i.e., through stories, reflection essays, or an ePortfolio page) the specific

ways in which I have learned from people with backgrounds, cultures, and perspectives different from my own.

Recognize knowledge and skills gained from different types of learning experiences
13. I understand that different types of knowledge/skills are gained from different kinds of experiences (e.g., in general, the knowledge/skills gained from taking an English class are different from the knowledge/skills gained from participating on a sports team).
14. I can clearly identify the specific types of knowledge and skills I have gained from different learning and life experiences (e.g., from academic classes, paid work, personal challenges, or leadership opportunities).
15. I can clearly demonstrate (i.e., through a reflective essay, video, PowerPoint, or an ePortfolio page) the specific types of knowledge and skills I have gained from a wide range of learning and life experiences.

Transfer and apply knowledge and skills to new contexts
16. I understand the need to connect knowledge I have gained from one place (e.g., the skills gained from participating on a sports team) to other situations (e.g., working with a group to solve a math or chemistry problem).
17. I can identify several different examples of how I have applied the knowledge or skills I have gained from one experience (e.g., learning to convey the essence of complex information for a science presentation) to other situations (e.g., creating an interesting website for a student organization).
18. I can provide evidence (i.e., though an essay, video, PowerPoint, or an ePortfolio page) of the specific ways in which I have applied the knowledge/skills I have gained in one experience to other situations or contexts.

Work within my passion, interests, and sources of curiosity
19. I can clearly identify the passions, interests, and sources of curiosity that influence my learning, work, and social life.
20. I have the habit of creating learning and/or professional goals that are informed by my passions, interests, sense of purpose, or sources of curiosity.
21. I can demonstrate to others (i.e., through a PowerPoint presentation, paper, video, or an ePortfolio page) the knowledge/skills I have gained from pursuing an area of study, or engaging in a series of actions, that reflect my passions, interests, and sources of curiosity.

Develop an on-line professional identity
22. I understand the need to develop an online professional identity that is different from a typical Facebook or MySpace identity (e.g., through the development of a professional web page or an integrative ePortfolio).
23. I am taking steps to develop a professional online identity that demonstrates my knowledge, skills, values, goals, and contributions to others (e.g., through a professional web page or an integrative ePortfolio).
24. I am continually updating and expanding my online professional identity (i.e., through a personal web page, or an integrative ePortfolio) in order to demonstrate my knowledge, skills, values, goals, and contributions to others.

Work effectively in groups or teams

25. In a group or team situation, I pay attention to who is, and who is not, participating fully in the discussion and the activities of the group.

26. I ask questions and listen to others in order to understand if and how the needs, goals, perspectives, interests, etc. of all group members are being addressed in the group's decision making and activities.

27. I can provide evidence (i.e., through a story, video, PowerPoint, letter of recommendation, or an ePortfolio page) of the ways in which I have learned how to positively contribute to the functioning of a group or team.

Evaluate and modify my work

28. I can identify the standards that both myself and others will use to evaluate my learning and/or work (e.g., the criteria a professor or supervisor will use to assess my work as "excellent", "good", or "needs improvement").

29. I often reflect on if and how my work (academic and otherwise) is meeting my own standards and expectations.

30. I seek feedback on a regular basis in order to understand if and how my work (academic and otherwise) meets the needs, standards, and/or expectations of others.

31. I can demonstrate (i.e., through a reflective essay, feedback from supervisors, or as an ePortfolio page) how I have changed my perspective, decisions, or actions as a result of my own reflections or feedback from others.

Work with others to make a difference

32. I can work with others to identify a problem or need within a specific field, group, organization, or community (e.g., a school or non-profit organizations needing additional funds or resources in order to fulfill their mission).

33. I can work with others to develop a plan and take action in order to address the needs of a group, organization, or community (e.g., creating a stable funding stream to support a non-profit organization in an ongoing basis).

34. I can provide evidence (through a PowerPoint, video, letters from others, or ePortfolio page) of how I have worked with others to identify and address a problem, need, or challenge within a group, organization, or community.

Engage in ethical decision-making and actions

35. I recognize the need to reflect on how my decisions and actions affect others (i.e., asking myself, "Do my decisions contribute to the overall care, well-being, or positive functioning of individuals, groups, organizations, and communities that are a part of my life?").

36. I can identify specific moments or experiences where I have developed or practiced ethical principles (e.g., the principles of equity, justice, fairness, compassion, care) in my decision making and actions.

37. I can provide evidence of decisions and actions where I have either developed, or expressed, one or more ethical principles (e.g., equity, justice, fairness, compassion, care) in the context of working with individuals, groups, organizations, or communities that are a part of my life.

Employing language from the AAC&U VALUE rubric for integrative learning, this instrument reflects a definition of integrative learning that emphasizes critical reflexivity, tacit knowledge transfer, and working for social change. These emphases are partially consistent with the theoretical foundations described in Chapter 3. The integrative learning construct measured by this instrument, with its focus on the critical examination of one's assumptions and on the transfer of knowledge, aligns closely with all three of the theories reviewed: transfer of learning, reflective practice, and self-authorship. The Integrative Learning Self-Assessment diverges slightly is in its relational focus. Though development in the interpersonal and intrapersonal domains is encapsulated in self-authorship, the instrument also addresses working for social change. Specifically, there are multiple questions addressing students' abilities to work with others to identify problems, take action to address them, and provide evidence of doing these things. Finally, the survey includes three questions about developing an online professional identity. These questions make sense given the use of the ePortfolio as a reflective tool and because this set of items aligns with the integrated communication criterion in the integrative learning VALUE rubric. Also, within the intrapersonal domain described in the self-authorship literature, dimensions of identity for college students might include but are not limited to race, gender, social class, and sexual orientation (Abes, Jones, & McEwen, 2007; Jones & McEwen, 2000). Conceivably, given college students' current relationship with technology, how one presents himself or herself online might be a significant part of his or her identity.

Additional Survey Questions. In addition to the 37 items that serve as the basis for the integrative learning scales, the surveys include a variety of questions that provide researchers with information about students' backgrounds, experiences with MPortfolio, and plans to use their ePortfolio in the future. On the pre-survey, there are three brief sets of additional questions.

In the first set, the survey asks students about their co-curricular engagement, in what types of activities they participate and the number of hours they participate each week. Second, students are asked to indicate whether they identify as being part of a minority group. In the third set, students are asked to indicate their parents' or guardians' highest level of educational attainment. These questions are summarized in Table 4.2.

Table 4.2: Additional Survey Questions, Pre-Survey

Question	Response Options
What kinds of activities do you participate in outside of your academic courses?	
Student organizations	Yes
Paid work	No
Internships	
Peer teaching and/or mentoring	
Resident advising	
Research	
Sororities or fraternities	
Taking care of a family member or loved one (e.g., parent, child, or partner)	
Other (please specify)	
I don't participate in other activities.	
Do you experience yourself as a member of a minority group within your program or school?	
	Yes
	No
What is the educational level of your parents and/or your legal guardians?	
Mother	Grade school
Father	High school
Legal guardians	Some college
	Vocational certificate
	Associate's degree
	Bachelor's degree
	Advanced degree (e.g., M.D., M.S.W., M.B.A., M.P.H., Ph.D., or J.D.)
	Not applicable

On the post-survey, the additional questions are more extensive. Beyond the 37 integrative learning statements, students are first asked how frequently they engage in a variety of campus activities (e.g., taking courses within major, taking courses outside of major, employment, volunteering, research, Greek life) and how important these activities are to their development. This question is followed by a series of questions about the MPortfolio experience. In this set of questions, the survey first asks students whether they might use the reflection exercises, Generative Knowledge interviews, and/or your MPortfolio in the future for a variety of purposes (e.g., to reflect on experiences; to clarify personal philosophy, values, or goals; to show to people who are going to write letters of recommendation; to apply to graduate school; to apply to a job). Next, the survey asks students to indicate their level of agreement with several statements about how aspects of the MPortfolio process may have helped them achieve the intended integrative learning outcomes. For example, did the reflection process help them understand the value of their learning experiences? By including examples of work in their ePortfolios, did they develop a greater understanding of the knowledge and skills that they have gained? The next post-survey question asks students to indicate the levels of importance they would assign to several of the MPortfolio processes (listening to and sharing experiences with others, receiving feedback on the ePortfolio, giving feedback on others' ePortfolios, putting everything together in a completed ePortfolio, and sharing the ePortfolio with others). Students are then asked to indicate their level of agreement with two statements about the MPortfolio process: (1) I enjoyed creating my MPortfolio (e.g., choosing a design or finding images to go with my written content) and (2) I would recommend the MPortfolio experience to others. The survey concludes with five open-ended questions about the MPortfolio experience: (1) who (which groups of students) do you think would benefit the most from MPortfolio, (2) what do

you think was the purpose of MPortfolio, (3) what would you change to make MPortfolio better,

(4) what did you like most about MPortfolio, and (5) what did you like least about MPortfolio?

The complete set of additional questions on the post-survey is summarized in Table 4.3.

Table 4.3: Additional Survey Questions, Post-Survey	
Question	Response Options
Which of the following activities do you participate in and how important are these to your overall learning and development?	*Frequency*
Taking Courses within my major	Never
Taking Courses outside my major	Once a year
Participating in student organizations	Once a semester
Working for money (on campus)	Every month
Working for money (off campus)	Every week
Volunteering off campus for a group or organization	Daily
Volunteering on campus for a group or organization	
Engaging in peer teaching, mentoring, or resident advising	*Importance to your development*
Engaging in research	Not at all important (1)
Doing an internship	Not very important (2)
Participating in sororities or fraternities	Neutral (3)
Other (please specify below)	Somewhat important (4)
	Very important (5)
How might you use the reflection exercises, Generative Knowledge interviews, and/or your MPortfolio in the future?	
I might use one or all of them to continue to reflect on my experiences.	Yes
I might use one or all them to help me identify connections or common themes across my different experiences.	No
I might use one or all them to help me clarify my underlying philosophy, values, and/or goals.	
I might use one or all them to help me think about my future.	
I might share one or all them with friends or family.	
I might use one or all of them with professors, peers, or others in an academic setting.	
I might show my MPortfolio to people who are going to write letters of recommendations for me.	
I might use my MPortfolio to help me apply to graduate school (either sending it as a link or copying content for applications).	
I might use my MPortfolio to apply for a job or internship.	
Other (please specify)	
Please indicate your level of agreement with the following statements:	Strongly disagree (1)

The reflection process helped me understand the value of my learning experiences.	Disagree (2)
The completion of several portfolio pages helped me understand the relationship between different types of learning and life experiences.	Neutral (3)
The process of creating my Example(s) of Work helped me understand the knowledge and skills I have gained.	Agree (4)
The process of creating a Philosophy Statement helped me see connections between my experiences.	Strongly agree (5)

While creating your MPortfolio, how important was . . .

Listening to the experiences of others and sharing my own	Not at all important (1)
Receiving feedback on the content or design of your portfolio	Not very important (2)
Giving feedback on the content or design of your portfolio	Neutral (3)
Putting everything together for a completed portfolio	Somewhat important (4)
Sharing your portfolio with others	Very important (5)
	Not applicable

Please indicate your level of agreement with the following statements:

I enjoyed creating my MPortfolio (e.g., choosing a design or finding images to go with my written content).	Strongly disagree (1)
I would recommend the MPortfolio experience to others.	Disagree (2)
	Neutral (3)
	Agree (4)
	Strongly agree (5)

Who (which groups of students) do you think would most benefit from the process of creating an MPortfolio?	Open-ended
What do you think was the purpose of creating an MPortfolio as part of your course or program?	Open-ended
What would you change to make the MPortfolio experience better?	Open-ended
Please share with us what you liked most about creating your MPortfolio:	Open-ended
Please share with us what you liked least about creating your MPortfolio:	Open-ended

Administered approximately two years after students engage in MPortfolio, the follow-up survey includes the 37 integrative learning statements as well as a set of supplemental items. A portion of the supplemental items, summarized in Table 4.4, is directly applicable to the current research and focuses on students' continued use of what they learned and produced as part of the

MPortfolio process and to what extent their MPortfolio experience influenced various aspects of professional and academic development. Also relevant is a program evaluation question in which students are asked to reflect back on their MPortfolio experience and suggest how the process could be improved so that it would be more useful to them, having been through the process two years prior.

Table 4.4: Additional Survey Questions, Follow-Up Survey	
Question	Response Options
To what extent did your MPortfolio experience influence the following aspects of your professional and/or academic development?	Not at all (1)
Clarity about professional aspirations	Slightly (2)
Clarity about academic goals	Somewhat (3)
Ability to speak about yourself in an interview	To a moderate extent (4)
Ability to write an admissions essay	To a great extent (5)
	Not applicable
When did you last update your MPortfolio?	I continually update my MPortfolio
	Within the past month
	Within the past 6 months
	Within the past year
	Not in the past year, but since the conclusion of the course in which I created the MPortfolio
	I have not looked at my MPortfolio since the conclusion of the course in which I created it
Please describe how you have used or plan to use what you learned through the MPortfolio process.	Open-ended
Reflecting back on your experience creating an MPortfolio, how would you improve the process so that it would be more useful to you today?	Open-ended

Research Design

In this study, I employ a research design that explores both correlational and causal relationships between ePortfolio engagement and integrative learning. Both the correlational and causal components of the study utilize the Integrative Learning Self-Assessment through the pre- and post-surveys. Below, I present the details of the research design and explain the distinctions between the correlational and causal approaches.

Correlational Analysis. The pre-/post-survey design of the study aims to measure how students change over the course of the MPortfolio process. Students commence the process with a set of background characteristics and experiences. Since the MPortfolio is an inductive learning process that focuses on students' reflections on their identity and experiences, it is assumed that the background characteristics and experiences they bring to the process are elements that are critical to integrative learning through MPortfolio. The pre-survey, administered when students begin the process, serves a baseline measure of integrative learning. After engaging in the MPortfolio process, students complete the post-survey, which is the source of the dimensions of integrative learning that serve as the intended outcomes of the process. Beginning during the 2012-13 academic year, students who engaged in MPortfolio through the Division of Student Affairs two years prior completed a follow-up survey to determine how students' integrative learning ability changes beyond the immediate MPortfolio experience and whether they continue to engage in the reflective activities they learned through the process and if they continue to update and utilize their ePortfolios. Data from these three surveys comprise the data set for the current study. Figure 4.1 is a model of the research design that provides a visualization of the timing and elements of the study.
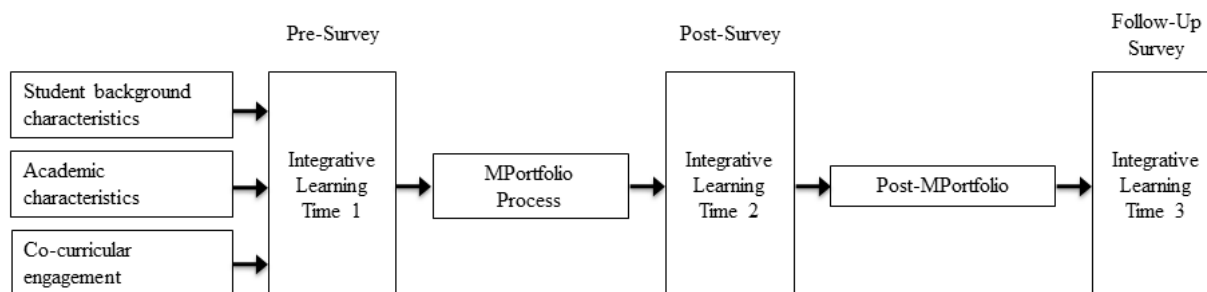
Figure 4.1: Conceptual Model of Correlational Research Design

The goal of this design is to demonstrate how students change throughout this process. However, without a control group of students who have not engaged in MPortfolio, it is impossible to determine whether the changes that students potentially experience are different from the development that college students might otherwise experience without going through this process. In order to determine whether integrative learning can be attributed to the MPortfolio process, it is necessary to determine how students who engage in the process develop differently from equivalent students who do not. In the next part, I describe the portion of the research design that will allow me to make causal claims about the impact of the MPortfolio process on integrative learning.

Causal Analysis. In order to determine the causal impact of MPortfolio on integrative learning, it is necessary to compare students who engage in the process (the treatment group) to a group of students that is essentially the same but do not engage in the MPortfolio experience (the control group). It is not enough to compare these groups on observable characteristics such as gender, race, major, or grade point average. Such a design can suffer from omitted variable bias. For example, the fact that students elect to participate in MPortfolio may be indicative of a difference in an unobserved characteristic, such as motivation, compared to students who do not participate. Thus, it is possible that this difference in motivation could explain any observed

differences in integrative learning. To make a compelling causal claim, it is important to eliminate such threats to validity by minimizing the differences between the treatment and control groups for both observable and unobservable characteristics.

The gold standard for causal research is a randomized controlled trial (RCT), an experimental design in which a group of subjects is randomly divided into a treatment group and a control group. These two groups are the same, on average, with the one exception that the treatment group receives the treatment (in this case, engagement in MPortfolio) and the control group does not. It has not been possible to arrange for an RCT to determine the effect of MPortfolio, since the institutional leaders who are responsible for it do not want to exclude interested students from the process. In the absence of an RCT, I employ a design that assigns students to treatment and control groups, minimizes omitted variable bias, and allows all students who are interested in MPortfolio to engage in the process.

As explained earlier in this section, there are quite a few experiences through which students can engage in the MPortfolio process. The causal component of this research includes only the students who engage in MPortfolio through the Psych 322: First-Year Experience course. Offered in both the Fall term and the Winter term, first-year students engage in this 1- or 2-credit course in a residence hall-based, peer-facilitated experience over 6 weeks. The fact that this course is offered both in the Fall and the Winter allows for the possibility to utilize a delayed treatment, control group research design. Figure 4.2 provides a visualization of this research design. In this design, the students who participated in the course during the Fall term serve as the treatment group, while those who participated during the Winter term serve as the control group during the Fall term (prior to their own participation). Students in the Fall course completed the pre-survey and the post-survey according to the standard Fall survey

administration schedule (at the start of the experience in October and again at the end in

December). Students in the Winter course cohort completed a pre-survey when the Fall course

began and, when they enrolled in the course during the Winter term, they completed the pre-

survey again at the start of the experience in January and the post-survey at the end of the

experience in March. This design allows me to compare a group of students who have selected

into the MPortfolio process and engage during the Fall term to a group of students who also

select into MPortfolio but do not participate in the Fall. Using two groups who select into the

process eliminates the omitted variable bias associated with selection differences. One could

argue that the two groups are inherently different because one group has chosen to participate in
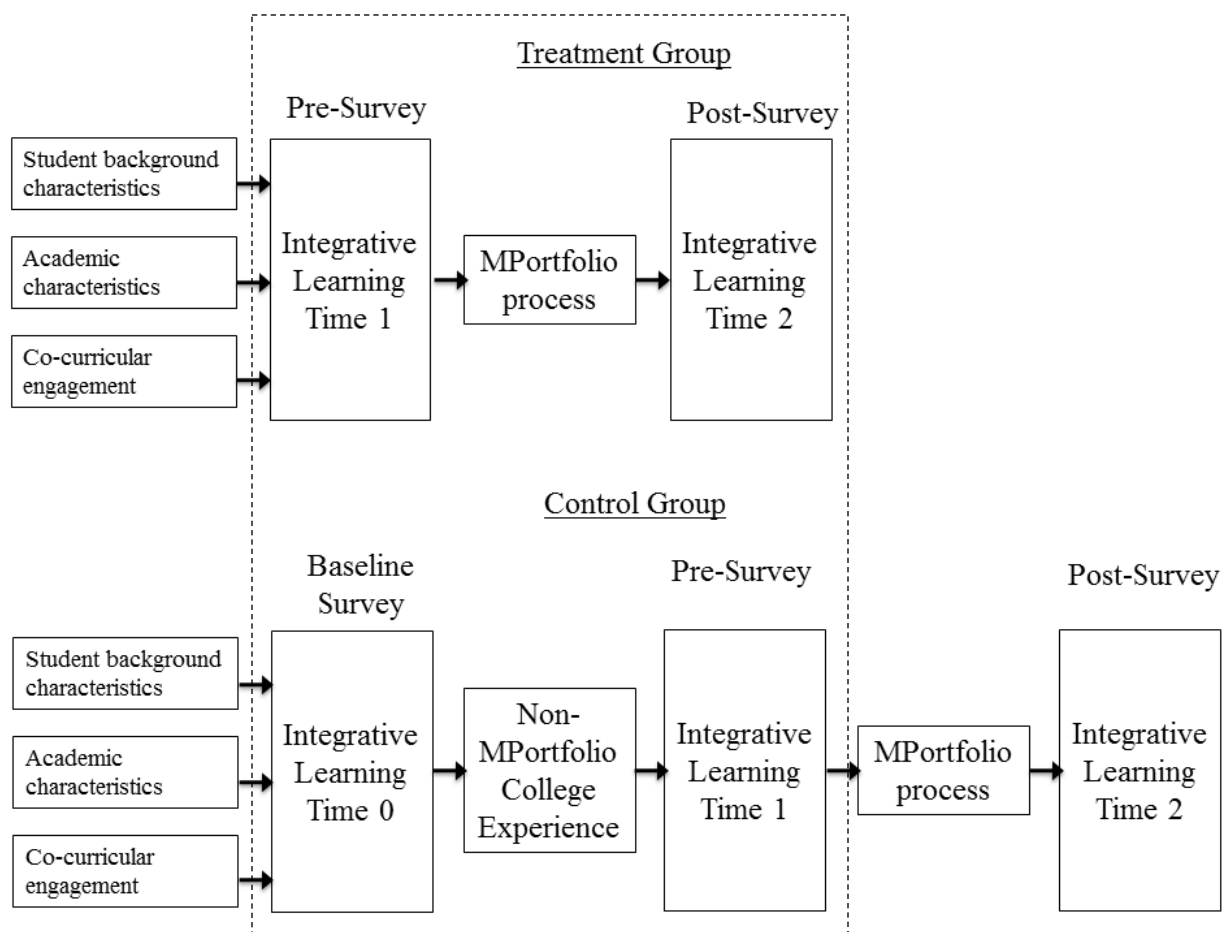
Figure 4.2: Conceptual Model of Causal Research Design

the Fall and, for some unknown reason, the other group has decided to put off its engagement until the Winter. However, the reason why one group participates in the Fall and the other participates in the Winter is based on the Resident Advisor who leads the process. Some of the Resident Advisors choose to lead the process in the Fall, while others choose to do so in the Winter. Since the students are randomly assigned to both their residence halls and their Resident Advisors, whether they participate during the Fall or the Winter appears to be unrelated to the integrative learning outcome.

Slavin (2007) proposes that a delayed treatment control group design is a useful randomized experimental approach when all research subjects want to be part of the treatment group. Rather than taking all those interested in participating in MPortfolio and randomly assigning them to groups that will and will not participate, this design assures that all who want to engage in the process are allowed to do so, albeit at different times. This was an essential consideration because none of the educators leading the sites were willing to have a portion of their students not engage in the MPortfolio aspect of their learning experience. Regarding threats to validity, the delayed treatment design may also be some advantages over traditional randomized experiments. Murnane and Willett (2010) identify four major threats to validity in a randomized experiment: contamination of the treatment-control contrast, cross-overs, attrition from the sample, and participation in the experiment itself affecting participants' behavior. One of these four types of threats to validity, contamination, is a legitimate concern in the current study. Contamination of the treatment-control contrast refers to how behaviors of the control group may be influenced by interactions with the treatment group. Potentially, students in the treatment group, who engage in MPortfolio during the Fall term, might talk to their peers about their experience. Thus, students considering participation in MPortfolio during the Winter term

might have more information about the experience than those who had considered participation during the Fall term. These conversations might encourage (or discourage) participation in the Winter MPortfolio course. Though selection bias is reduced because both the treatment group and the control group elect to engage in MPortfolio, it is plausible that the two groups have different levels of motivation or interest in the process. The other three threats to validity are not as pertinent to the current study. Cross-overs occur when a member of the control group switches to the treatment group, or vice versa, after random assignment has taken place. This was not the case for any students in the current study. Next, for both the treatment group and the control group, the research only included students who completed the entire MPortfolio experience, so attrition from the sample is not a threat in this case. The final threat described by Murnane and Willett is participation in the experiment itself affecting participants' behavior. Also known as Hawthorne and John Henry effects, this phenomenon is not applicable to the current study since both groups receive the treatment.

Variables

In this section, I provide detail about the variables used in this analysis. It is split into two sub-sections, one focusing on the variables that serve as the integrative learning outcomes of the study and the other describing the independent variables that predict these outcomes. The operational model of the research design (Figure 4.3) presents the variables used in the analysis in the context of the conceptual research design displayed in Figure 4.1.
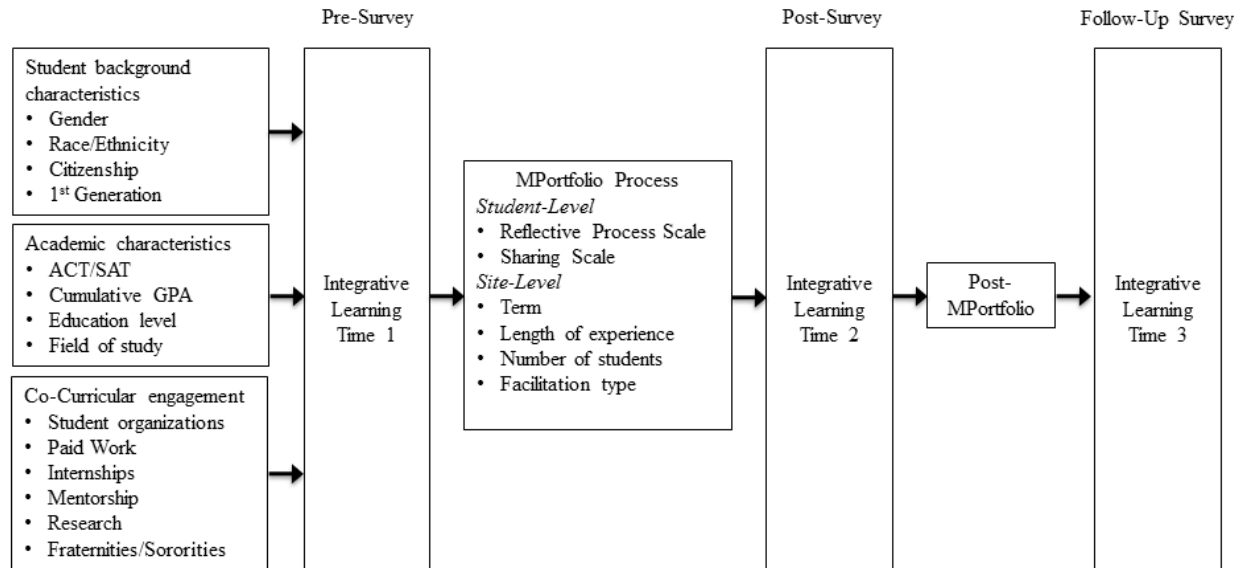
Figure 4.3: Operational Model of Research Design

Outcome variables: Dimensions of integrative learning. To reduce the 37 survey

items into a smaller set of dimensions of integrative learning, I conducted exploratory factor

analysis using principal component analysis. Though factor analysis and principal components

analysis are frequently referenced interchangeably, the two techniques are different. Where

factor analysis explores the underlying structures of latent variables, principal components

analysis serves simply as a variable reduction technique (Kim & Mueller, 1978). With that in

mind, principle components analysis is a suitable approach for exploring how the survey items

can be organized into discrete groups so that they can be reduced into scales. Because I intend to

organize the variables into discrete groups, I employ an orthogonal rotation method, varimax

rotation, as it produces factors that are assumed to be uncorrelated (Costello & Osborne, 2005).

Based on evaluation of Eigenvalues (greater than 1) and visualization of the scree plot, I

identified five factors that explain 60% of the variance. After exploring how each factor and the

items that loaded highly on each factor aligned with the theoretical constructs of integrative

learning, I named each factor: 1) Identify knowledge, skills, and values, 2) Provide evidence of knowledge, skills, and values to others, 3) Recognize and adapt to differences in order to create solutions, 4) Work with others to identify and address complex problems, and 5) Develop a professional digital identity. I then computed composite scores, or scales, based on the mean of the items that had their primary loadings on each factor. These scales, which I refer to as dimensions of integrative learning, include all 37 survey items and each item is unique to a particular dimension of integrative learning. Table 4.5 provides detail about these dimensions, including factor loadings and reliability estimates. Each dimension of integrative learning had a high level of reliability, as evidenced by Cronbach's alpha values exceeding .80.

Table 4.5: Items, Factor Loadings, and Reliabilities for Dimensions of Integrative Learning

Dimension and Item	Factor Loading	Alpha
Identify knowledge, skills, and values (Identify Knowledge, Skills, and Values dimension)		0.858
I can clearly identify the passions, interests, and sources of curiosity that influence my learning, work, and social life.	0.631	
I have the habit of creating learning and/or professional goals that are informed by my passions, interests, sense of purpose, or sources of curiosity.	0.619	
I can identify my strengths and the challenges (e.g., gaps in my knowledge) I encounter in specific learning or work situations (e.g., in writing a paper or doing research).	0.580	
I make choices to enhance my strengths and address my gaps/challenges in specific work or learning situations (e.g., going to office hours when I am struggling to understand something).	0.558	
I can identify examples of how my personal values and beliefs influence my learning, decisions, and actions (e.g., in the subjects I have chosen to study, or the groups I have chosen to join).	0.539	
I can articulate specific examples of my personal values and beliefs (e.g., believing in values such as "self-motivation" or "contributing to the well-being of others").	0.511	
I can clearly identify the specific types of knowledge and skills I have gained from different learning and life experiences (e.g., from academic classes, paid work, personal challenges, or leadership opportunities).	0.491	
Provide evidence of knowledge, skills, and values to others (Provide Evidence dimension)		0.936
I can provide evidence (i.e., in a reflective essay, video, or an ePortfolio page) of how my personal values and beliefs have informed my decisions and actions.	0.715	
I can provide evidence (i.e., though an essay, video, PowerPoint, or an ePortfolio page) of the specific ways in which I have applied the knowledge/skills I have	0.710	

gained in one experience to other situations or contexts.

I can provide evidence (i.e., a reflection essay, PowerPoint, or an ePortfolio page) of the knowledge and insights I have gained regarding the strengths, limitations, and biases within my own perspective. 0.695

I can provide evidence (through a PowerPoint, video, letters from others, or ePortfolio page) of how I have worked with others to identify and address a problem, need, or challenge within a group, organization, or community. 0.677

I can provide evidence of decisions and actions where I have either developed, or expressed, one or more ethical principles (e.g., equity, justice, fairness, compassion, care) in the context of working with individuals, groups, organizations, or communities that are a part of my life. 0.664

I can clearly demonstrate (i.e., through a reflective essay, video, PowerPoint, or an ePortfolio page) the specific types of knowledge and skills I have gained from a wide range of learning and life experiences. 0.661

I can provide evidence (i.e., through a story, video, PowerPoint, letter of recommendation, or an ePortfolio page) of the ways in which I have learned how to positively contribute to the functioning of a group or team. 0.659

I can provide evidence (i.e., in an essay, story, PowerPoint, or ePortfolio) of how I have expressed my strengths and/or taken action to address my challenges in specific situations. 0.653

I can demonstrate (i.e., through a reflective essay, feedback from supervisors, or as an ePortfolio page) how I have changed my perspective, decisions, or actions as a result of my own reflections or feedback from others. 0.648

I can demonstrate (i.e., through stories, reflection essays, or an ePortfolio page) the specific ways in which I have learned from people with backgrounds, cultures, and perspectives different from my own. 0.595

I can demonstrate to others (i.e., through a PowerPoint presentation, paper, video, or an ePortfolio page) the knowledge/skills I have gained from pursuing an area of study, or engaging in a series of actions, that reflect my passions, interests, and sources of curiosity. 0.569

I can identify several different examples of how I have applied the knowledge or skills I have gained from one experience (e.g., learning to convey the essence of complex information for a science presentation) to other situations (e.g., creating an interesting website for a student organization). 0.426

Recognize and adapt to differences in order to create solutions (Inter/Intrapersonal dimension) 0.873

I am aware that my background and social identities (e.g., my race, gender, nationality, social class, religion, sexual orientation) influence my perspective - how I see the world and make sense of things. 0.742

I recognize how interacting with people from backgrounds and cultures different from my own enhances my work and learning. 0.663

I can identify specific experiences (e.g., moments in my classes or in social situations) where I have learned about the strengths, limitations, and/or biases inherent in my own perspective. 0.629

I understand that different types of knowledge/skills are gained from different kinds of experiences (e.g., in general, the knowledge/skills gained from taking an English class are different from the knowledge/skills gained from participating on a sports team). 0.584

I actively seek to understand the views of people with backgrounds and perspectives 0.564

different from my own.

I recognize the need to reflect on how my decisions and actions affect others (i.e., asking myself, "Do my decisions contribute to the overall care, well-being, or positive functioning of individuals, groups, organizations, and communities that are a part of my life?").	0.521
I understand the need to connect knowledge I have gained from one place (e.g., the skills gained from participating on a sports team) to other situations (e.g., working with a group to solve a math or chemistry problem).	0.491
I can identify specific moments or experiences where I have developed or practiced ethical principles (e.g., the principles of equity, justice, fairness, compassion, care) in my decision making and actions.	0.420

Work with others to identify and address complex problems (Work with Others dimension)	0.847
I ask questions and listen to others in order to understand if and how the needs, goals, perspectives, interests, etc. of all group members are being addressed in the group's decision making and activities.	0.595
I can work with others to develop a plan and take action in order to address the needs of a group, organization, or community (e.g., creating a stable funding stream to support a non-profit organization in an ongoing basis).	0.584
I can work with others to identify a problem or need within a specific field, group, organization, or community (e.g., a school or non-profit organizations needing additional funds or resources in order to fulfill their mission).	0.565
I seek feedback on a regular basis in order to understand if and how my work (academic and otherwise) meets the needs, standards, and/or expectations of others.	0.559
I often reflect on if and how my work (academic and otherwise) is meeting my own standards and expectations.	0.533
In a group or team situation, I pay attention to who is, and who is not, participating fully in the discussion and the activities of the group.	0.524
I can identify the standards that both myself and others will use to evaluate my learning and/or work (e.g., the criteria a professor or supervisor will use to assess my work as "excellent", "good", or "needs improvement").	0.516

Develop a professional digital identity (Professional Digital Identity dimension)	0.849
I am taking steps to develop a professional online identity that demonstrates my knowledge, skills, values, goals, and contributions to others (e.g., through a professional web page or an integrative ePortfolio).	0.846
I am continually updating and expanding my online professional identity (i.e., through a personal web page, or an integrative ePortfolio) in order to demonstrate my knowledge, skills, values, goals, and contributions to others.	0.813
I understand the need to develop an online professional identity that is different from a typical Facebook or MySpace identity (e.g., through the development of a professional web page or an integrative ePortfolio).	0.804

The first dimension of integrative learning is *Identify knowledge, skills, and values*. The

common theme that appeared in this dimension's items is students' abilities to identify what they

have learned—knowledge, skills, values, passions, interests, strengths, etc. This ability to

identify what one has learned is a product of the reflective process that transforms tacit

knowledge to explicit knowledge. Through this greater understanding, a student can recognize

how his or her beliefs and values inform his or her life, recognize the strengths and weaknesses

he or she brings to learning and work situations, and explore the ways in which he or she can

enhance these strengths or address these weaknesses. Recalling the AAC&U VALUE Rubric for

integrative learning, identification is a benchmark level of performance (the lowest level out of

four ordered categories of performance): "Identifies connections between life experiences and

those academic texts and ideas perceived as similar and related to own interests" (AAC&U,

2009, p. 2). I refer to this dimension as the Identify Knowledge, Skills, and Values dimension.

The second dimension builds upon identifying knowledge, skills, and values to being able

to *provide evidence of knowledge, skills, and values to others*. This dimension consists of 12

items, so it encompasses a broad range of student abilities. While the items in this dimension

feature a variety of student outcomes and activities (e.g., personal values and beliefs, knowledge

and skills, learning from and working with others) within and across specific contexts, the

common thread across the items is the student's ability to demonstrate what he or she has

learned. Eleven of the dimension's 12 items include either "provide evidence" or "demonstrate"

in the item's language. The AAC&U Integrative Learning VALUE Rubric explicitly addresses

the ability to demonstrate integration in a criterion called "Integrated Communication." At the

most basic level, students should have the capacity to complete the assignment in "an appropriate

form." However, for students to exhibit higher levels of performance, their demonstration of

integration should explicitly connect content and form and purposefully enhance meaning for the

audience. I refer to this dimension as the Provide Evidence dimension.

The third dimension, *Recognize and adapt to differences in order to create solutions*, emphasizes students' understanding about how identity shapes their worldview and the opportunities and challenges associated with working with people different from oneself. This dimension of integrative learning demonstrates the relational emphasis of the Integrative Learning Self-Assessment. The dimension represents the interpersonal and intrapersonal domains of self-authorship and recognizes that integration is not merely the connection of ideas and experiences; accounting for context and understanding how one's learning connects to their own perspectives and the perspectives of others are qualities that are critical for addressing complex problems in the 21st century. I refer to this dimension as the Inter/Intrapersonal dimension.

The fourth dimension, *Work with others to identify and address complex problems*, builds upon the previous dimension. Once a student recognizes the importance of understanding context and how individuals' perspectives are informed by their backgrounds and experiences, can he or she then work with others to identify and address complex problems? This dimension includes a variety of activities related to working with others to solve problems: collaboratively identifying problems and developing plans and taking action to address the problems, taking into account the needs and perspectives of all group members, being mindful of the ways in which other group members are engaging, and seeking feedback from others. I refer to this dimension as the Work with Others dimension.

The fifth dimension, *Develop a professional digital identity*, is similar to the second dimension (*Provide evidence of knowledge, skills, and values to others*) in that it highlights the importance of being able to provide evidence of integration in a coherent and meaningful way. Consisting of only 3 items, this dimension includes developing and continually updating a

professional identity online (e.g., through an ePortfolio or personal website) that demonstrates one's knowledge, skills, and values. Additionally, one item in this dimension specifies that this online professional identity should be different from one's personal Facebook account. I refer to this dimension as the Professional Digital Identity dimension.

Predictor variables. The current research features five categories of predictor variables, four of which are at the student level with the fifth category at the site level. At the student level, the first three of these categories (i.e., background characteristics, academic characteristics, co-curricular involvement) reflect the characteristics and experiences that students bring to the MPortfolio process. The fourth student level category, student-level learning process characteristics, captures students' experiences with the reflective ePortfolio process. The fifth category of predictor variables is site-level learning process characteristics. This category is similar to the student-level learning process characteristics in that it reflects the experiences of students as they go through the MPortfolio process, but it instead focuses on the shared characteristics of all students who experience MPortfolio through a particular site (e.g., facilitation type, number of students participating). In the remainder of this sub-section, I describe the predictor variables, organized by category, that I employ in the analysis.

There are several student background characteristics that are included as predictor variables in this research. First, the student's gender is included as a predictor variable. This variable is derived from institutional records provided by the Office of the Registrar, which currently treats gender as a binary. The variable is operationalized as a dummy variable ("female") indicating whether a student is female (female=1) or male (female=0). The second student background characteristic that is included in the student's race/ethnicity. Also furnished by the Office of the Registrar, a student's race/ethnicity is captured in one of the following 6

categories: Asian, Black, Hispanic, Native American, White, and Multiracial. The race/ethnicity

categories appear in the current study as dummy variables. Some students in the analytic sample

did not have an ethnicity specified, based on data from the Office of the Registrar. Also, the

number of Native American students is quite small (N = 4), so those students have been

combined with the group of students whose race or ethnicity is not specified. The third student

background characteristic is the highest level of educational attainment of the students' parents.

On the pre-survey, students are asked to indicate the highest level of education attained by their

fathers, mothers, and guardians. I have combined these responses into a dummy indicator of

whether a student is a first-generation college student (first-generation=1) or not (first-

generation=0). In this study, first-generation includes all students for whom neither parent had a

highest level of education of a bachelor's degree or an advanced degree. For approximately 20%

of students in the population, parent education is missing; this question was not asked during the

first year of the study and two sites (the School of Information and one of the School of Social

Work sites) elected not to include this question on their version of the pre-survey. A dummy

variable is also used for students with missing parent education values. Finally, I explore the

differences between international students and students from the United States by including a

dummy variable identifying students from the United States. Table 4.6 includes the list of

student background characteristic variables, how these variables are coded, and the source of

each variable.

Table 4.6: Description of Predictor Variables, Student Background Characteristics		
Variable	Description/Coding	Source
Gender	0=Male; 1=Female	Office of the Registrar
Race/Ethnicity		Office of the Registrar
Asian	0=Not Asian; 1=Asian	
Black	0=Not Black; 1=Black	
Hispanic	0=Not Hispanic; 1=Hispanic	
Multiracial	0=Not Multiracial; 1=Multiracial	
White	0=Not White; 1=White	
Not Specified	0=Race/Ethnicity Specified; 1=Race/Ethnicity Not Specified	
Parent education		Pre-survey
First-Generation	0=Other; 1=First-Generation	
Bachelor's/Advanced Degree	0=Other; 1=Bachelor's/Advanced Degree	
Missing/Not indicated	0=Other; 1=Parent education missing or not indicated	
Citizenship	0=Not US citizen; 1=US citizen	Office of the Registrar

The predictor variables in the model also include a set of academic characteristics that students bring to the MPortfolio process, both from before college and during college prior to their engagement in this process. To account for academic ability, standardized test scores and cumulative grade point average are included. Standardized test scores are comprised of ACT composite scores and SAT scores that have been adjusted to the ACT scale, based on the concordance provided by the College Board. Since the source of these data is institutional records, graduate students in the population only have scores if they attended the University of Michigan as undergraduates. Also included is the student's cumulative grade point average when they began the MPortfolio process. Approximately a quarter of students did not yet have a cumulative grade point average at the start of the process. Cumulative grade point average is on a four-point scale, with a 0 representing an F and a 4 representing an A; a handful of students have grade point averages greater than a 4 because a student can earn a 4.3 for an A+. Students in the Rackham Graduate School had grade point averages on a 9-point scale, though I have

recoded these values so all students are on the same four-point scale. For both standardized test scores and cumulative grade point average, I have organized the variables into categorical rather than continuous variables due to the students who do not have values. The variables are organized approximately into quartiles; they are not precise quartiles due to the distributions of the variables. The student's primary field of study is categorized into 6 dummy variables: Humanities, Natural Sciences, Social Sciences, Interdisciplinary, Professional, and Undeclared. The Natural Sciences variable includes Engineering students. The Professional variable includes Business students as well as career-specific fields such as Education and Social Work. Education level is also captured as dummy variables representing five categories: First-year, Sophomore, Junior, Senior, and Graduate/Professional. Table 4.7 details the academic characteristics variables employed in the study.

Table 4.7: Description of Predictor Variables, Academic Characteristics

Variable	Description/Coding	Source
Standardized test scores		Office of the Registrar
Low	0=Not Low; 1=Low	
Low/Medium	0=Not Low/Medium; 1=Low/Medium	
High/Medium	0=Not High/Medium; 1=High/Medium	
High	0=Not High; 1=High	
Missing/No Score	0=Not Missing/No Score; 1=Missing/No Score	
Cumulative GPA		Office of the Registrar
Low	0=Not Low; 1=Low	
Low/Medium	0=Not Low/Medium; 1=Low/Medium	
High/Medium	0=Not High/Medium; 1=High/Medium	
High	0=Not High; 1=High	
Missing/No GPA	0=Not Missing/No GPA; 1=Missing/No GPA	
Field of study		Office of the Registrar
Humanities	0=Not Humanities; 1=Humanities	
Natural Sciences	0=Not Natural Sciences; 1=Natural Sciences	
Social Sciences	0=Not Social Sciences; 1=Social Sciences	
Interdisciplinary	0=Not Interdisciplinary;	

	1=Interdisciplinary	
Professional	0=Not Business; 1=Professional	
Undeclared	0=Not Undeclared; 1=Undeclared	
Education level		Office of the Registrar
First-year	0=Not First-year; 1=First-year	
Sophomore	0=Not Sophomore; 1=Sophomore	
Junior	0=Not Junior; 1=Junior	
Senior	0=Not Senior; 1=Senior	
Graduate/Professional	0=Not Graduate/Professional; 1=Graduate/Professional	
Unspecified/Missing	0=Not Unspecified/Missing; 1=Unspecified/Missing	

The third category of predictor variables, co-curricular involvement, is derived from the pre-survey. On the survey, students are asked to indicate if they engaged in a variety of activities outside the classroom (e.g., internships, volunteer work, fraternities or sororities). If students are expected to reflect on their experiences through the MPortfolio process, it may be useful to account for the types of co-curricular experiences they bring to the process. Summarized in Table 4.8, these variables are included in the analysis as dummy variables.

Table 4.8: Description of Predictor Variables, Co-Curricular Involvement

Variable	Description/Coding	Source
Co-curricular engagement		Pre-survey
Participating in student organizations	0=No; 1=Yes	
Working for money	0=No; 1=Yes	
Volunteering	0=No; 1=Yes	
Engaging in peer teaching, mentoring, or resident advising	0=No; 1=Yes	
Engaging in research	0=No; 1=Yes	
Doing an internship	0=No; 1=Yes	
Participating in sororities or fraternities	0=No; 1=Yes	

The post-survey includes two sets of items that account for the different ways that students experience the MPortfolio process. In the first set, the survey asks students to indicate their level of agreement with statements about whether various aspects of the process (i.e.,

reflection, completion of portfolio pages, describing examples of work, creating a philosophy statement) helped them understand what they have learned, why it is important, and how these different learning experiences connect to each other. These items have been combined into a scale that is calculated as the unweighted mean of these statements. I refer to this scale as the Reflective Process Scale and summarize it with the following statement: The reflection and creation process helped me recognize the value of my learning experiences and understand how these experiences connect. For the second set of items, students are asked to indicate the level of importance of putting together everything in a completed portfolio and interacting with others as part of the process (i.e., giving and receiving feedback and sharing the portfolio with others). I refer to this as the Sharing Scale and summarize it as follows: Engaging with others was an important part of the process. Like the Reflective Process Scale, the Sharing Scale is also an unweighted mean. Table 4.9 provides a summary of these items.

Table 4.9: Description of Predictor Variables, Student-Level Learning Process Characteristics

Variable	Description/Coding	Source
Reflective Process Scale	Continuous (Scale: 1 to 5)	Post-Survey
The reflection and creation process helped me recognize the value of my learning experiences and understand how these experiences connect.		
Sharing Scale	Continuous (Scale: 1 to 5)	Post-Survey
Engaging with others was an important part of the process.		

Detailed in Table 4.10, the final category of predictor variables, site-level learning process characteristics, is comprised of features of the MPortfolio sites. Facilitation type is the first site-level predictor and includes dummy variables for peer facilitation, faculty/staff facilitation, and mixed facilitation. There is considerable variation in the size of the sites; for

example, UC 421: ResStaff Class enrolls approximately 200 students, while only four students

engaged in MPortfolio through the Ginsberg Fellows program in its first year. In order to

explain whether there are differences in integrative learning related to the size of sites, I have

organized the number of students who engage in MPortfolio into categories (fewer than 10

students, 10 to 49, 50 or more). Length of experience is another site-level characteristic that I am

accounting for in this study. Most students engage in the MPortfolio process over the course of a

single semester, though some sites have durations as short as 6 weeks and as long as a full

academic year. The term or terms during which students engage in the MPortfolio process is the

final site-level characteristic in the model. This element is especially pertinent to first-year

students engaging in the process; one hypothesis discussed by MPortfolio faculty and staff is that

first-year students may not be ready to engage in this process when they first arrive as

undergraduates since their learning experiences at the college level are so limited. Exploring

differences by term would contribute to testing this hypothesis.

Table 4.10: Description of Predictor Variables, Site-Level Learning Process Characteristics

Variable	Description/Coding	Source
Facilitation type		Program records
Peer-facilitated	0=Not peer-facilitated; 1=Peer-facilitated	
Faculty/Staff-facilitated	0=Not faculty/staff-facilitated; 1=Faculty/staff-facilitated	
Mixed facilitation	0=Not mixed facilitation; 1=Mixed facilitation	
Number of students		
Small (< 10 students)	0=Not Small (Fewer than 10 students); 1=Small (Fewer than 10 students)	
Medium (11 to 49 students)	0=Not Medium (10 to 49 students); 1=Medium (10 to 49 students)	
Large (50 or more students)	0=Not Large (50 or more students); 1=Large (50 or more students)	
Length of experience		
Less than one term	0=Not less than one term; 1=Less than one term	

One term	0=Not one term; 1=One term
More than one term	0=Not more than one term; 1=More than one term
Term	
Fall term	0=Not Fall Term; 1=Fall Term
Winter term	0=Not Winter Term; 1=Winter Term
Spring/Summer term	0=Not Spring/Summer Term; 1=Spring/Summer Term

Analytic Samples

The vast majority of individuals participating in this study were students at the University of Michigan-Ann Arbor, a highly selective public research university, with the remaining students representing the University of Michigan-Dearborn, a selective satellite campus located just outside of Detroit. The current research employs three different analytic samples, depending on the research question. The main correlational analysis, exploring both the overall changes students experience and group differences, is the largest of the samples, including more than 1,500 students who completed both the pre-survey at the start of the experience and the post-survey at the end. The second analytic sample builds upon this by linking the pre-survey and post-survey responses of approximately 60 students to responses to their follow-up survey two years later. Third, a small group of first-year students participating in MPortfolio comprise the analytic sample used to determine the causal impact of MPortfolio. In the remainder of this section, I provide details about each of these samples.

Correlational Analysis. The sample used in the correlational analysis includes 1,539 students who engaged in an MPortfolio experience between the 2009-10 academic year and the 2013-14 academic year and who responded to both the pre-survey and the post-survey. This number represents a majority of the students who engaged in MPortfolio over this period. The students who engaged in MPortfolio but were not accounted for in the research are not included

in the analytic sample due to survey non-response and students' decisions not to consent to participate in the research. Additionally, some student responses were removed from the analysis because they participated multiple times.

Though research activities related to MPortfolio began during the 2009-10 academic year, my involvement did not begin until January 2012, when I commenced my role as MPortfolio Research Lead for the Division of Student Affairs. After I started this position, the pre-survey response rate was 85% and the post-survey response rate was 80%. Matching the pre-survey responses to post-survey responses, the overall matched response rate was 71%. For the 2009-10 and 2010-11 academic years, researchers who collected these data were unable to provide a precise response rate but indicated that the matched response rate was "in the sixties."

The pre-survey includes a question asking whether the student provides consent to the use of their survey data (in aggregated form) for research and publication purposes. Each year, approximately 90% of respondents consented to the use of their data. The analytic sample includes only these students.

In total, there were 1,600 matched responses to the pre-survey and the post-survey. Students who engaged in multiple MPortfolio experiences only had their first experiences included in the analysis, so 61 responses were removed from the population. I made this decision based on statistical reasons and to manage the scope of the research. Due to the statistical assumption of independence of observations, these cases cannot be included in the primary correlational analysis. Also, exploring how multiple experiences with the reflective ePortfolio process would add a dimension to the research that would be better answered in the future after more students have had multiple experiences with the process.

Table 4.11, a breakdown of the number of responses by site and by year, provides some detail about the 1,539 students who are part of the correlational analytic sample. Of the students in the analytic sample, more than half (59%) experienced MPortfolio through DSA sites. The site with the greatest representation was UC 421: ResStaff Class, which accounted for 40% of all students in the current study. Regarding trends over time, the number of respondents peaked in 2010-11 (N = 386) and 2012-13 (N = 384). The variation from year to year is explained by the number of participants from each site; notably, the withdrawal of the School of Education at UM-Dearborn from the research contributed to a large decrease in the number of participants while a gradual increase of participants from DSA sites balanced this decrease.

Table 4.11: Number of Survey Respondents, by Site and by Year

	2009-10	2010-11	2011-12	2012-13	2013-14	Total
UC 421: ResStaff Class	11	155	144	146	161	617
Psych 322: First-Year Experience Course	0	0	12	33	76	121
Intergroup Relations	5	5	24	11	19	64
Living Arts	0	0	22	0	0	22
Other Division of Student Affairs	26	13	18	13	20	90
School of Information	0	0	0	71	0	71
Undergraduate Research Opportunity Program	0	20	0	95	33	148
Sweetland Writing Center	84	0	0	0	0	84
UM-Dearborn School of Education	43	171	0	0	0	214
Other Non-DSA	24	22	11	15	36	108
Total	**193**	**386**	**231**	**384**	**345**	**1,539**

Note: Students counted in this table responded to both the pre-survey and the post-survey

Follow-Up Survey. Building on the correlational analysis is the research addressing the long-term relationship between integrative learning and engagement in the reflective ePortfolio process. During the 2012-13 academic year, 59 students who had previously completed both the pre-survey and the post-survey completed a follow-up survey two years after their initial MPortfolio experience. The survey was distributed to all students who engaged in MPortfolio

through DSA sites, responded to both the pre-survey and the post-survey, and gave their consent

to participate in the research. The response rate for the follow-up survey was 30%. Though this

was considerably lower than the matched response rate for the pre-survey and post-survey, it is

reasonable given the students' distance from the initial MPortfolio experience and because quite

a few students had already graduated and were no longer on campus.

Comparing the follow-up survey sample to the other students in the full sample, there are

differences. The main difference is that all students in the follow-up survey sample are drawn

from Division of Student Affairs sites, compared to a little more than half (61.5%) of the group

consisting of other students in the full sample. Otherwise, comparing the two groups on most

observable characteristics, the two groups appear rather similar. The two groups were similar

based on gender (follow-up sample was 70.2% female, compared to 64.6%, p=0.390),

race/ethnicity (10.5% of the follow-up sample were students of color, compared to 16.8%,

p=0.211), and citizenship (89.5% of the follow-up sample were US citizens, compared to 91.1%,

p=0.674). There was one significant difference between the two groups regarding student

background characteristics. Students in the follow-up sample were significantly less likely to be

first-generation students (11.9%, compared to 28.1%, p=0.021). Regarding academic

characteristics, the two groups were similar. Students in the follow-up sample had higher ACT

scores, on average, though this difference was not significant (29.6 for the follow-up sample,

compared to 28.9, p=0.153). The mean cumulative grade point averages for the two groups were

nearly identical (3.46 for the follow-up sample, compared to 3.44, p=0.806). There were

inherent differences in academic characteristics due to the fact that all students in the follow-up

sample were from the Division of Student Affairs. None of the students in the follow-up sample

had their initial MPortfolio experience as first-year students or as graduate/professional students.

Additionally, students in the follow-up sample did not represent the following fields of study: art design/architecture, education, health professions, information, and social work. Perhaps most importantly, the two groups were similar in their measures of integrative learning at both the time of the pre-survey and at the time of the post-survey. There were no significant differences between the follow-up survey group and the group of other students in the full sample for all dimensions of integrative learning at both time points.

Causal Analysis. The analytic sample used for the causal analysis includes both a treatment group and a control group. The treatment group consists of 48 of the 50 first-year students who engaged in MPortfolio through the First-Year Experience Course during the Fall 2013 term. Regarding the control group, a survey was administered to a total of 363 students who could potentially participate in MPortfolio during the Winter 2014 term. These students were identified as potential participants because their residential advisor had demonstrated interest in serving as a peer facilitator for the course for the Winter 2014 term. Working with resident advisors to encourage students to respond to the survey resulted in 168 responses, yielding a response rate of 46%. Of the 168 students who responded to the survey, only 11 students eventually enrolled in the course. These 11 students comprise the control group.

Analytic Approach

In this section, I describe the analytic approaches that I employ in order to produce the results presented in the next chapter. In addition to descriptive statistics, there are three statistical approaches that I use to answer the study's research questions: paired-samples *t*-tests, repeated-measures ANOVAs, and hierarchical linear modeling (HLM). The application of these approaches depends on the sub-question being answered. For example, I use paired-samples *t*-tests to explore overall integrative learning changes over the course of the MPortfolio process,

but to understand the causal impact of MPortfolio the approach I employ is a repeated-measures ANOVA. I use HLM to explore differences based on student and learning process characteristics. The remainder of this section details these three analytic approaches.

Paired-samples *t*-test. A paired-samples *t*-test is a test of mean differences intended for use in a within-subjects design. Also known as a dependent *t*-test, the paired-samples *t*-test is useful for a pre-/post-survey design such as the current study since it identifies differences in the mean values of the same group over two points in time. In other words, the test provides evidence of whether the students experience significant changes from the start of the process to the end. It tests the null hypothesis that there is no difference between the pre-survey mean and the post-survey mean (H_0: $\mu_{pre} = \mu_{post}$). A significant result indicates that one can reject the null hypothesis that, on average, there is no difference between the pre-survey to the post-survey.

The paired-samples *t*-test relies on four assumptions. First, the dependent variable in the analysis must be continuous. In this study, the dependent variables, the dimensions of integrative learning, are continuous and on a scale of 1 to 5. Second, for a paired-samples *t*-test, the two groups being compared must be related. In the current study, the groups consist of matched pairs. All students in the study took both the pre-survey and the post-survey and their responses were matched. In order to ensure the validity of the test, the third assumption for paired-samples *t*-tests is that there are no outliers. The fourth assumption of a paired-samples *t*-test is that the dependent variable is normally or approximately normally distributed. In the current study, the dependent variables are approximately normally distributed but violate statistical tests of normality (e.g., the Shapiro-Wilk test) due to a ceiling effect. This ceiling effect will be discussed further in the limitations section of this chapter and again in Chapter 6.

There are several instances in which I use a paired-samples *t*-test in the current study. This statistical test is the main approach used to determine whether there are overall changes from the pre-survey to the post-survey. Similarly, I also use paired-samples *t*-tests to explore the changes that individual groups experience through MPortfolio (e.g., females, Hispanic students, sophomores, humanities majors). The other instance in which I employ paired-samples *t*-tests is when exploring whether the changes that students potentially experience through the MPortfolio process persist two years later. The main statistical approach that I use to answer this question is a repeated-measures ANOVA. This type of analysis identifies whether there are significant differences in the outcome variable (dimensions of integrative learning) between time points. It does not, however, pinpoint whether significant changes (if they exist) occur between the first and second measurements or the second and third.

Repeated-measures ANOVA. Like the paired-samples *t*-test, a repeated-measures ANOVA is a statistical approach that is useful for determining whether the dimensions of integrative learning change over the course of the MPortfolio process. Repeated-measures ANOVA is a multivariate approach that is commonly used in research that examines a single group over multiple points in time, using the same measure at each point (e.g., a pre-test and a post-test). In the current study, each dimension of integrative learning on the post-survey serves as a dependent variable, while the pre-survey dimension acts as a main predictor variable that can interact with one or more main factors as well as include a series of covariates. As with the paired-samples *t*-test, the null hypothesis for the repeated-measures ANOVA is that the mean values for each dimension of integrative learning are equal at all time points. The repeated-measures ANOVA produces an *F*-ratio that indicates whether to reject the null hypothesis that the mean values at different time points are the same. This *F*-statistic is computed as the

variability associated with the treatment (i.e., the MPortfolio process) divided by error variability. An advantage of this approach is that, because the same subjects are in each group, it eliminates variability resulting from the individual differences between subjects. By partitioning out between-subjects variability, error variability is reduced and the *F*-ratio increases.

The repeated measures design is especially illustrative when answering the second sub-question, which focuses on the causal impact of the reflective ePortfolio process on integrative learning. The first step when answering this question is to confirm that the treatment group and the control group are alike, based on observable characteristics. After determining that the groups are comparable, the repeated measures models only need to include as predictor variables the pre-survey dimension and a dummy variable identifying those in the treatment group. A significant interaction between the pre-survey dimension and the treatment dummy variable indicates that MPortfolio has a significant effect on the outcome variable, the dimensions of integrative learning.

The other instance in which I employ repeated-measures ANOVA is when answering the sub-question that addresses whether student learning persists beyond the initial MPortfolio experience. To answer this question, there are measures of integrative learning at three time points: pre-survey, post-survey, and follow-up survey. The *F*-statistic generated by the repeated-measures ANOVA indicates whether there is a difference in the means of the integrative learning dimensions at these time points. If a significant difference exists, I then use paired-samples *t*-tests to determine whether the difference in means was between the pre-survey and the post-survey or the post-survey and the follow-up survey (or both).

There are several assumptions associated with repeated-measures ANOVAs. These assumptions include the assumptions for standard univariate ANOVAs as well as an additional

assumption for repeated-measures approaches. The standard assumptions include a normal distribution for the dependent variable, independence of observations, and homoscedasticity. For the repeated-measures analysis, the homoscedasticity assumption is expanded to assume sphericity, which assumes both equal variances between groups and equal variances in the differences between levels (i.e., level 1 and level 2, level 2 and level 3). The assumption of sphericity only applies to the long-term gains models, since these models are the only ones that are three-level repeated-measures ANOVAs (i.e., Pre and Post, Post and Follow-Up). There is an additional assumption that applies to the causal models: randomness. According to this assumption, observations must be randomly derived. Established earlier in this chapter, randomization occurs when students are given their room assignment in university housing.

Hierarchical linear modeling. Hierarchical or multilevel modeling is a statistical technique designed to analyze clustered data. In education research, the most common example of this type of data is students who are clustered in classrooms that are clustered in schools. Though one could conceivably analyze these data using typical linear regression approaches, this might violate the assumption of independence since students who are clustered in this manner likely do not represent observations that are truly independent. Hierarchical linear modeling can also be used to analyze longitudinal data. Since longitudinal data are nested within the individual, employing this approach is similarly useful. Another benefit of this type of approach is that it provides some flexibility in whether parameter values (i.e., intercepts and slopes) will be fixed or random. This flexibility allows researchers to isolate effects at different levels. In the present study, the longitudinal aspect of the data is captured at Level 1; pre-survey and post-survey responses are clustered in students and students are clustered in sites.

Hierarchical linear modeling has several assumptions and these are generally consistent with the assumptions of ordinary least squares regression. The first of these assumptions is linearity, which assumes that there is a linear relationship between predictor variables and the outcome variable. The second, normality, assumes that residuals are normally distributed at each level of the model. The third assumption, homoscedasticity assumes that the variance of residuals is constant across the distribution of the dependent variable. Finally, assumptions about independence differ due to the organization of the data. Though it is assumed that error terms of the dependent variable are uncorrelated, there is a key difference related to the independence assumption of multi-level models. Implicitly, data at the lower levels are not independent. At the highest level, though, it is assumed that observations are independent.

I employ hierarchical linear modeling to answer the third and fourth research sub-questions, exploring how student background and learning process characteristics contribute to variation in integrative learning gains. There are two reasons why hierarchical linear modeling is an appealing approach to answer these questions. The first reason is the organization of the data. The data are structured in such a way that a multi-level approach can captures the longitudinal nature of the data as well as how students are nested into sites. For the current study, I use a three-level hierarchical linear model with pre- and post-survey responses at the level 1, students at level 2, and sites at level 3. Figure 4.4 visualizes the multi-level organization of the data.
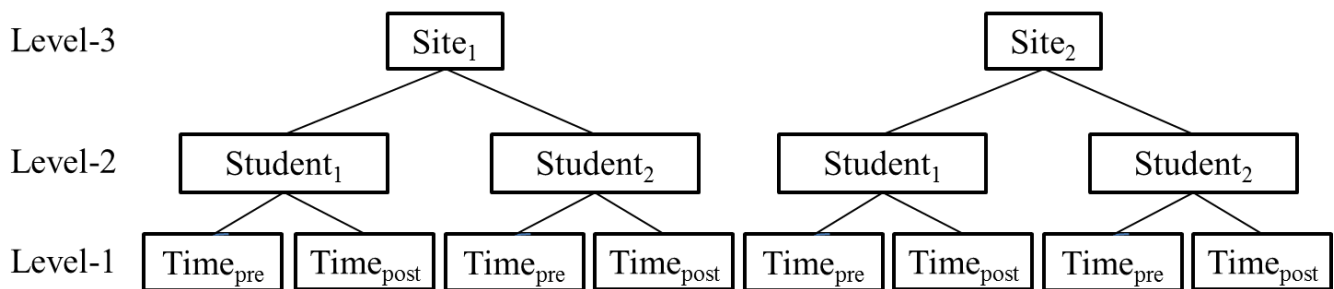
Figure 4.4: Organization of data for 3-level hierarchical linear model

The second reason why this is an appealing approach for answering these research questions is the ability to construct models that have slopes and intercepts as outcomes. Given the longitudinal nature of the data and the research questions, differences in intercepts demonstrate whether groups differ at the start of the reflective ePortfolio process, when holding all other variables constant. At the same time, differences in slopes indicate whether groups are experiencing learning gains at different trajectories. In other words, the slopes are key to answering whether student background and learning process characteristics contribute to differences in integrative learning gains.

The first step in determining whether a multi-level model is appropriate is to employ a one-way ANOVA with random effects, which is also known as a fully unconditional model. This type of model does not include any independent variables and partitions total variance into within-group variance and between-group variance and calculates the total amount of variance within each level. This partitioning is known as the Intraclass Correlation Coefficient (ICC) and it is computed as the ratio of between-group (student at level 2 and site at level 3) over the total variance. The fully unconditional models demonstrate that 30% to 50% of the total variance in integrative learning gains can be attributed at the student level and 5% to 8% of the total variance can be attributed to the site level. According to Raudenbush and Bryk (2002), it could be important to account for group level variation representing as little as 2 to 3 % of total variation (though they suggest that, ultimately, it should be at the discretion of the individual researcher to determine whether there is a sufficient level of variation at the group level to employ a multilevel approach). Niehaus, Campbell, and Inkelas (2014), in a review of studies employing hierarchical linear modeling in higher education, pose the question, how much group-level variance is enough? The authors cited a study that employed HLM with an ICC of only 0.1%, though other

studies that they reviewed had ICCs ranging from 2% to 33%. The ICCs in the present study

provide sufficient evidence that a multi-level approach is appropriate.

Limitations

To understand the limitations of this study, it is helpful to revisit the weaknesses of the

extant bodies of literature reviewed in the two previous chapters. The present study has the

opportunity to add to the scant bodies of scholarly research on how ePortfolios, competency-

based instruction assessment approaches, and assessment, broadly defined, can enhance student

achievement. A weakness of the research is the lack of insight it provides on the relationship

between student achievement and the interactions between assessment and various student

characteristics; the present study explores this relationship. Additionally, while few studies

employ experimental or quasi-experimental approaches needed to make causal inferences about

the influence of institutional assessment on student achievement, the present study aims to fill

this gap in the research with its research design. However, the study has several limitations that

do not allow it to remedy the weaknesses previously identified.

A frequent issue with the extant research on assessment and its influence on student

achievement is that studies tend to rely on self-reported levels of achievement of student

outcomes. The first limitation of the study is that it relies solely on self-reported measures.

Though direct measures of student learning would be preferable, the use of self-reported

measures makes a study of this scope manageable. Additionally, the validity of integrative

learning is likely to benefit from the longitudinal design in which student learning is a function

of students' self-assessments at both the start and end of the process.

Another limitation of the research is that it cannot determine whether potential learning

gains would be attributed to specific aspects of the reflective ePortfolio experience. There are

three components (curriculum, pedagogy, and ePortfolio) that are integrated into each

MPortfolio experience. Since all sites incorporate these elements, it is impossible to identify

whether students would experience similar learning gains with the curriculum and pedagogy

alone without the ePortfolio.

Noted earlier in the chapter, the ceiling effect associated with the distributions of the

dimensions of integrative learning is a potential limitation of the study. Though I treat the

dimensions of integrative learning as continuous variables, they are not truly continuous because

they are restricted to a range of 1 to 5. Students tend to start the process with surprisingly high

integrative learning values with little room to improve. Additionally, particularly for the post-

survey dimensions, the distributions are approximately normally distributed, but they are cut off

on the high end due to a ceiling on the values. Though the distributions are probably sufficiently

normal so that normality assumptions are met, it might be worth considering non-parametric

approaches if distributions are excessively truncated in future analyses.

There are a few limitations related to the causal aspect of the research. First, the number

of students in the treatment group is quite small. It proved to be rather difficult to identify

students who would eventually engage in the process and to get them to respond to the survey

before even they knew they would be participating. In the future, finding ways to identify

students who will enroll in the course is important. In the meantime, though, the data collected

for the present study provide useful information about the relationship between engagement in

the reflective ePortfolio process and integrative learning. Second, a low level of statistical power

due to the small number of students in the causal design limits the ability to apply the design to

the other research questions in the study. For example, with a larger number of students, it

would be possible to explore group differences based on student background characteristics.

Also, since the causal design is limited to a single course, it is impossible to employ the design in order to make causal claims about site-level differences. Similarly, in the current research, it is not possible to make causal claims about the long-term persistence of learning gains.

Summary of Chapter

This chapter detailed the methodology used to explore the relationship between engagement in the reflective ePortfolio process and integrative learning. After describing the study's research questions, I detailed the sites, the courses and co-curricular programs engaging students in MPortfolio, that participated in the research. The chapter also included a description of the survey instrument used, the Integrative Learning Self-Assessment, details about the research designs guiding the study, and explanations of the variables used. The chapter concluded with descriptions of the analytical approaches employed and the limitations of the research.

Chapter 5: Results

In Chapter 5, I present the results of the analysis. The chapter is organized into four parts that address the research questions outlined in Chapter 1. In the first part, I address the overarching research question of whether ePortfolios facilitate the integrative learning. Specifically, I explore whether students who engage in the MPortfolio process experience significant changes in the five dimensions of integrative learning from the start of the process to the finish. The next three sections of the chapter answer the study's four sub-questions. In the second section, I build upon the overall analysis by exploring whether the development that students potentially experience is causally related to the MPortfolio process or merely the change that students would otherwise experience without going through the process. In the third section, I explore whether student characteristics contribute to variation in integrative learning. These student characteristics are organized into three categories: student background characteristics, academic characteristics, and co-curricular involvement. In this section, I also demonstrate whether different learning process characteristics, at both the student level and the site level, are associated with variation in integrative learning gains. In the final section, I demonstrate whether the learning gains that students potentially achieve persist beyond the initial MPortfolio experience.

Overall Change in Dimensions of Integrative Learning

In this section, I address the first sub-question of the study, *over the course of the reflective ePortfolio process, how does integrative learning change in students?* Described in detail in the previous chapter, the integrative learning outcome is operationalized as five scales

that I refer to as dimensions of integrative learning, measured at the start of the MPortfolio

process in a pre-survey and again in a post-survey at the end. In order to understand whether

engagement in the MPortfolio process is associated with integrative learning, I have performed a

series of paired samples *t*-tests on the overall sample of students who engaged in MPortfolio and

completed both the pre-survey and the post-survey. This procedure demonstrates whether the

mean post-survey dimensions of integrative learning are significantly different from the

equivalent means from the pre-survey. In other words, on average, do students experience

significant changes in the dimensions of integrative learning from the start of the MPortfolio

process to the end?

      Table 5.1 presents the mean values for each dimension of integrative learning from both

the pre-survey and the post-survey, as well as the difference between these two values. Also, the

table indicates whether these mean differences are statistically significant and the effect sizes of

the changes. The results of the paired samples *t*-test suggest that, on average, students who

Table 5.1 Paired Samples *T*-Tests of Pre- and Post-Survey Dimensions of Integrative Learning

Dimension of Integrative Learning	Pre-Survey Mean (Standard Deviation)	Post-Survey Mean (Standard Deviation)	Mean Difference	Effect size (Cohen's d)
Identify Knowledge, Skills, and Values dimension	4.257 (0.472)	4.436 (0.459)	0.179***	0.375
Provide Evidence dimension	3.911 (0.655)	4.261 (0.572)	0.349***	0.539
Inter/Intrapersonal dimension	4.427 (0.431)	4.536 (0.444)	0.109***	0.244
Work with Others dimension	4.243 (0.482)	4.401 (0.476)	0.158***	0.309
Professional Digital Identity dimension	3.563 (0.916)	4.029 (0.845)	0.466***	0.468

***p< .001

engage in MPortfolio experience significant positive changes across all five dimensions of integrative learning.[1] Based on the effect size values, gains ranged from fairly small to moderate (Cohen, 1988). Students most improved their ability to provide evidence of knowledge, skills, and values to others (Cohen's d = .539), while the smallest gains were related to students' ability to recognize and adapt to differences in order to create solutions (Cohen's d = .244).

Focusing on the pre-survey mean values, it is striking how high the pre-survey means are; the scale for each dimension spans from 1 to 5 and three of the five dimensions have pre-survey means greater than 4. In the previous chapter, I described a ceiling effect as a potential limitation; with pre-survey means greater than 4 and the highest scale value capped at 5, there is not much room to increase. Despite this potential limitation, there were significant positive changes for all five dimensions of integrative learning. At the same time, though a potential ceiling effect did not contribute to a lack of statistical significance, it may have tempered the effect sizes of the dimensions that had high mean pre-survey values.

Testing the Causal Relationship between MPortfolio and Integrative Learning

In this section, I present the results of the causal research design. Though in the previous section the results demonstrated that students experience significant positive changes in all five dimensions of integrative learning, it is impossible to determine from those results whether the change can be attributed to the MPortfolio process or that the change is a result of a variety of other factors in students' lives. To briefly revisit the description provided in the previous chapter, in this research design I employ a delayed treatment control group design that eliminates selection bias by comparing a treatment group of students who experience the MPortfolio process to a control group of students who have not yet participated in the process.

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[1] I use a cutoff of p < .05 to indicate significance. I use the term, "marginally significant," for p-values between .05 and .10.

Comparing the two groups on observable characteristics, they appear to be the same. Regarding academic ability, the mean composite ACT scores for the treatment (M = 29.5) and control (M=29.4) groups were not significantly different (p=.902). Since this comparison was made during the first semester of the first year, it is not possible to make comparisons based on grade point average. Regarding demographics, the groups were similarly composed, with chi-square tests revealing no significant differences by sex or race. Females comprised 72.9% of the treatment group and 63.6% of the control group (p=.540). Due to the small size of the control group, I aggregated students of color into a single group, which comprised 26.7% of the treatment group and 18.2% of the control group (p=.560). There were no international students in the control group and international students accounted for only 4.3% of the treatment group. Finally, I am unable to make a meaningful comparison based on field of study because these data were collected at two different points in time.[2]

The next comparison of the treatment and control groups is concerning the dimensions of integrative learning at the time of the pre-survey for the treatment group and the baseline survey, prior to enrolling in the course, for the control group. Table 5.2 presents the means for each dimension for the treatment and control groups and the difference between the group means. For four of the five dimensions of integrative learning, there were no significant differences between the treatment and control groups at Time 1 of the causal design. The one exception was the Identify Knowledge, Skills, and Values dimension. For this dimension, students in the control group had a significantly higher baseline mean than the treatment group.

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[2] Field of study data were provided by the Office of the Registrar and correspond with the start of the term of the student's MPortfolio experience. Thus, students in the treatment group have a field of study that corresponds with their student record at the time of matriculation and students in the control group have a field of study based on their student record at the start of their second term.

Table 5.2 Dimensions of Integrative Learning at Baseline, Treatment and Control Groups

Dimension of Integrative Learning	Treatment Mean (Standard Deviation)	Control Mean (Standard Deviation)	Mean Difference
Identify Knowledge, Skills, and Values dimension	3.961 (0.516)	4.377 (0.340)	-0.415*
Provide Evidence dimension	3.681 (0.611)	3.835 (0.400)	-0.154
Inter/Intrapersonal dimension	4.266 (0.490)	4.352 (0.487)	-0.087
Work with Others dimension	4.098 (0.467)	4.104 (0.561)	-0.006
Professional Digital Identity dimension	3.438 (0.884)	3.455 (0.910)	-0.017

* Significant at .05 level

Table 5.3 shows that, for the Identify Knowledge, Skills, and Values dimension, there was a significant main effect for the change from Time 1 to Time 2, $F(1, 57) = 5.268$, p<.05, $\eta2=.085$. This result demonstrates that the total sample of both the treatment group and the control group experienced a significant positive change. The within-subjects interaction of time and treatment is the key component of the analysis, as it determines whether the treatment and control groups experience significantly different changes from Time 1 to Time 2. In other

Table 5.3: Repeated Measures ANOVA to Demonstate the Effect of MPortfolio on Integrative Learning, Identify Knowledge, Skills, and Values dimension

	df	MS	F	p		η^2
Within-Subjects						
Time	1	0.629	5.268	0.025	*	0.085
Time*Treatment	1	4.008	33.554	<0.001	***	0.371
Error (MPortfolio)	57	0.119				
Between-Subjects						
Treatment	1	0.060	0.194	0.662		0.003
Error	57	0.310				

* Significant at .05 level
*** Significant at .001 level

words, based on this research design, this interaction reveals whether there is a causal

relationship between engagement in the MPortfolio process and integrative learning. The

significance of the interaction, $F (1, 57) = 33.554$, $p<.001$, $\eta 2=.371$, provides evidence that

MPortfolio affects students' abilities to identify their knowledge, skills, and values.

Figure 5.1 illustrates how the treatment group and the control group change from Time 1

to Time 2. As noted above, compared to the treatment group, the control group had a

significantly higher mean value for this dimension at Time 1. A paired-samples *t*-test of the

treatment group revealed a significant positive change from the pre-survey to the post-survey

($p<.001$). At the same time, students in the control group demonstrated a significant decline

($p<.05$) from Time 1, when they took the baseline survey prior to their enrollment in the course,

and Time 2, when they took the pre-survey.
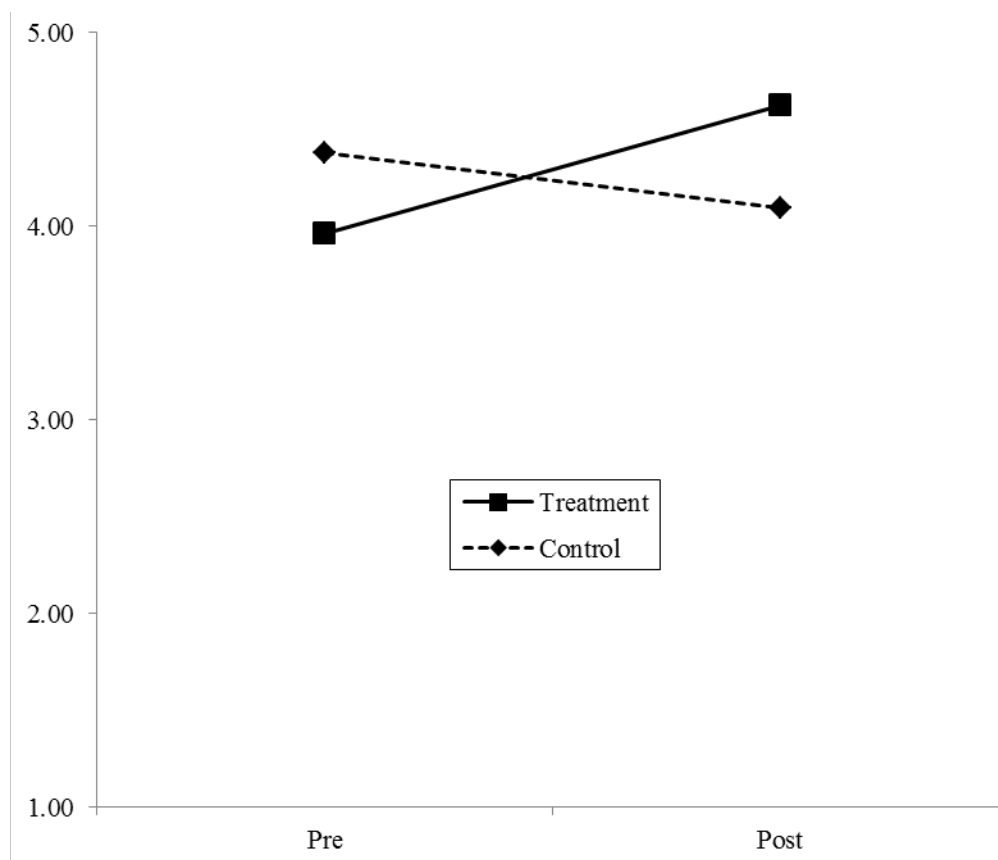
Figure 5.1: Effect of MPortfolio on the Identify Knowledge, Skills, and Values dimension

The results of the causal model for the Provide Evidence dimension are featured in Table 5.4. Again, there is a significant main effect that demonstrates that the total sample of both treatment and control groups experienced a significant positive change from Time 1 to Time 2, F (1, 57) = 13.876, p<.001, η2=.196. Most importantly, the interaction between time and treatment provides evidence that there is a causal relationship between engagement in MPortfolio and the development of students' abilities to provide evidence of their knowledge, skills, and values to others, F (1, 57) = 21.375, p<.001, η2=.273. There was also a significant between-subjects difference, according to the model. This between-subjects test tells us that the treatment and control groups have significantly different mean values for the Provide Evidence dimension, when averaged across both time points. The between-subjects differences revealed in this and the other repeated measures ANOVA models in this chapter are not useful for answering this study's research questions since the research questions are concerned with change from Time 1 to Time 2 rather than average differences across both time points.

Table 5.4: Repeated Measures ANOVA to Demonstrate the Effect of MPortfolio on Integrative Learning, Provide Evidence dimension

	df	MS	F	p		η^2
Within-Subjects						
Time	1	2.621	13.876	<0.001	***	0.196
Time*Treatment	1	4.038	21.375	<0.001	***	0.273
Error (MPortfolio)	57	0.189				
Between-Subjects						
Treatment	1	1.842	4.948	0.03	*	0.08
Error	57	0.372				

* Significant at .05 level
*** Significant at .001 level

Figure 5.2 visualizes the effect of MPortfolio on students' abilities to provide evidence of their knowledge, skills, and values to others. At Time 1, there was no significant difference between the treatment and control groups ($Mean_{treatment}$=3.68, $Mean_{control}$=3.83, p=.429). Using a paired-samples *t*-test to compare the means of Time 1 and Time 2, there was no significant difference for the control group (p=.364). For the treatment group, there was a significant positive change from Time 1 to Time 2 (p<.001).
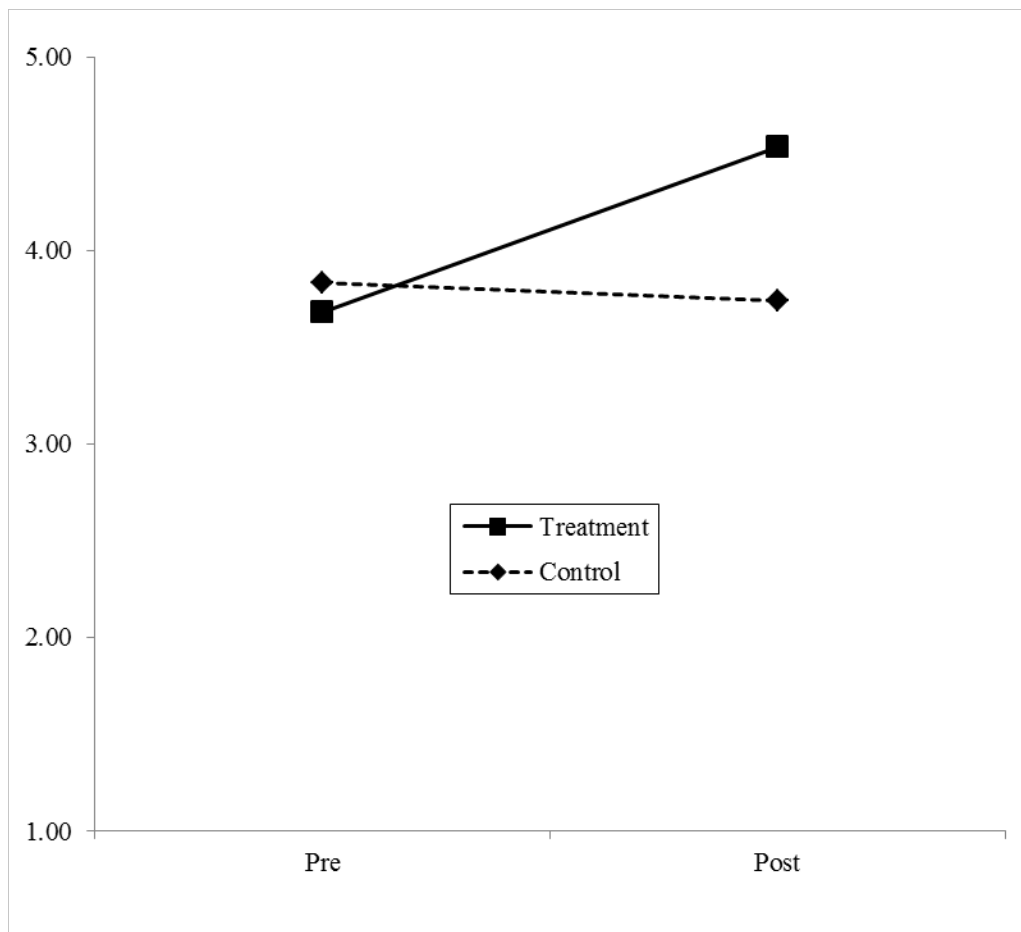
Figure 5.2: Effect of MPortfolio on the Provide Evidence Dimension

For the Inter/Intrapersonal dimension, there was also a significant positive effect associated with engagement in the MPortfolio process, $F(1, 57) = 12.63$, $p<.001$, $\eta2=.181$. See Table 5.5 for the complete model results. Figure 5.3 provides a visual of the changes that the treatment and control groups for the Inter/Intrapersonal dimension. On average, this is the dimension in which students reported having the strongest ability at Time 1. Comparing the two groups, there was no significant difference at Time 1 between the treatment and control groups ($Mean_{t1}=4.27$, $Mean_{c1}=4.35$, $p=.598$). The treatment group experienced a significant positive change from Time 1 to Time 2 ($Mean_{t1}=4.27$, $Mean_{t2}=4.62$, $p<.001$), while there was slight, non-significant decline between Time 1 and Time 2 for the control group ($Mean_{t1}=4.35$, $Mean_{t2}=4.18$, $p=.192$).

Table 5.5: Repeated Measures ANOVA to Demonstrate the Effect of MPortfolio on Integrative Learning, Inter/Intrapersonal dimension

	df	MS	F	p		η^2
Within-Subjects						
Time	1	0.155	1.577	0.214		0.027
Time*Treatment	1	1.244	12.63	0.001	**	0.181
Error (MPortfolio)	57	0.098				
Between-Subjects						
Treatment	1	0.561	1.952	0.168		0.033
Error	57	0.287				

** Significant at .01 level
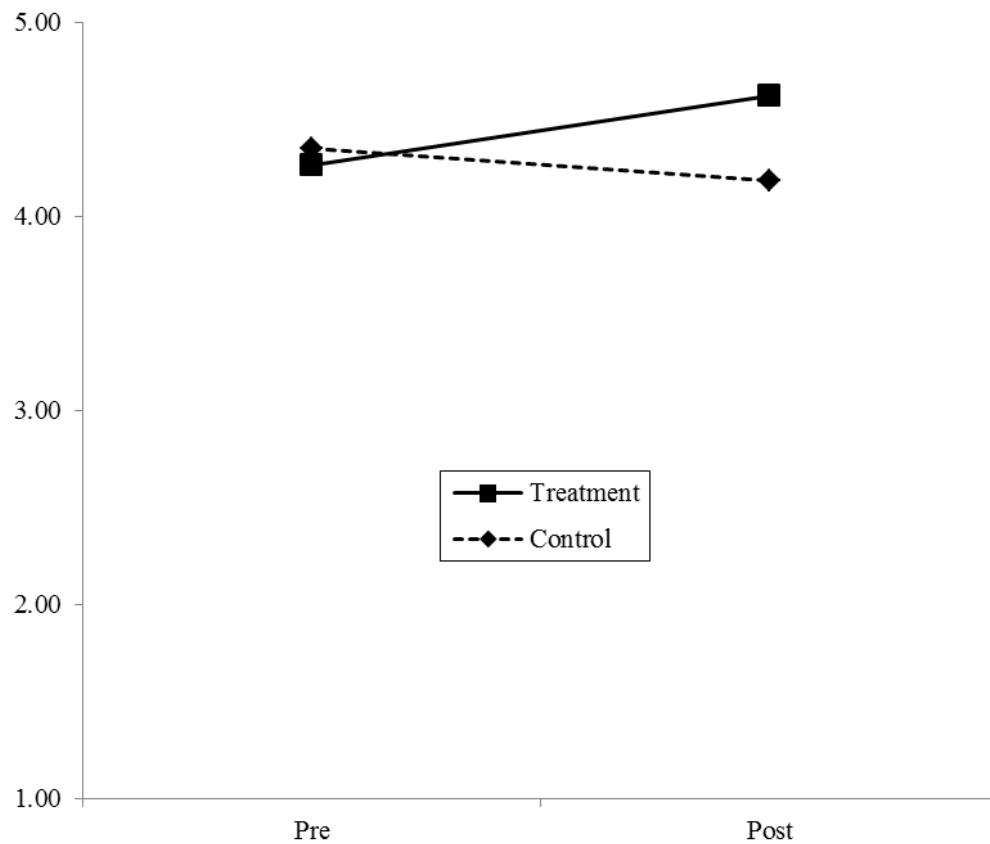
Figure 5.3: Effect of MPortfolio on the Inter/Intrapersonal dimension

There was also a significant positive effect for the fourth dimension of integrative

learning, work with others to identify and address complex problems. Reported in detail in

Table 5.6, in addition to there being a significant positive main effect for time, $F (1, 57) = 4.946$,

$p<.05$, $\eta2=.080$, the interaction between time and the treatment reveals that there is a causal

relationship between engagement in MPortfolio and students' abilities to work with others to

identify and address complex problems, $F (1, 57) = 9.382$, $p<.01$, $\eta2=.141$. At Time 1, the mean

value for the Work with Others dimension was 4.10 for both the treatment group and the control

group ($p=.972$). From Time 1 to Time 2, the mean for the control group declined slightly and

non-significantly to 4.026 (p=.671), whereas the mean for the treatment group increased

significantly to 4.589 (p<.001).

Table 5.6: Repeated Measures ANOVA to Demonstrate the Effect of MPortfolio on Integrative Learning, Work with Others dimension

	df	MS	F	p		η^2
Within-Subjects						
Time	1	0.764	4.946	0.030	*	0.080
Time*Treatment	1	1.449	9.382	0.003	**	0.141
Error (MPortfolio)	57	0.154				
Between-Subjects						
Treatment	1	1.391	4.659	0.035	*	0.076
Error	57	0.299				

* Significant at .05 level

** Significant at .01 level
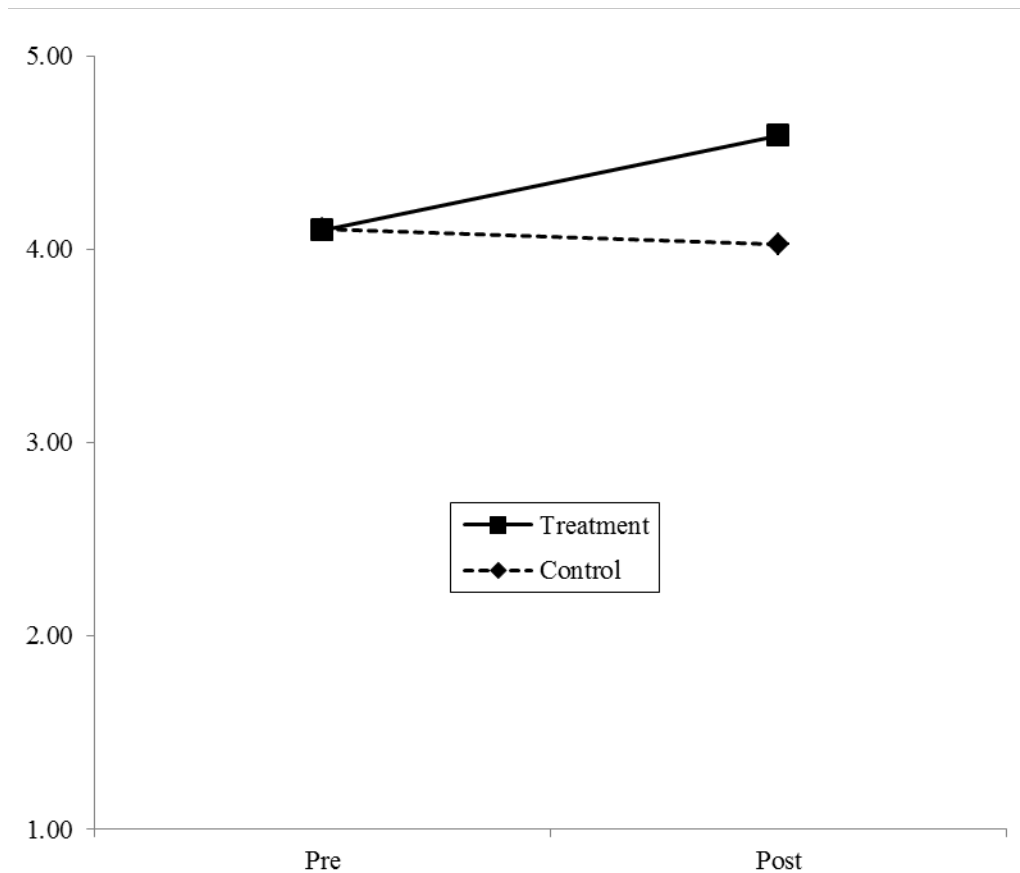
Figure 5.4: Effect of MPortfolio on the Work with Others dimension

The results for the Professional Digital Identity dimension were a bit different from the results for the other four dimensions. Table 5.7 indicates that there was a significant main effect for time, $F(1, 57) = 11.55$, $p<.01$, $\eta2=.168$, meaning that the combined treatment and control groups experienced a significant positive change from Time 1 to Time 2. The interaction between time and treatment, indicating whether there is a causal relationship, was only marginally significant, $F(1, 57) = 3.594$, $p<.10$, $\eta2=.059$. At Time 1, the mean Professional Digital Identity dimension values for the treatment and control groups were not only not significantly different but they were also nearly identical ($Mean_{t1}=3.438$, $Mean_{c1}=3.456$, $p=.954$). From Time 1 to Time 2, each group saw a positive change, as depicted in Figure 5.5. The change for the treatment group was significant ($Mean_{t1}=3.438$, $Mean_{t2}=4.292$, $p<.001$), while the increase for the control group was not significant ($Mean_{c1}=3.455$, $Mean_{c2}=3.697$, $p<.233$).

Table 5.7: Repeated Measures ANOVA to Demonstrate the Effect of MPortfolio on Integrative Learning, Professional Digital Identity dimension

	df	MS	F	p		η^2
Within-Subjects						
Time	1	5.381	11.55	0.001	**	0.168
Time*Treatment	1	1.675	3.594	0.063	~	0.059
Error (MPortfolio)	57	0.466				
Between-Subjects						
Treatment	1	1.493	1.995	0.163		0.034
Error	57	0.749				

~ Significant at .10 level
* Significant at .05 level
** Significant at .01 level
*** Significant at .001 level
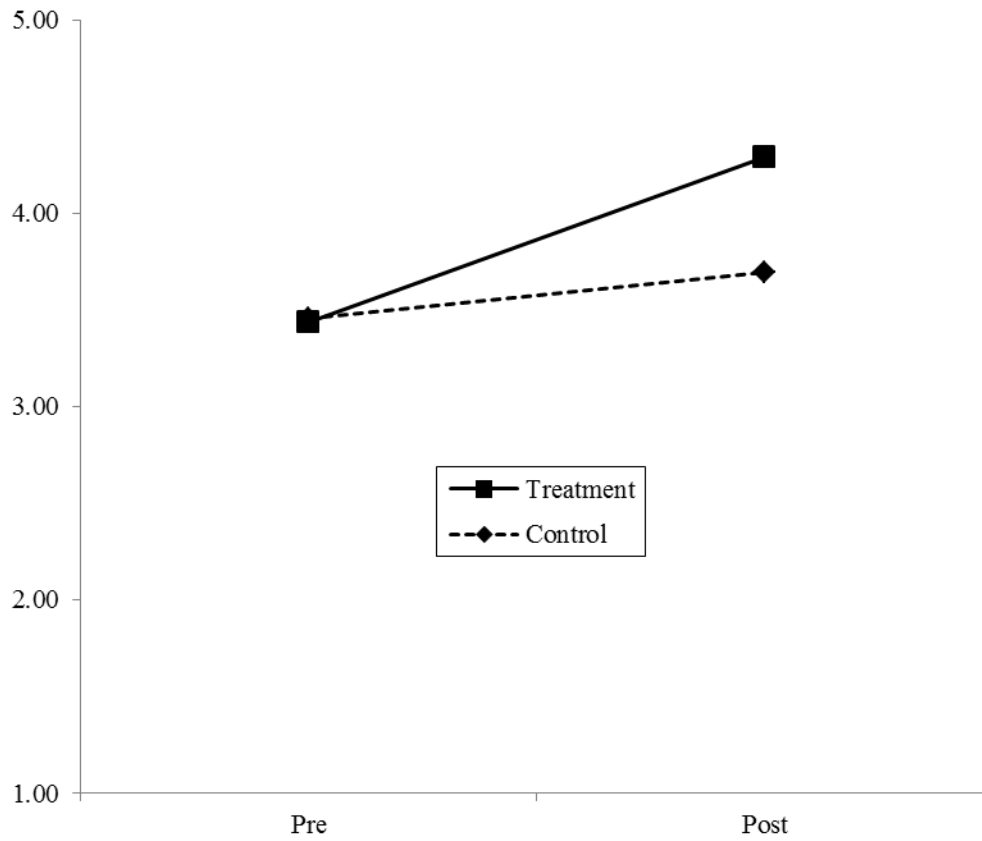
Figure 5.5: Effect of MPortfolio on the Professional Digital Identity
dimension

Summary of causal results. In the previous section, the results of the correlational

analysis demonstrated that students participating in MPortfolio experienced learning gains across

all five dimensions of integrative learning; the results of the delayed treatment control group

design described in the current section support these findings. For four of the five dimensions of

integrative learning, there was a significant positive effect associated with ePortfolio

engagement. For the fifth dimension, the Professional Digital Identity dimension, the effect was

positive but marginally significant ($p=0.063$). These results provide strong evidence that there is

a causal relationship between engagement in the reflective ePortfolio process and integrative

learning gains.

Variation Associated with Student and Learning Process Characteristics

In this section, I address the two sub-questions related to variation in integrative learning. The first of these sub-questions asks what student characteristics contribute to variation in integrative learning through the MPortfolio process. Student characteristics fall into three categories: background characteristics, academic characteristics, and co-curricular involvement. The second sub-question explores the learning process characteristics that contribute to variation in integrative learning. Learning process characteristics are captured at both the student level and at the site level. Student-level learning process characteristics encompass the ways in which individual students engage in the process (i.e., reflection and sharing with others), while the term and the facilitation type are examples of site-level learning process characteristics.

This section of the results chapter is organized according to the sets of characteristics explored in the analysis: student background characteristics, academic characteristics, co-curricular involvement, student-level learning process characteristics, and site-level learning process characteristics. Within each of these sub-sections, I present the descriptive statistics for each independent variable, the mean values of pre- and post-survey dimensions of integrative learning that correspond with each independent variable, and the results of paired-samples *t*-tests that signify significant differences from the pre-survey to the post-survey within each group. Within each sub-section is a table summarizing the results of multi-level models for each of the five dimensions of integrative learning with intercepts and slopes as outcomes. Due to spacing, the tables summarizing the multi-level model results present only the variables in a single set of characteristics; the actual models estimated include the full set of independent variables.

Student background characteristics. In this sub-section, I explore how variables related to a student's background (i.e., demographics and parent education) contribute to variation in

integrative learning through the MPortfolio process. Table 5.8 summarizes the descriptive

statistics for this set of variables. About two-thirds of the students in the population were female

(64.8%). Regarding race/ethnicity, White students comprised 58.2% of the population, Asian

students represented 17.3%, Black students accounted for 9.6%, Hispanic students were 4.9% of

the population, and 7.1% had a race/ethnicity that was unknown. International students

comprised 9.0% of students in the study population. Finally, regarding parent education, most

students had at least one parent with a bachelor's degree or higher (58.2%), whereas 22.1% of

students were first generation students. Approximately twenty percent of students in the study

have a missing value for highest level of parents' educational attainment; these missing values

are a result of non-response and the exclusion of this question on different versions of the survey.

Table 5.8 also provides the results for paired-samples t-tests for each group of students

according to their background characteristics. This analysis demonstrates whether, for each

group of students based on their background characteristics, the post-survey mean value of each

dimension is greater than the pre-survey mean value. On average and nearly without exception,

students of all backgrounds experience positive changes from the pre-survey to the post-survey

for each of the five dimensions of integrative learning. For example, for both males and females,

the mean scale value for each dimension of integrative learning was significantly greater on the

post-survey compared to the pre-survey (p<.001). Additionally, students of all different levels of

parental educational attainment experienced significant positive changes from the pre-survey to

the post-survey for each dimension of integrative learning. The few exceptions were almost all

related to the Inter/Intrapersonal dimension. For several underrepresented minority groups as

well as foreign students, the pre-survey mean values for this dimension were especially high and

there was little room for the value to increase. As a result, the post-survey mean value was not

significantly higher than the pre-survey mean value. One other exception was that multiracial students did not have a significant difference for the Work with Others dimension.

Although it is encouraging that students of different backgrounds tend to experience integrative learning gains over the course of the MPortfolio process, it does not answer the research sub-question, which focuses on the variation of these integrative learning changes. In order to answer this question, it is necessary to focus on differences in the slope of students' changes from the start of the process to the end. These results are presented in Table 5.9. For several of the student background characteristics (e.g., Asian students for the Identify Knowledge, Skills, and Values dimension, female students for the Inter/Intrapersonal dimension), there were significant differences for the intercept but not for the slope. This indicates that, controlling for all other factors, the groups were significantly different at the time of the pre-survey, but they experienced changes that were no different over the course of the process. For example, Figure 5.6 illustrates the changes that females and males experience over the course of the MPortfolio process for the Inter/Intrapersonal dimension. The graph demonstrates how, when controlling for other factors, female students have higher mean Inter/Intrapersonal dimension values at the start of the process and that both groups experience changes that are nearly identical. A marginally significant difference related to United States citizenship on the Inter/Intrapersonal dimension serve as an example of how groups that are similar at the start of the process, controlling for other factors, experience different learning gains by the end of the reflective ePortfolio process. Figure 5.7 illustrates how, when controlling for other factors, the two groups have similar mean values at the time of the pre-survey, but students who are United States citizens have notably higher mean values at the time of the post-survey.
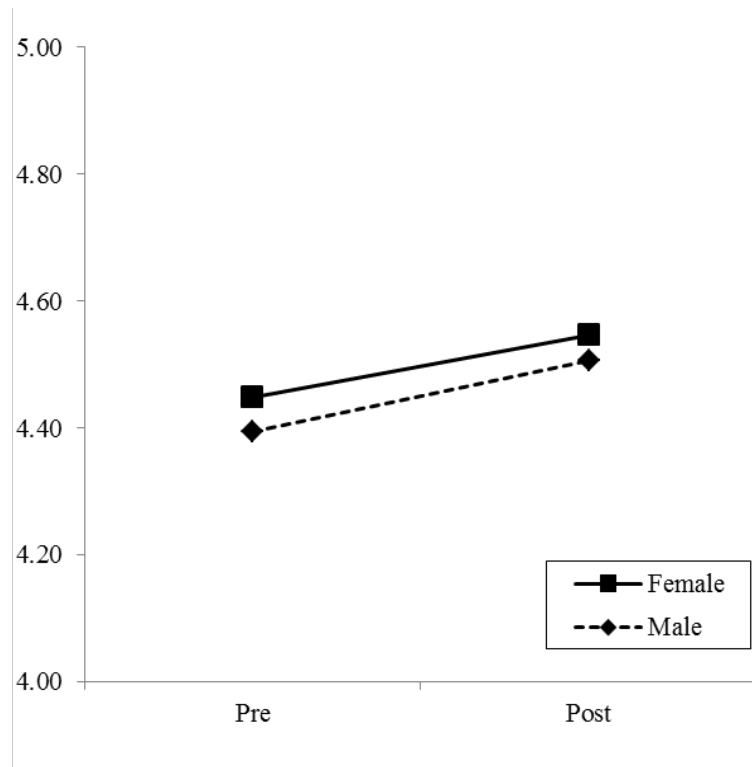
Figure 5.6: Differences based on gender from pre-survey to post-survey for Inter/Intrapersonal dimension
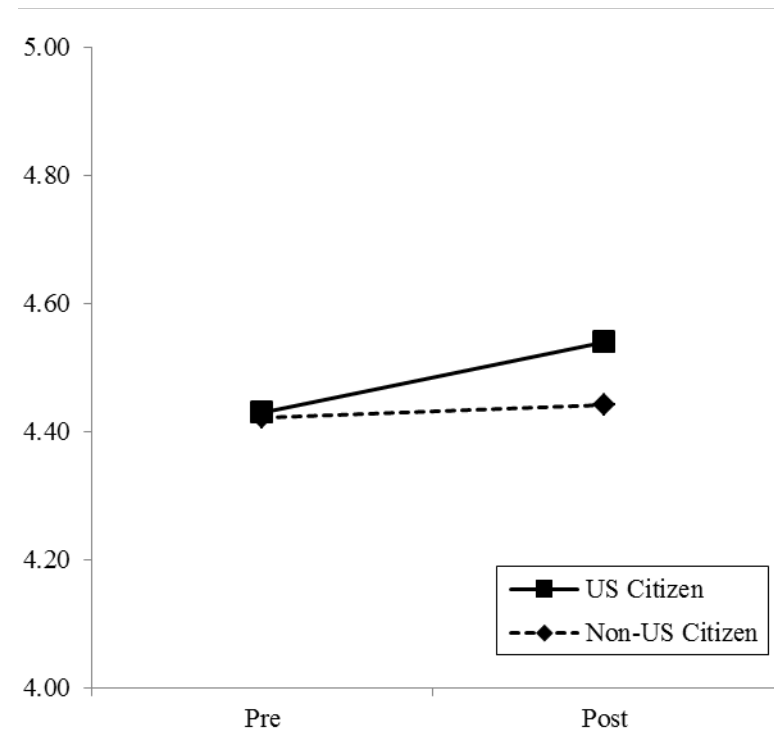
Figure 5.7: Differences based on US Citizenship from pre-survey to post-survey for the Inter/Intrapersonal dimension

Indicated in Table 5.9, there were several variables in the models with significant intercepts, though of the full set of student background characteristics, there was only one variable across all five models that had a slope that was significantly different at the .05 level. This significantly different slope was for Asian students, compared to White students, in the model for the Professional Digital Identity dimension. Depicted in Figure 5.8, these differences demonstrate that, controlling for other factors, Asian students had a significantly higher mean value for the Professional Digital Identity dimension on the pre-survey and a significantly flatter slope from the pre-survey to the post-survey. Though they had a flatter slope, Asian students still had a higher mean value for the Professional Digital Identity dimension at the time of the post-survey, compared to the comparison group (White students).
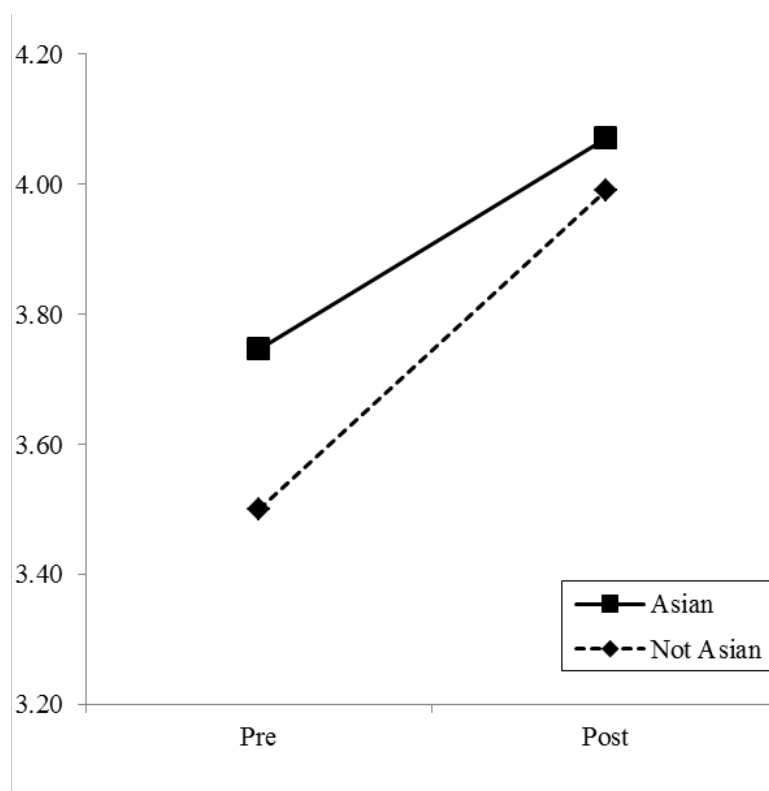
Figure 5.8: Differences based on race/ethnicity (Asian) from pre-survey to post-survey for the Professional Digital Identity dimension

Table 5.8: Descriptive Statistics, Student Background Characteristics

		N	Percent	Identify Pre-Survey Mean (Std dev)	Identify Post-Survey Mean (Std dev)	Sig	Provide Evidence Pre-Survey Mean (Std dev)	Provide Evidence Post-Survey Mean (Std dev)	Sig	Inter/Intrapersonal Pre-Survey Mean (Std dev)	Inter/Intrapersonal Post-Survey Mean (Std dev)	Sig	Work with Others Pre-Survey Mean (Std dev)	Work with Others Post-Survey Mean (Std dev)	Sig	Prof Digital Identity Pre-Survey Mean (Std dev)	Prof Digital Identity Post-Survey Mean (Std dev)	Sig
Gender	Female	994	64.8%	4.280 (0.46)	4.464 (0.439)	***	3.940 (0.645)	4.285 (0.560)	***	4.456 (0.417)	4.561 (0.426)	***	4.261 (0.466)	4.424 (0.461)	***	3.585 (0.88)	4.035 (0.825)	***
	Male	539	35.2%	4.224 (0.489)	4.388 (0.488)	***	3.869 (0.666)	4.211 (0.593)	***	4.383 (0.446)	4.490 (0.474)	***	4.216 (0.506)	4.357 (0.502)	***	3.512 (0.980)	4.008 (0.887)	***
Race/ Ethnicity	Asian	267	17.3%	4.159 (0.505)	4.340 (0.491)	***	3.876 (0.646)	4.212 (0.576)	***	4.362 (0.464)	4.502 (0.418)	***	4.187 (0.523)	4.354 (0.461)	***	3.664 (0.864)	4.046 (0.781)	***
	Black	148	9.6%	4.342 (0.433)	4.503 (0.417)	***	4.107 (0.552)	4.358 (0.501)	***	4.530 (0.398)	4.590 (0.366)	~	4.278 (0.461)	4.428 (0.484)	***	3.714 (0.893)	4.081 (0.772)	***
	Hispanic	75	4.9%	4.305 (0.453)	4.439 (0.462)	*	3.914 (0.709)	4.241 (0.609)	***	4.513 (0.432)	4.622 (0.405)	*	4.274 (0.455)	4.442 (0.412)	**	3.724 (0.795)	4.117 (0.793)	***
	Multiracial	44	2.9%	4.295 (0.430)	4.440 (0.352)	*	3.969 (0.816)	4.162 (0.542)	~	4.483 (0.387)	4.520 (0.437)		4.312 (0.459)	4.336 (0.425)		3.409 (0.835)	3.775 (0.812)	*
	White	896	58.2%	4.266 (0.469)	4.451 (0.459)	***	3.889 (0.652)	4.268 (0.581)	***	4.421 (0.423)	4.537 (0.463)	***	4.245 (0.479)	4.414 (0.486)	***	3.483 (0.944)	3.998 (0.888)	***
	Not Specified	109	7.1%	4.299 (0.455)	4.478 (0.446)	***	3.946 (0.670)	4.235 (0.571)	***	4.454 (0.421)	4.493 (0.475)		4.286 (0.445)	4.368 (0.490)	~	3.688 (0.903)	4.171 (0.773)	***
Citizenship	US Citizen	1391	91.0%	4.269 (0.470)	4.449 (0.454)	***	3.914 (0.657)	4.269 (0.572)	***	4.435 (0.427)	4.548 (0.443)	***	4.249 (0.480)	4.411 (0.477)	***	3.544 (0.924)	4.025 (0.855)	***
	Non-US Citizen	137	9.0%	4.158 (0.475)	4.307 (0.477)	**	3.905 (0.616)	4.141 (0.573)	***	4.380 (0.444)	4.413 (0.448)		4.186 (0.487)	4.288 (0.463)	*	3.679 (0.833)	4.005 (0.771)	***
Parent education	First Generation	340	22.1%	4.292 (0.449)	4.484 (0.437)	***	3.978 (0.598)	4.343 (0.528)	***	4.451 (0.400)	4.563 (0.435)	***	4.271 (0.465)	4.433 (0.483)	***	3.613 (0.868)	4.109 (0.852)	***
	Bachelor's degree or higher	895	58.2%	4.289 (0.476)	4.469 (0.472)	***	3.942 (0.681)	4.295 (0.587)	***	4.461 (0.431)	4.576 (0.448)	***	4.287 (0.478)	4.443 (0.466)	***	3.562 (0.941)	4.022 (0.853)	***
	Missing/Not indicated	308	19.7%	4.139 (0.466)	4.294 (0.416)	***	3.767 (0.612)	4.065 (0.537)	***	4.316 (0.437)	4.391 (0.415)	**	4.084 (0.478)	4.239 (0.469)	***	3.498 (0.899)	3.945 (0.815)	***

Sig: ~ p < .10; * p < .05; ** p < .01; *** p < .001

Table 5.9: 3-Level HLM Predicting Dimensions of Integrative Learning, Background Characteristic Variables

	Identify				Provide Evidence				Inter/Intrapersonal				Work with Others				Prof Digital Identity			
	Intercepts		Slopes		Intercepts		Slopes		Intercepts		Slopes		Intercepts		Slopes		Intercepts		Slopes	
Female	0.024		0.018		0.029		0.002		0.053	*	-0.013		0.028		0.012		0.019		-0.060	
Asian	-0.095	*	-0.040		-0.010		-0.074		-0.065	~	0.008		-0.086	*	0.009		0.245	**	-0.171	*
Black	0.019		0.011		0.115	*	-0.076		0.045		-0.043		-0.008		0.000		0.119		-0.090	
Hispanic	0.059		-0.064		0.066		-0.093		0.131	*	-0.038		0.075		-0.029		0.290	**	-0.183	
Multiracial	0.013		-0.029		0.058		-0.155		0.017		-0.053		0.051		-0.127		-0.072		-0.124	
Race missing	0.034		-0.008		0.033		-0.062		0.060		-0.064		0.038		-0.052		0.159	~	0.018	
US Citizen	0.054		0.008		-0.052		0.098		0.012		0.085	~	0.012		0.057		-0.012		0.079	
First generation	-0.055	~	0.058	~	-0.046		0.081	~	-0.037		0.030		-0.039		0.028		0.002		0.031	
Parent Education Missing	-0.115	*	0.016		-0.177	**	0.093		-0.088	*	0.042		-0.151	**	0.065		0.068		0.054	

Sig: ~ p < .10; * p < .05; ** p < .01; *** p < .001

Comparison groups: Male, White, Non-US Citizen, Parent highest level of education is bachelor's degree or higher

Note: Models also include academic, co-curricular, student-level learning process characteristics, and site-level learning process characteristics.

Academic characteristics. Building on the previous section on student background characteristics, this sub-section addresses whether there is variation in integrative learning associated with students' academic characteristics. These academic characteristics include their standardized test scores, cumulative grade point average at the start of the MPortfolio process, level of education (or class year), and field of study. Standardized test scores are organized approximately into quartiles (they are not in actual quartiles due to the distribution of scores). Additionally, about a quarter of students did not have standardized test scores (e.g., graduate students do not have an ACT or SAT on record). Grade point average is similarly organized into four similarly sized groups with approximately a quarter of students not having a cumulative grade point average at the start of process; students without a cumulative grade point average were almost all new students who did not yet have any grades on their records. Regarding level of education, students were most frequently juniors (33.7%) when they engaged in the process. The most frequent field of study category was professional (29.1%), followed closely by natural sciences and engineering (23.8%). Almost a quarter of the students had not yet declared a major when they went through the MPortfolio process. Table 5.10 summarizes the descriptive statistics for the academic characteristics. This table also includes the results of paired-samples *t*-tests for each dimension and within each academic characteristic group. There were significant changes from the pre-survey to the post-survey for each *t*-test with only one exception; the post-survey mean value for the Inter/Intrapersonal dimension was not significantly higher than the corresponding pre-survey mean value for graduate/professional students.

Table 5.11 displays the results of the multi-level models with intercepts and slopes as outcomes for the academic characteristics in the models. For each set of academic characteristics (i.e., standardized test scores, cumulative grade point average, level of education,

and field of study), there were significant differences in slopes for at least one of the dimensions of integrative learning. For standardized test scores, there was variation in both the intercepts and slopes in the model for the Provide Evidence dimension. Interestingly, there was an inverse relationship between standardized test score and pre-survey mean Provide Evidence dimension value. In other words, controlling for other factors, at the start of the process students with lower standardized test scores tended to rate themselves as being stronger on this dimension than students with higher standardized test scores. Students with lower standardized test scores had significantly flatter slopes compared to the higher standardized test score groups. Figure 5.9 illustrates these differences.
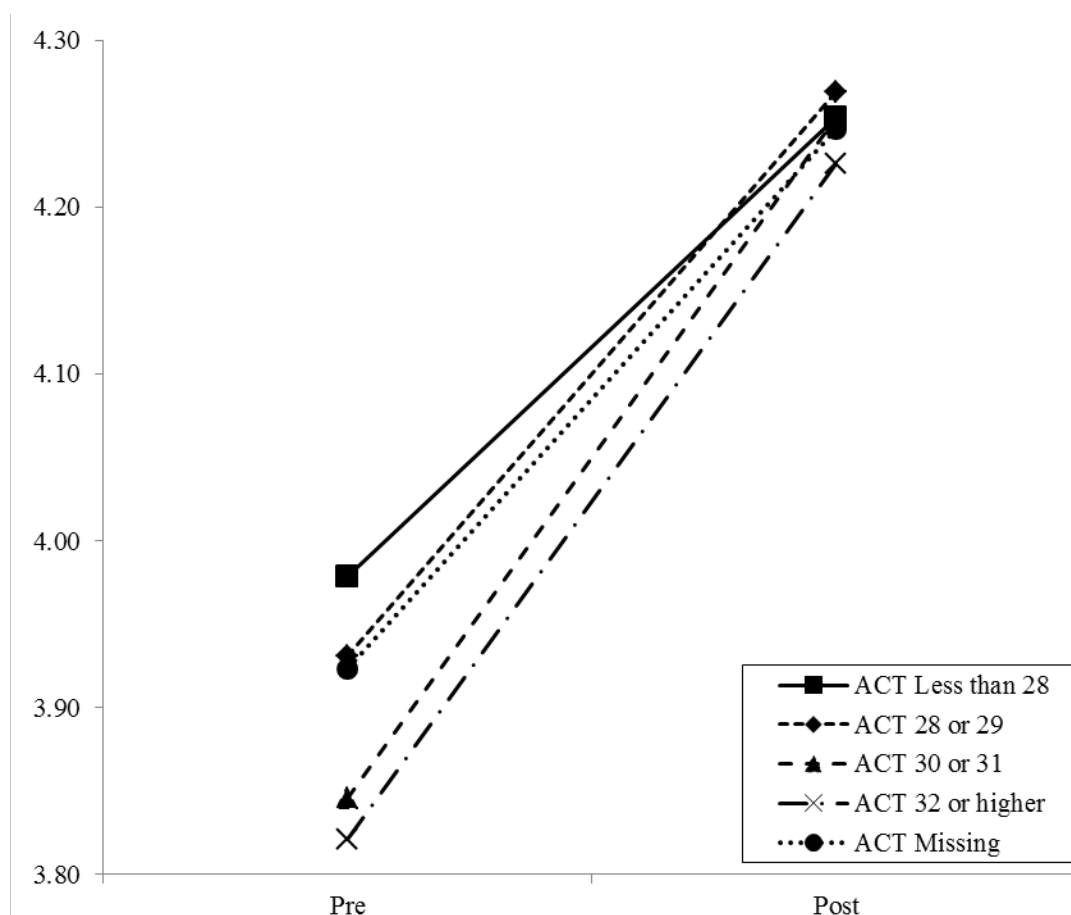
Figure 5.9: Differences based on standardized test score from pre-survey to post-survey for the Provide Evidence dimension

Differences based on cumulative grade point average were similar. Students with the lowest grade point averages tended to rate their abilities as being stronger than those with higher grade point averages, particularly for the Identify and Provide Evidence dimensions (though these differences were not statistically significant). For three dimensions (Identify, Provide Evidence, and Inter/Intrapersonal), there were significant differences in slope coupled with intercepts that were not significantly different. For the Identify Knowledge, Skills, and Values dimension, this group's change from the pre-survey to the post-survey was significantly flatter compared to students with grade point averages in the 3.00 to 3.49 range and the 3.75 and higher range (there was no significant difference with the slope of the 3.50 to 3.74 grade point average group and the difference with the missing grade point average group was marginally significant). Figure 5.10 illustrates the differences by grade point average for the Identify Knowledge, Skills, and Values dimension. Differences for the Provide Evidence dimension appear more subtle,
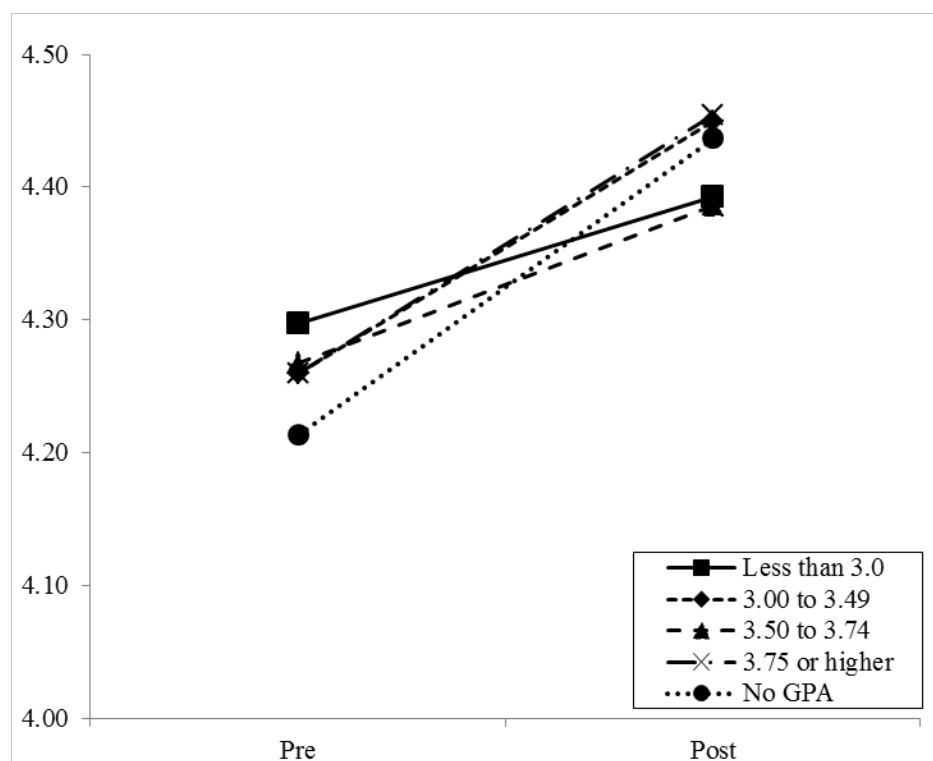
Figure 5.10: Differences based on cumulative grade point average from pre-survey to post-survey for the Identify Knowledge, Skills, and Values dimension

though there is one difference that is statistically significant. The difference between the lowest grade point average group and the second lowest group (3.00 to 3.49) was significant. Students in the second lowest grade point average group (3.00 to 3.49) had significantly steeper slopes, on average, compared to the lowest grade point average group (less than 3.0). Finally, for the Inter/Intrapersonal dimension, students in the highest grade point average group (3.75 and higher) had a significantly steeper slope than students in the lowest grade point average group. Students in the lowest grade point average group had a higher intercept than the students in the highest grade point average group, though this difference was not statistically significant.

Across all five dimensions, there was one significant difference in the slope related to level of education and this difference was part of the model for the Identify Knowledge, Skills, and Values dimension. On this dimension, first-year students had lower mean pre-survey values, holding all else constant, than other class years; this difference was marginally significant for sophomores and juniors and not significant for other groups. Sophomores had a marginally significantly higher pre-survey mean value, ceteris paribus, and then had a significantly flatter slope compared to first-year students. See Figure 5.11 for differences based on class year.

Regarding field of study, there were fairly substantial differences in the pre-survey values for the Professional Digital Identity dimension. Figure 5.12 illustrates the differences in intercepts and slopes by field of study for this dimension. Controlling for other factors, students with professional majors and interdisciplinary majors had significantly greater pre-survey values on the Professional Digital Identity dimension than undeclared students (and natural science and social science majors had marginally significantly greater values). There were two significantly different slopes. Social science and professional majors had slopes that were significantly flatter than the slope for students whose major was undeclared.
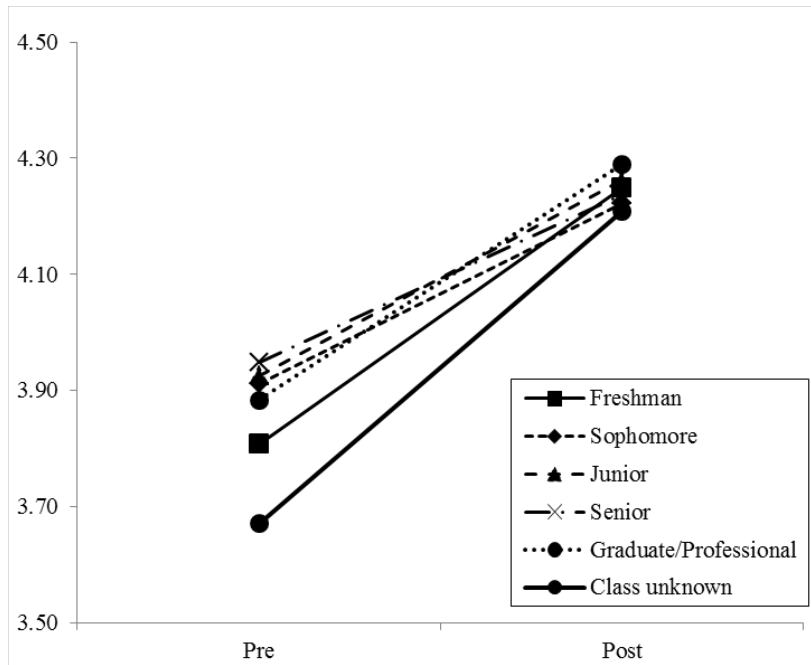
Figure 5.11: Differences based on level of education from pre-survey to post-survey for the Provide Evidence dimension
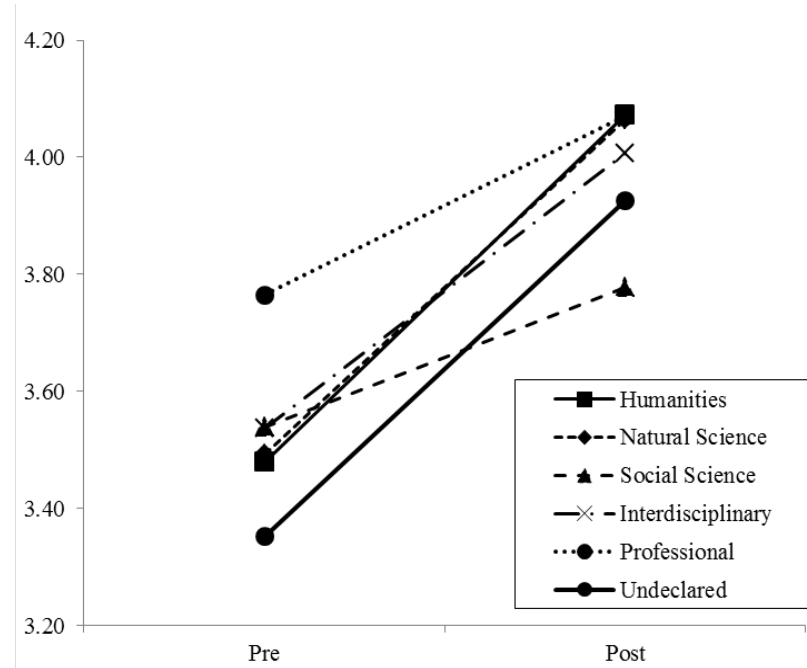
Figure 5.12: Differences based on field of study from pre-survey to post-survey for the Professional Digital Identity dimension

Table 5.10: Descriptive Statistics, Academic Characteristics

		N	Percent	Identify Pre-Survey Mean (Std dev)	Post-Survey Mean (Std dev)	Sig	Provide Evidence Pre-Survey Mean (Std dev)	Post-Survey Mean (Std dev)	Sig	Inter/Intrapersonal Pre-Survey Mean (Std dev)	Post-Survey Mean (Std dev)	Sig	Work with Others Pre-Survey Mean (Std dev)	Post-Survey Mean (Std dev)	Sig	Prof Digital Identity Pre-Survey Mean (Std dev)	Post-Survey Mean (Std dev)	Sig
Standardized test scores	ACT Less than 28	371	24.1%	4.280 (0.447)	4.441 (0.428)	***	3.974 (0.612)	4.264 (0.545)	***	4.454 (0.422)	4.542 (0.407)	***	4.246 (0.472)	4.386 (0.455)	***	3.572 (0.891)	3.995 (0.828)	***
	ACT 28 or 29	239	15.5%	4.209 (0.461)	4.445 (0.452)	***	3.888 (0.644)	4.302 (0.525)	***	4.422 (0.445)	4.554 (0.442)	***	4.205 (0.475)	4.419 (0.469)	***	3.542 (0.945)	3.999 (0.845)	***
	ACT 30 or 31	288	18.7%	4.182 (0.527)	4.416 (0.464)	***	3.823 (0.724)	4.255 (0.603)	***	4.405 (0.428)	4.558 (0.423)	***	4.238 (0.500)	4.434 (0.472)	***	3.413 (0.962)	3.980 (0.911)	***
	ACT 32 or higher	287	18.6%	4.244 (0.477)	4.433 (0.456)	***	3.822 (0.673)	4.201 (0.596)	***	4.394 (0.443)	4.530 (0.453)	***	4.250 (0.478)	4.396 (0.470)	***	3.467 (0.956)	3.917 (0.886)	***
	No ACT/SAT	354	23.0%	4.351 (0.435)	4.451 (0.493)	***	4.025 (0.607)	4.280 (0.587)	***	4.460 (0.413)	4.506 (0.492)	~	4.270 (0.484)	4.380 (0.514)	***	3.760 (0.821)	4.204 (0.753)	***
Cumulative GPA	GPA Less than 3	166	10.8%	4.277 (0.453)	4.404 (0.431)	***	3.983 (0.595)	4.261 (0.535)	***	4.450 (0.418)	4.530 (0.421)	**	4.243 (0.521)	4.358 (0.485)	**	3.669 (0.902)	4.065 (0.77)	***
	GPA 3 to 3.49	398	25.9%	4.259 (0.473)	4.458 (0.456)	***	3.937 (0.664)	4.327 (0.561)	***	4.459 (0.427)	4.579 (0.426)	***	4.263 (0.485)	4.431 (0.462)	***	3.608 (0.942)	4.070 (0.883)	***
	GPA 3.5 to 3.74	263	17.1%	4.280 (0.481)	4.416 (0.455)	***	3.950 (0.693)	4.229 (0.592)	***	4.493 (0.396)	4.555 (0.429)	*	4.291 (0.458)	4.417 (0.440)	***	3.613 (0.884)	3.977 (0.845)	***
	GPA 3.75 and higher	300	19.5%	4.278 (0.475)	4.471 (0.442)	***	3.891 (0.670)	4.250 (0.566)	***	4.421 (0.450)	4.570 (0.432)	***	4.276 (0.433)	4.433 (0.437)	***	3.448 (0.969)	3.917 (0.917)	***
	No GPA	412	26.8%	4.228 (0.469)	4.421 (0.486)	***	3.863 (0.627)	4.223 (0.588)	***	4.360 (0.433)	4.461 (0.481)	***	4.174 (0.505)	4.354 (0.533)	***	3.522 (0.874)	4.081 (0.779)	***
Education level	First-year	203	13.3%	4.068 (0.458)	4.431 (0.467)	***	3.698 (0.610)	4.222 (0.602)	***	4.263 (0.452)	4.440 (0.455)	***	4.070 (0.497)	4.354 (0.520)	***	3.351 (0.894)	3.979 (0.821)	***
	Sophomore	287	18.8%	4.310 (0.456)	4.443 (0.438)	***	3.973 (0.645)	4.309 (0.519)	***	4.481 (0.414)	4.554 (0.411)	**	4.300 (0.474)	4.437 (0.443)	***	3.625 (0.927)	4.110 (0.807)	***
	Junior	515	33.7%	4.288 (0.483)	4.454 (0.456)	***	3.933 (0.681)	4.283 (0.568)	***	4.447 (0.429)	4.578 (0.437)	***	4.289 (0.489)	4.437 (0.471)	***	3.563 (0.918)	4.029 (0.859)	***
	Senior	309	20.2%	4.254 (0.470)	4.405 (0.491)	***	3.921 (0.659)	4.223 (0.621)	***	4.430 (0.423)	4.526 (0.483)	***	4.262 (0.458)	4.377 (0.503)	***	3.481 (0.917)	3.952 (0.879)	***
	Graduate/ Professional	199	13.0%	4.309 (0.431)	4.429 (0.439)	***	3.991 (0.574)	4.202 (0.558)	***	4.484 (0.399)	4.507 (0.434)		4.204 (0.439)	4.324 (0.440)	***	3.760 (0.874)	4.028 (0.857)	***
	Unspecified/ Missing	14	0.9%	4.531 (0.329)	4.673 (0.299)	*	4.060 (0.691)	4.518 (0.425)	*	4.589 (0.365)	4.750 (0.310)	*	4.316 (0.558)	4.735 (0.358)	**	3.881 (0.823)	4.500 (0.566)	**

Sig: ~ p < .10; * p < .05; ** p < .01; *** p < .001

		N	Percent	Identify Pre-Survey Mean (Std dev)	Identify Post-Survey Mean (Std dev)	Sig	Provide Evidence Pre-Survey Mean (Std dev)	Provide Evidence Post-Survey Mean (Std dev)	Sig	Inter/Intrapersonal Pre-Survey Mean (Std dev)	Inter/Intrapersonal Post-Survey Mean (Std dev)	Sig	Work with Others Pre-Survey Mean (Std dev)	Work with Others Post-Survey Mean (Std dev)	Sig	Prof Digital Identity Pre-Survey Mean (Std dev)	Prof Digital Identity Post-Survey Mean (Std dev)	Sig
Field of study	Humanities	128	8.3%	4.367 (0.420)	4.536 (0.403)	***	3.995 (0.729)	4.351 (0.515)	***	4.533 (0.384)	4.646 (0.357)	**	4.291 (0.487)	4.516 (0.418)	***	3.411 (0.935)	4.045 (0.862)	***
	Natural Sciences & Engineering	367	23.8%	4.190 (0.522)	4.402 (0.482)	***	3.815 (0.682)	4.237 (0.578)	***	4.380 (0.439)	4.510 (0.460)	***	4.226 (0.474)	4.387 (0.470)	***	3.530 (0.906)	4.047 (0.818)	***
	Social Sciences	138	9.0%	4.216 (0.463)	4.355 (0.423)	***	3.883 (0.623)	4.170 (0.567)	***	4.414 (0.429)	4.523 (0.389)	**	4.226 (0.469)	4.367 (0.459)	***	3.547 (0.965)	3.752 (0.935)	**
	Interdisciplinary	99	6.4%	4.302 (0.418)	4.453 (0.439)	***	3.941 (0.618)	4.203 (0.639)	***	4.484 (0.420)	4.574 (0.427)	*	4.322 (0.458)	4.408 (0.464)	~	3.515 (0.969)	3.909 (0.879)	***
	Professional	448	29.1%	4.354 (0.434)	4.454 (0.477)	***	4.043 (0.586)	4.281 (0.575)	***	4.480 (0.407)	4.527 (0.475)	*	4.295 (0.464)	4.390 (0.502)	***	3.753 (0.853)	4.133 (0.816)	***
	Undeclared	359	23.3%	4.181 (0.469)	4.446 (0.443)	***	3.837 (0.672)	4.276 (0.564)	***	4.374 (0.451)	4.531 (0.439)	***	4.169 (0.51)	4.397 (0.479)	***	3.426 (0.933)	4.003 (0.840)	***

Table 5.10: Descriptive Statistics, Academic Characteristics (Continued)

Sig: ~ p < .10; * p < .05; ** p < .01; *** p < .001

Table 5.11: 3-Level HLM Predicting Dimensions of Integrative Learning, Academic Variables

	Identify				Provide Evidence				Inter/Intrapersonal				Work with Others				Prof Digital Identity			
	Intercepts		Slopes		Intercepts		Slopes		Intercepts		Slopes		Intercepts		Slopes		Intercepts		Slopes	
Std Test: Low/Medium	-0.035		0.031		-0.044		0.055		-0.005		0.023		-0.036		0.064		-0.016		-0.030	
Std Test: High/Medium	-0.086	*	0.068	~	-0.134	**	0.127	*	-0.018		0.045		-0.008		0.059		-0.181	*	0.144	~
Std Test: High	-0.037		0.055		-0.158	**	0.122	*	-0.030		0.054		-0.014		0.039		-0.120		0.063	
Std Test: Missing	0.029		-0.084		0.103		-0.073		-0.007		-0.040		-0.022		-0.001		0.266	*	-0.010	
GPA: Low/Medium	-0.035		0.100	*	-0.061		0.156	**	0.006		0.052		0.015		0.076		-0.040		0.127	
GPA: High/Medium	-0.029		0.037		-0.030		0.023		0.025		-0.013		0.049		0.031		-0.040		0.029	
GPA: High	-0.038		0.109	*	-0.100		0.114	~	-0.064		0.093	*	0.028		0.072		-0.309	**	0.188	~
GPA: Missing	-0.079		0.127	~	-0.131		0.149		-0.073		0.008		0.016		0.017		-0.219		0.263	
Sophomore	0.109	~	-0.119	*	0.113		-0.136		0.100	~	-0.053		0.096		-0.100		0.142		0.037	
Junior	0.100	~	-0.059		0.125		-0.109		0.101	~	0.006		0.090		-0.080		0.097		0.098	
Senior	0.064		-0.038		0.146	~	-0.152	~	0.094		-0.009		0.069		-0.086		-0.038		0.149	
Graduate Student	0.068		0.016		0.080		-0.037		0.166	*	-0.060		-0.059		0.044		0.058		-0.070	
Class Unknown	0.121		-0.020		-0.128		0.094		0.109		0.073		-0.120		0.289	~	0.086		0.092	
Humanities	0.111	*	-0.016		0.086		0.019		0.082	~	0.005		0.035		0.061		0.125		0.030	
Natural Science	-0.046		0.021		-0.095	~	0.086		-0.039		0.002		-0.011		-0.008		0.144	*	-0.008	
Social Science	-0.062		-0.033		-0.066		-0.034		-0.049		-0.011		-0.037		-0.005		0.192	*	-0.346	**
Interdisciplinary	0.036		-0.022		0.016		-0.059		0.026		-0.012		0.094	~	-0.075		0.189	~	-0.111	
Professional	0.138	**	-0.082	~	0.184	**	-0.061		0.101	*	-0.033		0.163	**	-0.094	~	0.416	***	-0.271	*

Sig: ~ p < .10; * p < .05; ** p < .01; *** p < .001

Comparison groups: Standardized Test: Low, GPA: Low, First-year, Major undeclared

Note: Models also include student background, co-curricular, student-level learning process characteristics, and site-level learning process characteristics.

Co-curricular involvement. The final group of student background characteristics accounted for in the models is co-curricular involvement, which consists of 6 types of activities. The majority of students in the analysis indicated that they had participated in student organizations (70.4%) at the start of the MPortfolio process. The next most frequent activity was working for money (53.1%). The least frequent of the activities included in the analysis was participating in sororities or fraternities; approximately 10% of students reported that they had engaged in Greek life at the start of the MPortfolio process. Paired-samples *t*-tests revealed that for all activities except fraternities and sororities, there were significant positive changes from the pre-survey to the post-survey for all five dimensions of integrative learning. For students who engaged in Greek life, there was not a significant positive difference between the pre-survey and post-survey means for the Inter/Intrapersonal dimension.

There were several significant differences related to co-curricular involvement. First, at the time of the pre-survey, there was no significant difference in the Identify Knowledge, Skills, and Values dimension mean values between students engaging in student organizations and those who did not, controlling for other factors. Those who participated in student organization had a significantly steeper slope than students who did not engage in this activity. Second, there were differences related to students' participation in internships. Students who had done at least one internship prior to engagement in MPortfolio had significantly higher intercepts for three of the five dimensions (Identify, Provide Evidence, Professional Digital Identity; Work with Others was marginally significant). Students who had internships had a significantly flatter slope on the Provide Evidence dimension, compared to those who had not done an internship. They had marginally flatter slopes on the Identify and Work with Others dimensions. Third, there was significant variation in Provide Evidence dimension growth associated with engagement in

research. At the time of the pre-survey, students who had engaged in research were not significantly different than students who had not. Controlling for other factors, students who had engaged in research had a significantly steeper slope for this dimension than those who did not engage in research. Figures 5.13 through 5.15 depict these relationships.

Figure 5.13: Differences based on participation in student organizations from pre-survey to post-survey for the Identify Knowledge, Skills, and Values dimension
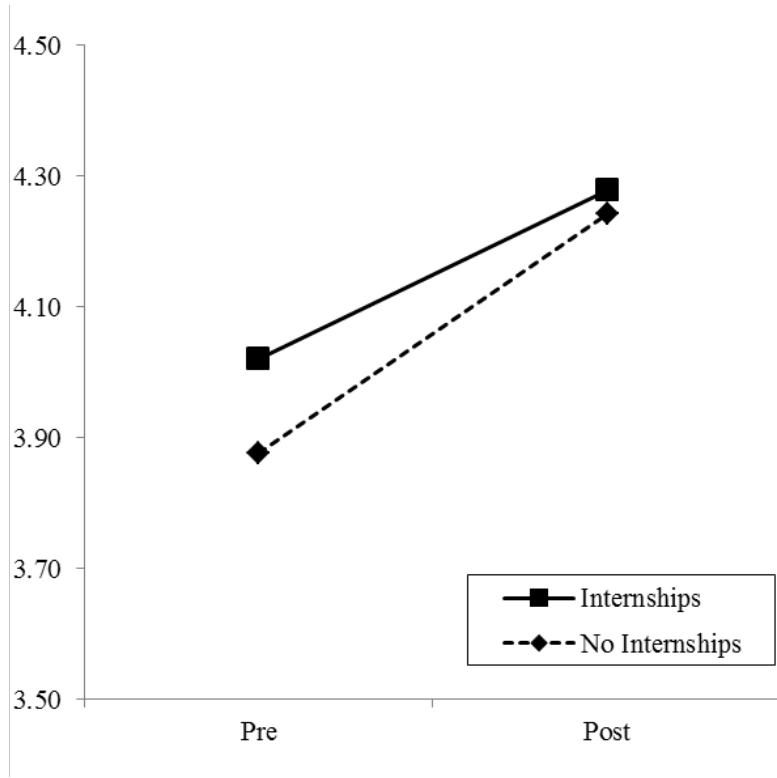
Figure 5.14: Differences based on internship participation from pre-survey to post-survey for Provide Evidence dimension

Figure 5.15: Differences based on participation in research from pre-survey to post-survey for the Provide Evidence dimension

There were also multiple slopes associated with participation in sororities or fraternities that were significantly different. For both the Identify Knowledge, Skills, and Values dimension and Inter/Intrapersonal dimension, there was no difference in the intercepts for students who participated in Greek life and those who did not. Also, for both of these dimensions, students who participated in a fraternity or sorority had significantly flatter slopes compared to students who had not engaged in Greek life. These differences in slopes are depicted in Table 5.16 and Table 5.17, respectively. In addition to these two differences, there was also a marginally significant result associated with Greek life engagement and the Work with Others dimension. For this dimension, the intercepts of fraternity and sorority participants and students not involved in Greek life were not significantly different and fraternity and sorority members had slope that was significantly flatter at the .10 level.
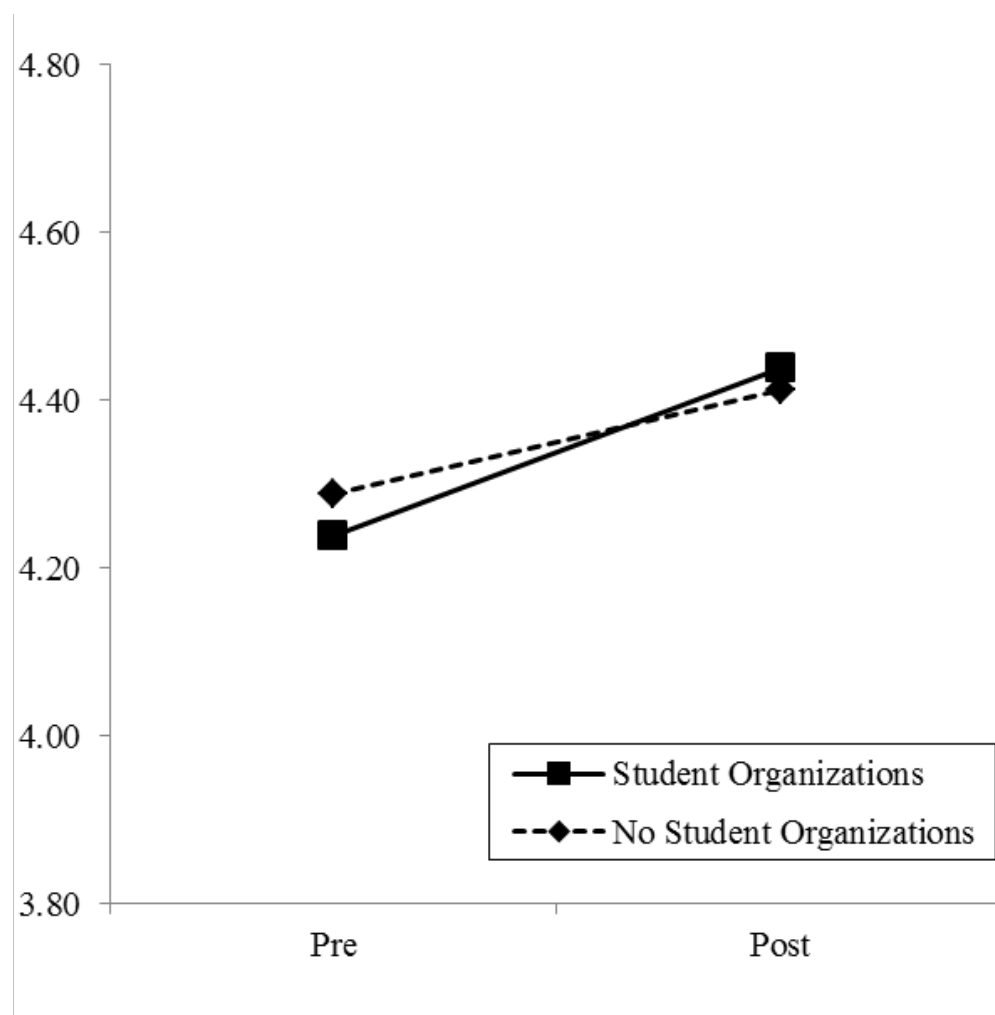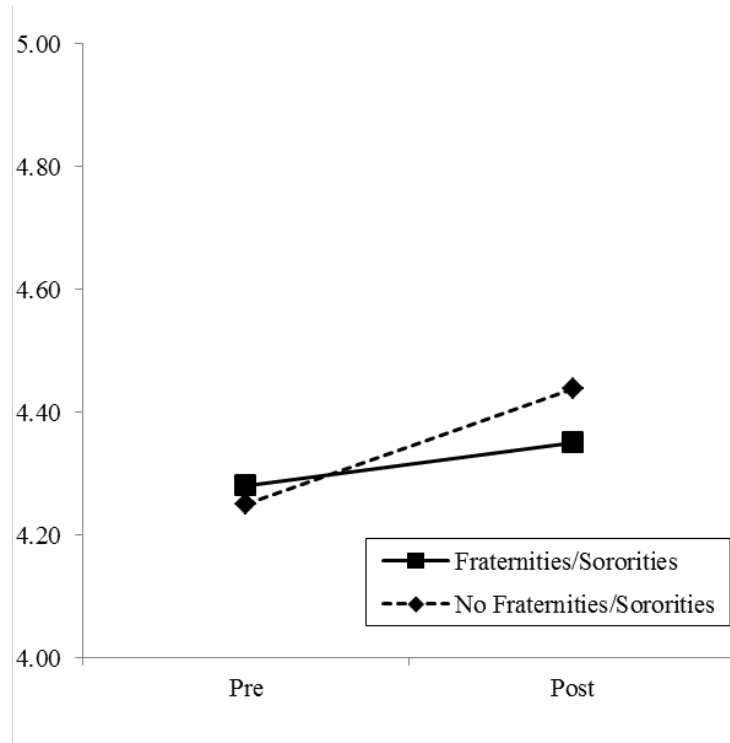
Figure 5.16: Differences based on fraternity/sorority participation from pre-survey to post-survey for the Identify Knowledge, Skills, and Values dimension

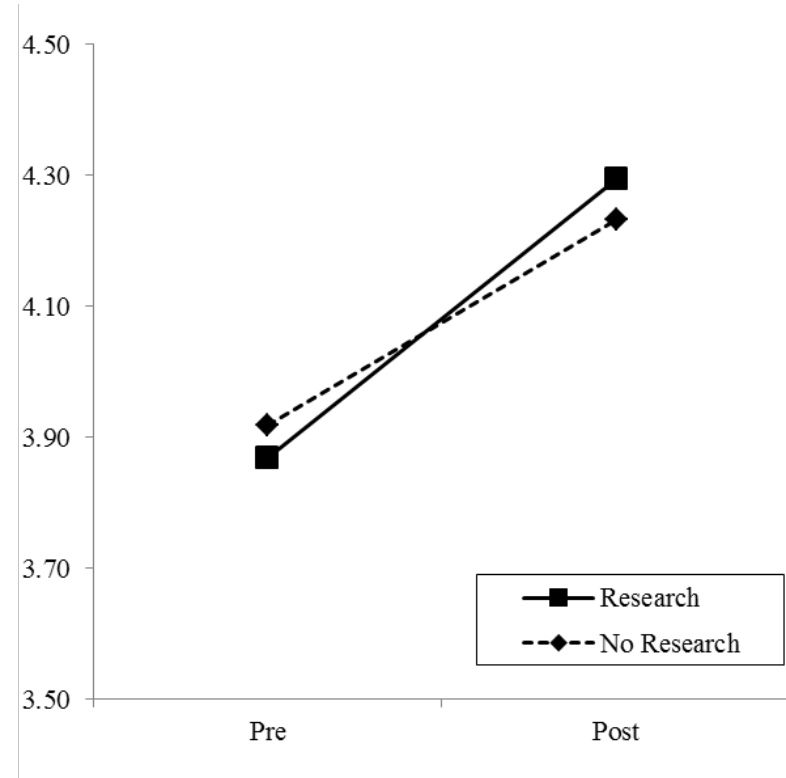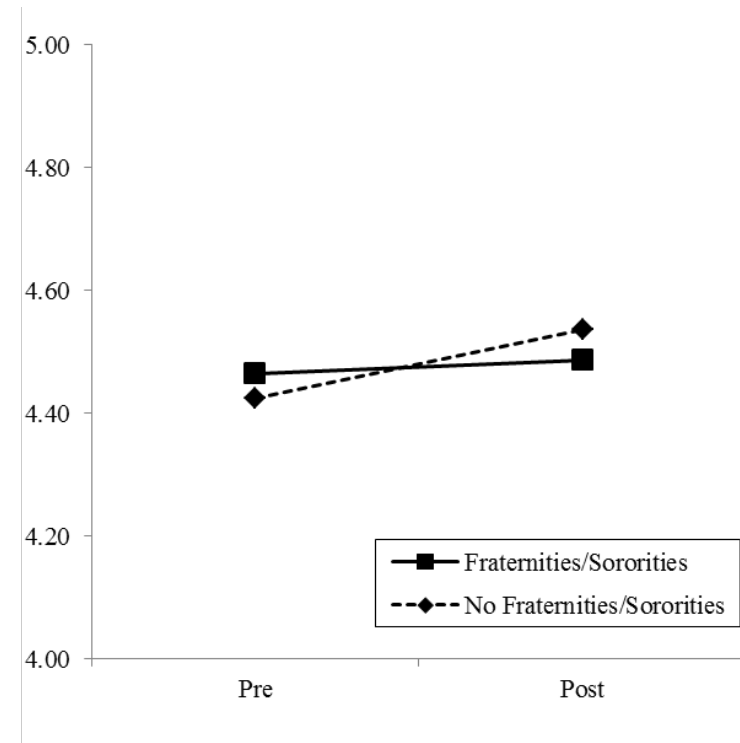Figure 5.17: Differences based on fraternity/sorority participation from pre-survey to post-survey for the Inter/Intrapersonal dimension

Table 5.12: Descriptive Statistics

	N	Percent	Identify Pre-Survey Mean (Std dev)	Identify Post-Survey Mean (Std dev)	Sig	Provide Evidence Pre-Survey Mean (Std dev)	Provide Evidence Post-Survey Mean (Std dev)	Sig	Inter/Intrapersonal Pre-Survey Mean (Std dev)	Inter/Intrapersonal Post-Survey Mean (Std dev)	Sig	Work with Others Pre-Survey Mean (Std dev)	Work with Others Post-Survey Mean (Std dev)	Sig	Prof Digital Identity Pre-Survey Mean (Std dev)	Prof Digital Identity Post-Survey Mean (Std dev)	Sig
Participating in student organizations	1084	70.4%	4.253 (0.471)	4.451 (0.457)	***	3.903 (0.668)	4.280 (0.570)	***	4.445 (0.421)	4.569 (0.431)	***	4.254 (0.474)	4.42 (0.468)	***	3.555 (0.926)	4.009 (0.851)	***
Working for money	817	53.1%	4.301 (0.466)	4.469 (0.461)	***	3.965 (0.645)	4.307 (0.570)	***	4.466 (0.415)	4.568 (0.452)	***	4.286 (0.468)	4.439 (0.482)	***	3.601 (0.911)	4.059 (0.841)	***
Doing an internship	297	19.3%	4.380 (0.436)	4.500 (0.488)	***	4.041 (0.675)	4.316 (0.614)	***	4.498 (0.412)	4.596 (0.478)	***	4.310 (0.470)	4.418 (0.508)	***	3.700 (0.971)	4.068 (0.873)	***
Engaging in peer teaching, mentoring, or resident advising	530	34.4%	4.308 (0.495)	4.467 (0.472)	***	3.988 (0.692)	4.323 (0.562)	***	4.489 (0.424)	4.588 (0.446)	***	4.317 (0.451)	4.463 (0.465)	***	3.607 (0.935)	4.034 (0.889)	***
Engaging in research	446	29.0%	4.260 (0.518)	4.440 (0.475)	***	3.874 (0.726)	4.269 (0.587)	***	4.413 (0.457)	4.542 (0.441)	***	4.264 (0.503)	4.429 (0.469)	***	3.574 (0.934)	3.978 (0.906)	***
Participating in sororities or fraternities	162	10.5%	4.254 (0.519)	4.361 (0.540)	*	3.917 (0.720)	4.224 (0.678)	***	4.427 (0.470)	4.483 (0.561)	***	4.216 (0.503)	4.325 (0.576)	*	3.539 (0.972)	3.940 (0.958)	***

Sig: ~ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Table 5.13: 3-Level HLM Predicting Dimensions of Integrative Learning, Co-curricular involvement

	Identify Intercepts		Identify Slopes		Provide Evidence Intercepts		Provide Evidence Slopes		Inter/Intrapersonal Intercepts	Inter/Intrapersonal Slopes	Work with Others Intercepts		Work with Others Slopes		Prof Digital Identity Intercepts		Prof Digital Identity Slopes
Student organizations	-0.046		0.069	*	-0.056		0.079		0.030	0.026	-0.027		0.030		0.053		-0.069
Paid work	0.029		-0.013		0.056	~	-0.018		0.037	-0.021	0.044	~	-0.014		0.086	~	-0.038
Internships	0.125	***	-0.062	~	0.142	**	-0.107	*	0.027	-0.008	0.058	~	-0.061	~	0.141	*	-0.029
Mentorship	0.022		0.012		0.075	*	0.003		0.037	-0.003	0.068	*	0.014		0.103	*	-0.045
Research	0.036		0.013		-0.048		0.110	*	0.017	0.025	0.052	~	0.023		0.066		-0.053
Fraternities/Sororities	0.028		-0.119	**	0.049		-0.074		0.036	-0.088 *	-0.021		-0.076	~	-0.044		-0.046

Sig: ~ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Note: Models also include student background, academic, student-level learning process characteristics, and site-level learning process characteristics.

Student-level learning process characteristics. At the student level, the analysis includes two variables that explain how the MPortfolio process facilitates integrative learning. The first of these variables is the process scale, which consists of four items and is represented by the following statement: "The reflection and creation process helped me recognize the value of my learning experiences and understand how these experiences connect." The second student-level learning process characteristic is the sharing scale, which is the mean of four items and is represented by this statement: "Engaging with others was an important part of the process." Though both variables are included as continuous variables in the multi-level models, Table 5.14 presents the descriptive statistics for these variables as both continuous and categorical (quartiles) to demonstrate how the dimensions of integrative learning vary across different levels of these scales.

Table 5.14 illustrates that students in the top three quartiles of each of these scales had significantly higher post-survey mean values than pre-survey mean values for each of the five dimensions of integrative learning. In the lowest quartile, on average, there were several dimensions on which students did not experience positive changes. For the sharing scale, there was one exception. In the lowest quartile, the post-survey mean value was not significantly different from the pre-survey mean value for the Inter/Intrapersonal dimension. For the process scale, there were three dimensions on which students in the lowest quartile did not experience significant changes, on average: the Identify Knowledge, Skills, and Values dimension, the Inter/Intrapersonal dimension, and the Work with Others dimension.

When controlling for other variables in the multi-level model, the process scale intercept and slope was positive and significant for each of the five dimensions of integrative learning.

Table 5.14: Descriptive Statistics, Student-level learning process characteristics

		N	Mean	Identify Pre-Survey Mean (Std dev)	Identify Post-Survey Mean (Std dev)	Sig	Provide Evidence Pre-Survey Mean (Std dev)	Provide Evidence Post-Survey Mean (Std dev)	Sig	Inter/Intrapersonal Pre-Survey Mean (Std dev)	Inter/Intrapersonal Post-Survey Mean (Std dev)	Sig	Work with Others Pre-Survey Mean (Std dev)	Work with Others Post-Survey Mean (Std dev)	Sig	Prof Digital Identity Pre-Survey Mean (Std dev)	Prof Digital Identity Post-Survey Mean (Std dev)	Sig
Scales	Reflection and creation process helped me recognize the value of my learning experiences and understand how these experiences connect	1503	3.934 (0.846)															
	Quartile 1			4.208 (0.532)	4.247 (0.543)		3.807 (0.705)	3.929 (0.664)	**	4.381 (0.48)	4.358 (0.551)		4.174 (0.514)	4.197 (0.563)		3.326 (1.025)	3.476 (1.012)	*
	Quartile 2			4.180 (0.439)	4.312 (0.402)	***	3.835 (0.576)	4.113 (0.479)	***	4.355 (0.415)	4.416 (0.414)	***	4.177 (0.457)	4.284 (0.421)	***	3.501 (0.842)	3.945 (0.709)	***
	Quartile 3			4.295 (0.416)	4.513 (0.372)	***	3.919 (0.595)	4.395 (0.418)	***	4.468 (0.366)	4.635 (0.318)	***	4.274 (0.411)	4.492 (0.370)	***	3.633 (0.806)	4.179 (0.694)	***
	Quartile 4			4.416 (0.462)	4.779 (0.290)	***	4.137 (0.717)	4.726 (0.353)	***	4.581 (0.401)	4.838 (0.249)	***	4.419 (0.494)	4.731 (0.344)	***	3.827 (0.945)	4.552 (0.633)	***
	Engaging with others was an important part of the process	1436	3.763 (0.985)															
	Quartile 1			4.218 (0.543)	4.284 (0.480)	*	3.798 (0.704)	4.008 (0.636)	***	4.367 (0.476)	4.381 (0.498)		4.179 (0.502)	4.235 (0.525)	~	3.413 (0.977)	3.615 (0.993)	**
	Quartile 2			4.198 (0.459)	4.357 (0.449)	***	3.803 (0.641)	4.137 (0.495)	***	4.398 (0.418)	4.486 (0.423)	***	4.180 (0.468)	4.301 (0.445)	***	3.407 (0.904)	3.852 (0.762)	***
	Quartile 3			4.258 (0.398)	4.44 (0.414)	***	3.939 (0.568)	4.28 (0.504)	***	4.433 (0.399)	4.531 (0.41)	***	4.242 (0.445)	4.418 (0.423)	***	3.561 (0.856)	4.075 (0.761)	***
	Quartile 4			4.327 (0.463)	4.599 (0.405)	***	4.043 (0.658)	4.504 (0.498)	***	4.494 (0.415)	4.685 (0.371)	***	4.347 (0.485)	4.576 (0.415)	***	3.751 (0.878)	4.382 (0.679)	***

Sig: ~ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$
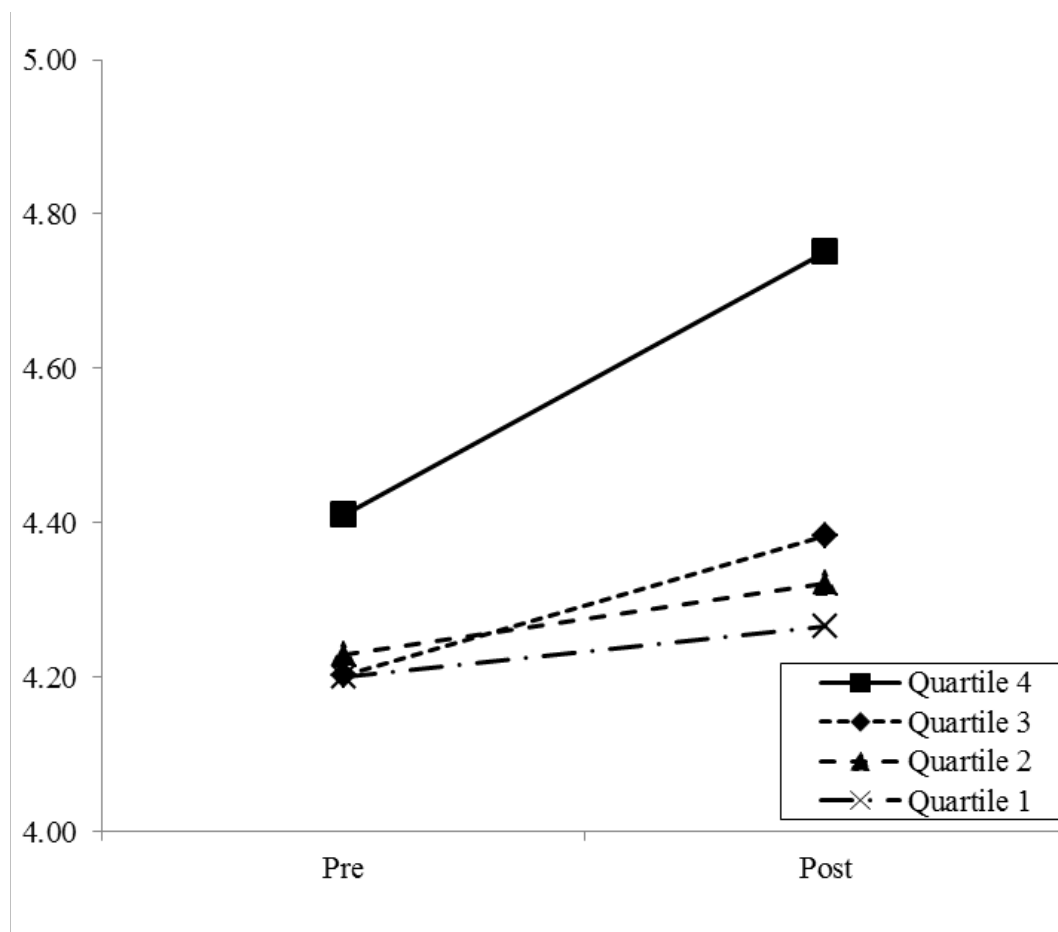
Figure 5.18: Differences based on reflection scale from pre-survey to post-
survey for the Identify Knowledge, Skills, and Values dimension

This means that students who rated highly on the process scale not only had higher mean values

for the dimensions of integrative learning on the pre-survey but they also experienced

significantly greater changes through the process (and despite starting at a higher level). Bearing

in mind that this variable is continuous in the model, Figure 5.22 illustrates how students in

different quartiles of the process scale change over the course of the MPortfolio process on the

Identify Knowledge, Skills, and Values dimension. It shows how students rating highly on this

scale begin this process at a significantly higher level and then develop at a much steeper

trajectory. Table 5.16 includes the intercepts and slopes for all learning process characteristics

and we can see that, when controlling for other factors, the slopes for the sharing scale are not significant for any of the five dimensions of integrative learning.

      Site-level learning process characteristics. At the site level, there were four categories of learning process characteristics included in the analysis: the term during which the MPortfolio process began, the length of the process, the number of students engaging in the process through that site, and the type of facilitation used. Most students began the MPortfolio process during the Winter term (63.6%), while about a third started the process during the Fall term (31.8%). The remaining 4.6% of students were those who participated in MPortfolio through the School of Information during the Spring/Summer term. The large percentage of students who engaged in the process during the Winter term can be attributed to nearly 200 students participating in the UC 421: ResStaff Class each year. This also explains the high percentage of students who engaged in the process through large sites of more than 50 students (75.1%). Those who engaged in the process through medium-sized sites (11 to 50 students) represented 22.0% of students in the analysis and 2.9% participated in sites with a small number of students (10 or fewer). Regarding length of the experience, the vast majority of students engaged in the process over the course of one term (89.2%), while 9.1% participated for less than one term and only 1.7% did so over the course of a full academic year. Finally, most students who engaged in MPortfolio did so in a faculty- or staff-facilitated experience (73.8%), while 7.9% participated in MPortfolio in a purely peer-facilitated setting. The remaining 18.3% engaged in the process through a site that employed a mixed approach of faculty/staff and student facilitators.

      The paired-samples *t*-tests for these groups showed that, in most cases, students experienced significant, positive changes across the dimensions of integrative learning, regardless of site-level learning process characteristics. Where there were exceptions, in most

cases the lack of significance could probably be explained by lack of statistical power. Students who engaged in the MPortfolio process for more than one term (N = 26) and in sites with a small number of students (N = 44) experienced positive but non-significant changes in the mean values for the Work with Others dimension and the Professional Digital Identity dimension. There is one site-level learning process characteristic that truly stands out as being different, based on the paired-samples *t*-tests, and that is beginning the process during the Spring/Summer term. This group is comprised of graduate students who engaged in the MPortfolio process as part of the School of Information's Practical Engagement Process. Students in this group actually experienced slight declines from the pre-survey to the post-survey in the mean values for the Provide Evidence dimension, Inter/Intrapersonal dimension, and Work with Others dimension. For the Professional Digital Identity dimension, there was a marginally significant positive change from the start of the process to the end and, for the Identify Knowledge, Skills, and Values dimension, there was a non-significant increase from the pre-survey to the post-survey. Table 5.15 displays the frequencies of the site-level learning process characteristics and, for each group, the results of the paired-samples *t*-tests of the mean pre-survey and post-survey values of each dimension of integrative learning.

Table 5.15: Descriptive Statistics, Site-level learning process characteristics

		N	Percent	Identify Pre-Survey Mean (Std dev)	Identify Post-Survey Mean (Std dev)	Sig	Provide Evidence Pre-Survey Mean (Std dev)	Provide Evidence Post-Survey Mean (Std dev)	Sig	Inter/Intrapersonal Pre-Survey Mean (Std dev)	Inter/Intrapersonal Post-Survey Mean (Std dev)	Sig	Work with Others Pre-Survey Mean (Std dev)	Work with Others Post-Survey Mean (Std dev)	Sig	Prof Digital Identity Pre-Survey Mean (Std dev)	Prof Digital Identity Post-Survey Mean (Std dev)	Sig
Term	Fall Term	489	31.8%	4.240 (0.461)	4.442 (0.481)	***	3.862 (0.644)	4.244 (0.599)	***	4.396 (0.425)	4.508 (0.468)	***	4.176 (0.479)	4.367 (0.51)	***	3.528 (0.876)	4.042 (0.814)	***
	Winter Term	979	63.6%	4.272 (0.475)	4.448 (0.447)	***	3.939 (0.660)	4.289 (0.555)	***	4.448 (0.429)	4.566 (0.428)	***	4.279 (0.480)	4.431 (0.458)	***	3.562 (0.932)	4.023 (0.860)	***
	Spring/ Summer Term	71	4.6%	4.237 (0.490)	4.268 (0.441)		3.959 (0.625)	3.980 (0.567)		4.418 (0.451)	4.324 (0.435)	~	4.241 (0.471)	4.205 (0.442)		3.775 (0.982)	3.967 (0.888)	~
Length of experience	Less than one term	140	9.1%	4.099 (0.500)	4.605 (0.449)	***	3.814 (0.670)	4.496 (0.508)	***	4.354 (0.458)	4.614 (0.4)	***	4.197 (0.479)	4.522 (0.456)	***	3.676 (0.933)	4.331 (0.664)	***
	One term	1373	89.2%	4.274 (0.466)	4.417 (0.457)	***	3.925 (0.650)	4.233 (0.576)	***	4.436 (0.426)	4.525 (0.449)	***	4.248 (0.483)	4.387 (0.479)	***	3.546 (0.914)	3.993 (0.856)	***
	More than one term	26	1.7%	4.407 (0.403)	4.610 (0.423)	*	3.981 (0.753)	4.431 (0.417)	**	4.538 (0.395)	4.707 (0.333)	~	4.330 (0.431)	4.462 (0.419)		3.718 (0.969)	4.141 (0.910)	
Number of students	Small (10 or fewer)	44	2.9%	4.149 (0.361)	4.380 (0.458)	**	3.631 (0.628)	4.114 (0.693)	***	4.366 (0.394)	4.520 (0.473)	*	4.162 (0.349)	4.260 (0.441)		3.583 (0.967)	3.811 (0.908)	
	Medium (11 to 50)	339	22.0%	4.178 (0.495)	4.526 (0.438)	***	3.854 (0.678)	4.391 (0.541)	***	4.415 (0.447)	4.622 (0.378)	***	4.188 (0.463)	4.458 (0.454)	***	3.649 (0.86)	4.164 (0.778)	***
	Large (More than 50)	1156	75.1%	4.288 (0.465)	4.414 (0.462)	***	3.944 (0.644)	4.228 (0.572)	***	4.437 (0.425)	4.512 (0.458)	***	4.264 (0.490)	4.389 (0.483)	***	3.535 (0.931)	3.994 (0.859)	***
Facilitation type	Peer-facilitated	121	7.9%	4.103 (0.519)	4.629 (0.447)	***	3.837 (0.680)	4.519 (0.510)	***	4.358 (0.461)	4.627 (0.38)	***	4.200 (0.495)	4.55 (0.455)	***	3.664 (0.938)	4.383 (0.623)	***
	Mixed facilitation	282	18.3%	4.226 (0.547)	4.376 (0.470)	***	3.882 (0.692)	4.179 (0.603)	***	4.360 (0.493)	4.432 (0.484)	*	4.222 (0.529)	4.330 (0.494)	**	3.711 (0.932)	4.036 (0.874)	***
	Faculty/Staff -facilitated	1136	73.8%	4.285 (0.441)	4.432 (0.452)	***	3.932 (0.641)	4.253 (0.564)	***	4.455 (0.406)	4.553 (0.436)	***	4.255 (0.468)	4.402 (0.472)	***	3.513 (0.907)	3.986 (0.852)	***

Sig: ~ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

The multi-level analysis, summarized in Table 5.16, revealed that there was only one learning process characteristic at the site-level that was associated with significant variation in integrative learning gains. For the term of the experience (i.e., fall, winter, spring/summer), the length of the process (i.e., less than one semester, one semester, one year), and the facilitation type (student-facilitated, faculty-/staff-facilitated, and mixed) there were no significant differences in slope. In other words, when controlling for all other factors, students experienced the same changes regardless of the term when the process started, the length of the process, and the type of facilitation. There were significant differences, however, based on the number of students going through the process. For the Identify Knowledge, Skills, and Values dimension and the Provide Evidence dimensions, students who engaged in MPortfolio through the largest sites (50 or more students) had intercepts that were significantly higher and significantly flatter slopes. Figures 5.19 and 5.20 demonstrate how, controlling for other factors, students in larger sites had higher mean pre-survey values for the Identify and Provide Evidence dimensions, respectively, and flatter slopes than students in medium-sized sites (11 to 50 students). At the time of the post-survey, when controlling for other factors, these two groups (students in medium-sized sites and students in large sites) had mean values that were approximately the same.
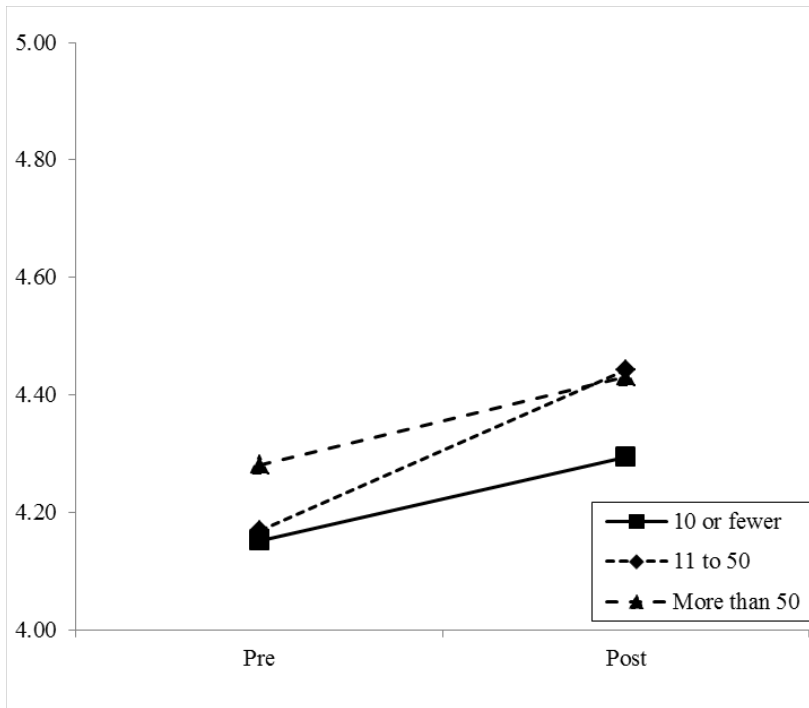
Figure 5.19: Differences based on site size from pre-survey to post-survey for the Identify Knowledge, Skills, and Values dimension
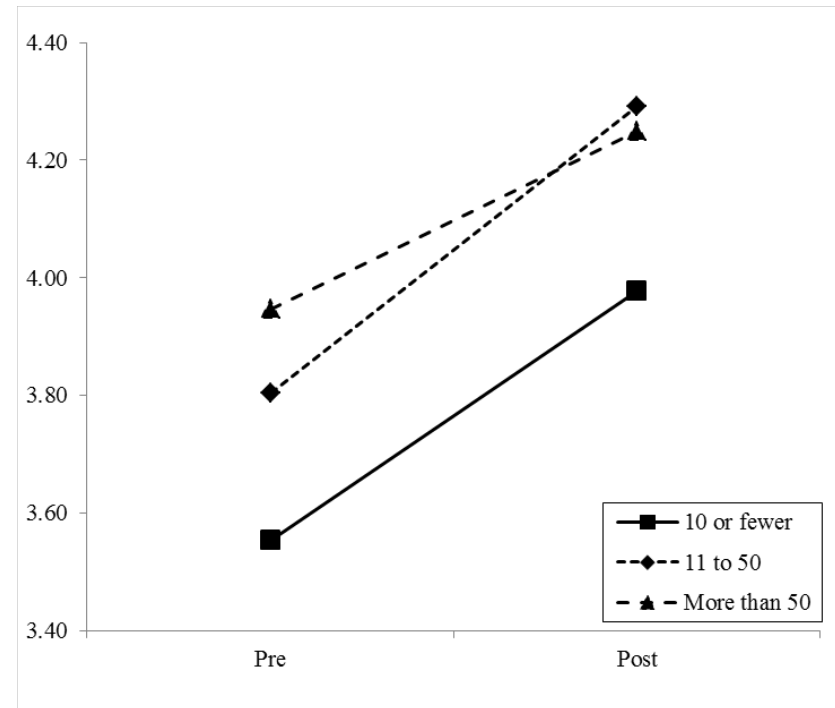
Figure 5.20: Differences based on site size from pre-survey to post-survey for the Provide Evidence dimension

Table 5.16: 3-Level HLM Predicting Dimensions of Integrative Learning, Learning Process Characteristics

	Identify		Provide Evidence		Inter/Intrapersonal		Work with Others		Prof Digital Identity	
	Intercepts	Slopes	Intercepts	Slopes	Intercepts	Slopes	Intercepts	Slopes	Intercepts	Slopes
Student-level										
Process Scale	0.071 ***	0.098 ***	0.070 **	0.197 ***	0.067 ***	0.090 ***	0.068 ***	0.096 ***	0.145 ***	0.214 ***
Sharing Scale	0.003	0.015	0.045 *	-0.010	0.017	0.012	0.028 *	0.010	0.042	0.037
Site-Level										
Fall term	-0.008	0.002	-0.007	-0.057	-0.009	0.031	-0.054	0.043	0.009	-0.093
Spring/ Summer Term	0.039	-0.008	0.129	-0.143	0.156	-0.068	0.276 *	-0.186 ~	0.076	0.100
Less than one semester	-0.104	0.161	0.104	0.180	-0.083	-0.022	-0.034	0.005	0.439	-0.206
Full year	0.149	-0.098	0.136	-0.030	0.077	-0.081	0.127	-0.097	0.047	0.156
Size: Small	-0.018	-0.122	-0.251 ~	-0.058	-0.089	-0.017	-0.062	-0.124	-0.084	-0.182
Size: Large	0.108 *	-0.113 *	0.135 *	-0.169 **	-0.002	-0.066	0.033	-0.044	-0.002	-0.029
Student-Facilitated	0.114	-0.017	0.062	-0.207	0.055	0.059	0.080	0.025	-0.002	0.166
Mixed Facilitation	-0.055	0.010	-0.012	-0.050	-0.149 **	-0.017	-0.087 ~	-0.018	0.167 ~	-0.142

Sig: ~ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Comparison groups: Winter term, One semester, Size: Medium, Faculty/Staff Facilitated

Note: Models also include student background, academic, and co-curricular characteristics.

Summary of student and learning process characteristics results. In this section, I explored how student and learning process characteristics contribute to variation in integrative learning gains. Testing differences from the pre-survey to the post-survey for specific groups (e.g., males, students with high grades, students with internships), each group experienced significant positive changes, on average and almost without exception, for all five dimensions. To control for different factors, I employed hierarchical linear modeling as a multivariate approach to explore group differences by using slopes and intercepts as outcomes. Student characteristics were categorized into three groups: student background characteristics, academic characteristics, and co-curricular involvement. Learning process characteristics were categorized at the student level and the site level.

Exploring differences related to student background characteristics, there was only one significant difference. Controlling for other factors, Asian students started the process with a significantly higher mean value on the Digital Professional Identity dimension and experienced change that was significantly weaker compared to White students. Otherwise, there were no significant differences related to gender, race, citizenship, or first generation status.

Regarding academic characteristics, however, there were several significant differences. Controlling for other factors, students with the lowest standardized test scores tended to rate their integrative learning abilities to be stronger than their peers with higher test scores. This was particularly true for the Provide Evidence dimension; for this dimension, students in the highest two standardized test score quartiles had significantly lower mean values at the start of the process than those in the lowest standardized test score quartile and experienced the greatest amount of change, when controlling for other factors. There were several differences related to grade point average. Controlling for other factors, students in the lowest grade point average

quartile demonstrated weaker growth than students in the second and fourth quartiles on the Identify Knowledge, Skills, and Values dimension, students in the second quartile on the Provide Evidence dimension, and students in the highest quartile on the Interpersonal dimension. Exploring differences related to class year, compared to sophomores, first-year students demonstrated significantly greater growth on the Identify Knowledge, Skills, and Values dimension over the course of the process. Finally, there were significant differences associated with field of study for the Professional Digital Identity dimension. Controlling for other factors, students in the social sciences and in professional fields rated themselves as significantly stronger on this dimension, controlling for other factors, at the start of the process. Over the course of the process, though, students in these fields demonstrated significantly weaker growth on this dimension, compared to those without a major.

There were several significant findings related to involvement in co-curricular activities. Students who participate in student organizations demonstrated significantly greater growth in the Identify Knowledge, Skills, and Values dimension, compared to students who did not participate in student organizations and controlling for all other factors. Students with internships rated themselves as significantly stronger at the start of the process, controlling for other factors, on the Provide Evidence dimension but exhibited significantly weaker growth at the end of the process, relative to students who had not participated in internships. Students who had research experiences exhibited significantly stronger growth in the Provide Evidence dimension, compared to those without research experiences. Compared to students not involved in Greek life, students in fraternities and sororities demonstrated significantly weaker growth in the Identify and Interpersonal dimensions.

Student-level learning process characteristics included only two variables: the reflective process scale and the sharing scale. For all dimensions, the reflective process scale had slopes and intercepts that were significant and positive, meaning that students with higher reflective process scale values tended to have higher integrative learning dimension values at the start of the process and experienced greater levels of growth than those with lower reflective process scale values. Controlling for other factors, there was no variation in integrative learning associated with the sharing scale.

The only site-level learning process characteristic for which there was a significant difference was the number of students participating in the process at that particular site. Controlling for other factors, students engaging in the process with a large group of students had significantly higher mean values on the Identify and Provide Evidence dimensions at the start of the process and experienced significantly weaker growth, compared to students in medium-sized sites. There were no significant findings associated with the term of the experience, the length of the experience, or type of facilitation.

Testing the Lasting Impact of MPortfolio on Integrative Learning

In this section, I answer the research sub-question, "Does the development that students experience persist beyond their initial experiences using ePortfolios?" Having established earlier in this chapter that students experience significant positive changes across all five dimensions of integrative learning, this question aims to determine whether students' learning gains are lasting. To revisit briefly the research design described in the previous chapter, these results are based on the responses of 59 students who responded to the pre-survey, the post-survey, and a follow-up survey two years after their MPortfolio experience. Due to the small number of respondents, the results presented in this section focus only on the main effect of time. Unlike the previous

sections of this chapter, though, the time effect explored in this section is a three-level effect (i.e., pre-survey, post-survey, follow-up survey) demonstrating how integrative learning changes over two time periods. The first time period occurred during the MPortfolio process and the second occurred from the time the MPortfolio process ends to approximately two years later at the time of the follow-up survey.

Through the remainder of this section, I explore the how each dimension of integrative learning changes over time. Table 5.17 presents the mean values for each dimension of integrative learning at the pre-survey, post-survey, and follow-up survey for the analytic sample used to answer this research sub-question. Like earlier sections of this chapter, the main statistical approach is a repeated-measures ANOVA. For a three-level design, a significant main effect indicates only that a significant different exists from one level to another, but the

Table 5.17: Mean Dimensions of Integrative Learning, Pre-Survey to Post-Survey to Follow-Up Survey

	Pre-Survey Mean (Std Dev)	Post-Survey Mean (Std Dev)	Follow-Up Survey Mean (Std Dev)
Identify Knowledge, Skills, and Values dimension	4.194 (0.456)	4.429 (0.411)	4.421 (0.405)
Provide Evidence dimension	3.796 (0.762)	4.308 (0.519)	4.110 (0.592)
Inter/Intrapersonal dimension	4.368 (0.426)	4.544 (0.456)	4.528 (0.424)
Work with Others dimension	4.201 (0.471)	4.419 (0.44)	4.368 (0.469)
Professional Digital Identity dimension	3.350 (0.940)	3.960 (0.856)	3.209 (1.171)

procedure does not reveal whether the difference is between time$_1$ and time$_2$ or between time$_2$ and time$_3$. After establishing whether the main effect is significant, I then use paired-samples t-tests to identify the differences. Another difference related to a three-level repeated-measures ANOVA is that the assumption of sphericity applies, since there are now multiple combinations of levels and the variances of these differences must be roughly equal. Unless indicated otherwise, the statistical models do not violate the assumption of sphericity.

For the Identify Knowledge, Skills, and Values dimension, there was a significant main effect for time, F (2, 116) =12.219, p<.001, η2=.174. Reviewing the plot that illustrates the changes in value from pre-survey to post-survey to follow-up survey (Figure 5.21), it appears that students markedly increased their mean values for the Identify Knowledge, Skills, and Values dimension from the pre-survey to the post-survey and the change from the post-survey to the follow-up survey two years later was minimal. The paired-samples t-test confirms this. There was a significant positive increase in the mean value over the course of the MPortfolio process (Mean$_{t1}$=4.194, Mean$_{t2}$=4.429, p<.001). Though there was a very slight decline from the post-survey to the follow-up survey, these means were not significantly different (Mean$_{t2}$=4.429, Mean$_{t3}$=4.421, p=.890). Further, students' self-reported ability to identify their knowledge, skills, and values was significantly higher at the time of the follow-up survey compared to the start of the MPortfolio process (Mean$_{t1}$=4.194, Mean$_{t3}$=4.421, p<.001).

Table 5.18: Three-Level Repeated Measures ANOVA for Integrative Learning, Identify Knowledge, Skills, and Values dimension

	df	MS	F	p		η^2
Within-Subjects						
Time	2	1.052	12.219	<.001	***	0.174
Error(Time)	116	0.860				

*** Significant at .001 level
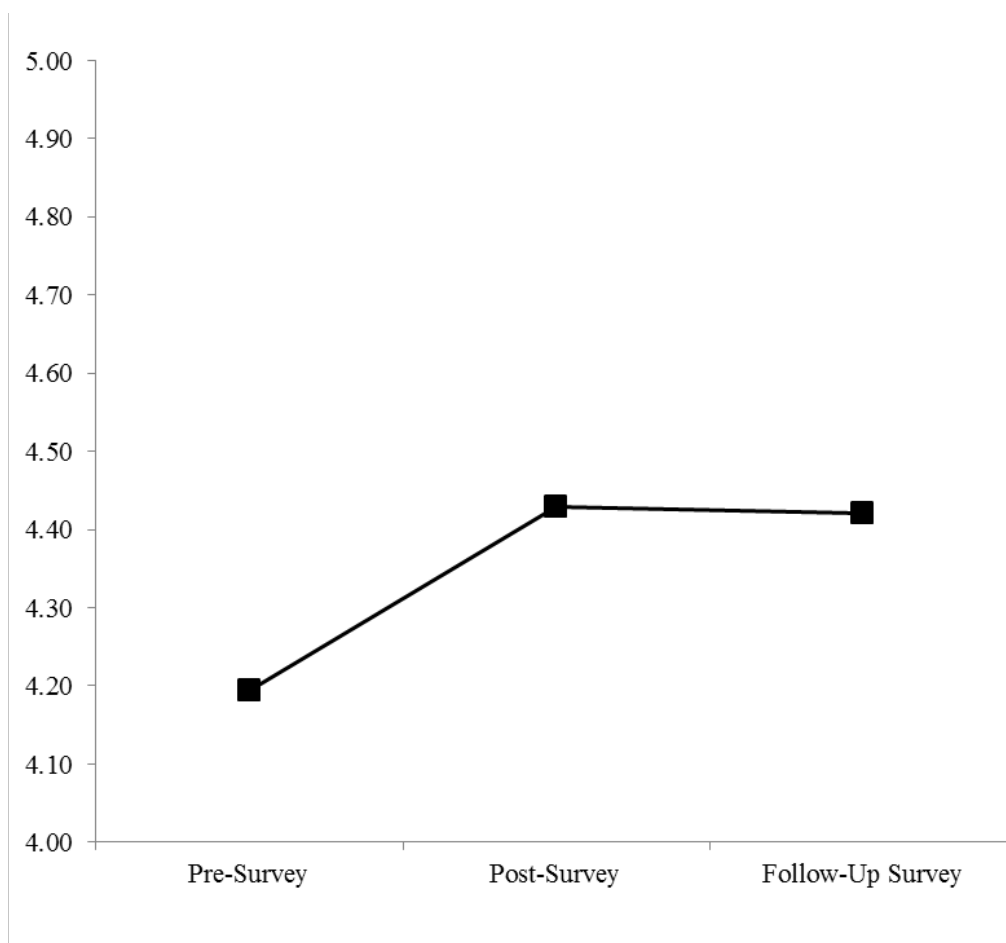
Figure 5.21: Change of Integrative Learning, Identify Knowledge, Skills, and Values dimension

There was a different pattern exhibited for the Provide Evidence dimension. For the repeated measures ANOVA, Mauchly's Test of Sphericity was significant (W=.884, χ^2=7.035, p=.030) indicated the sphericity assumption was violated, so the Greenhouse-Geisser estimates were interpreted to correct for this violation. The model indicated that there was a significant time effect, F (1.792, 116) =16.492, p<.001, $\eta2$=.221, and the plot in Figure 5.22 demonstrates an increase in the mean Provide Evidence dimension value from the pre-survey to the post-survey and a decrease from the post-survey to the follow-up survey. The paired samples *t*-tests show that students' reported a significantly stronger ability to provide evidence of knowledge, skills, and values at the end of the MPortfolio process compared to the start (Mean$_{t1}$=3.796, Mean$_{t2}$=4.308, p<.001). The decrease in the mean value from the post-survey to the follow-up survey was also significant (Mean$_{t2}$=4.308, Mean$_{t3}$=4.110, p=.011). Although this was a significant decline, the mean on the follow-up survey was still significantly higher than the pre-survey mean value (Mean$_{t1}$=3.796, Mean$_{t3}$=4.110, p=.001). These results indicate that the learning gains related to the ability to provide evidence of knowledge, skills, and values begin to fade in the two years after the MPortfolio experience; however, two years later this ability is still significantly stronger than it was at the start of the process.

Table 5.19: Three-Level Repeated Measures ANOVA for Integrative Learning, Provide Evidence dimension

	df	MS	F	p		η^2
Within-Subjects						
Time	1.792	4.391	16.492	<.001	***	0.221
Error(Time)	116	0.239				

*** Significant at .001 level
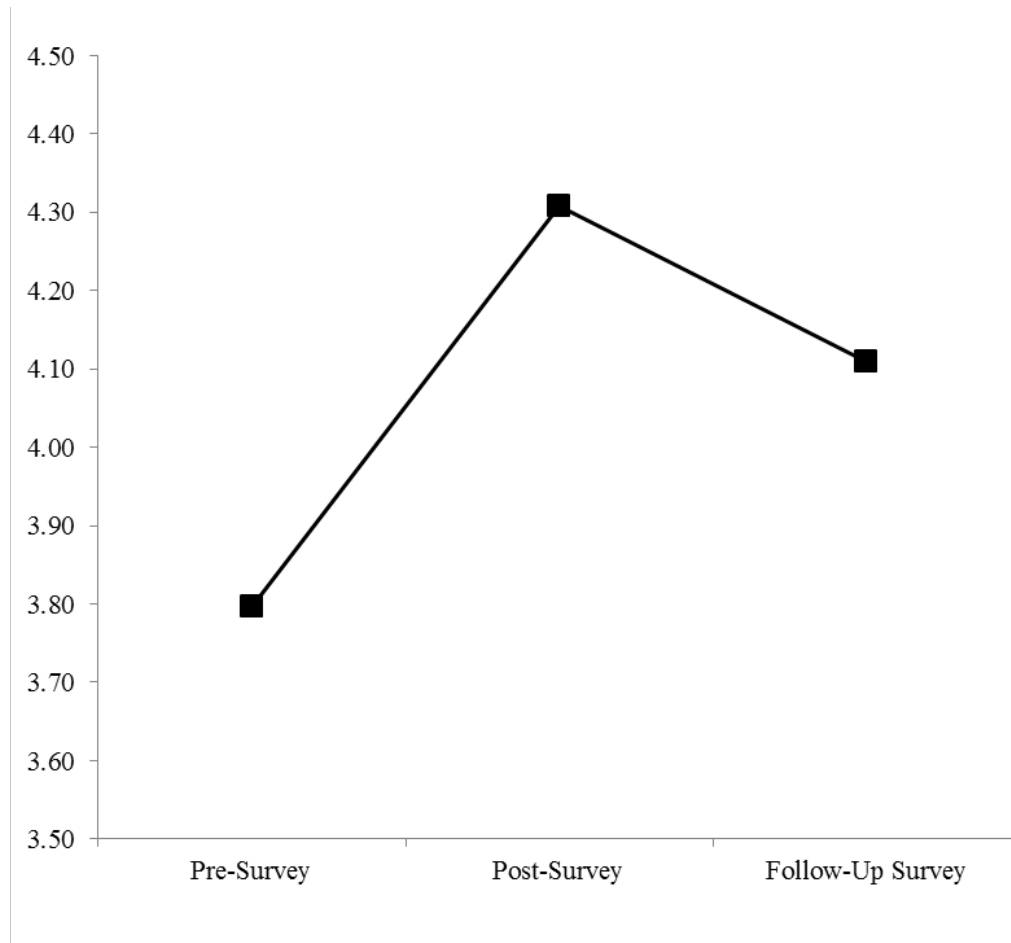
Figure 5.22: Change of Integrative Learning, Provide Evidence dimension

The pattern for the Inter/Intrapersonal dimension resembled that of the Identify Knowledge, Skills, and Values dimension; there was a notable increase from the pre-survey mean to the post-survey mean and there was a slight decrease from the post-survey to the follow-up survey (see Figure 5.23). The model described in Table 5.20 indicates that there is a main time effect, $F (2, 116) =6.718$, $p=.002$, $\eta2=.104$, meaning that students' self-reported abilities to recognize and adapt to differences in order to create solutions change over time. The paired samples t-tests reveal that the mean value from the post-survey is significantly higher than the mean value on the pre-survey (Mean$_{t1}$=4.368, Mean$_{t2}$=4.544, p=.002) and there was no significant difference between the post-survey and the follow-up survey values (Mean$_{t2}$=4.544,

Mean$_{t3}$=4.528, p=.742). Comparing the pre-survey to the follow-up survey, students' self-reported abilities to recognize and adapt to differences were significantly stronger, on average, on the latter survey (Mean$_{t1}$=4.368, Mean$_{t3}$=4.528, p=.004).

Table 5.20: Three-Level Repeated Measures ANOVA for Integrative Learning, Inter/Intrapersonal dimension

	df	MS	F	p		η^2
Within-Subjects						
Time	2	0.560	6.718	0.002	**	0.104
Error(Time)	116	0.083				

** Significant at .01 level
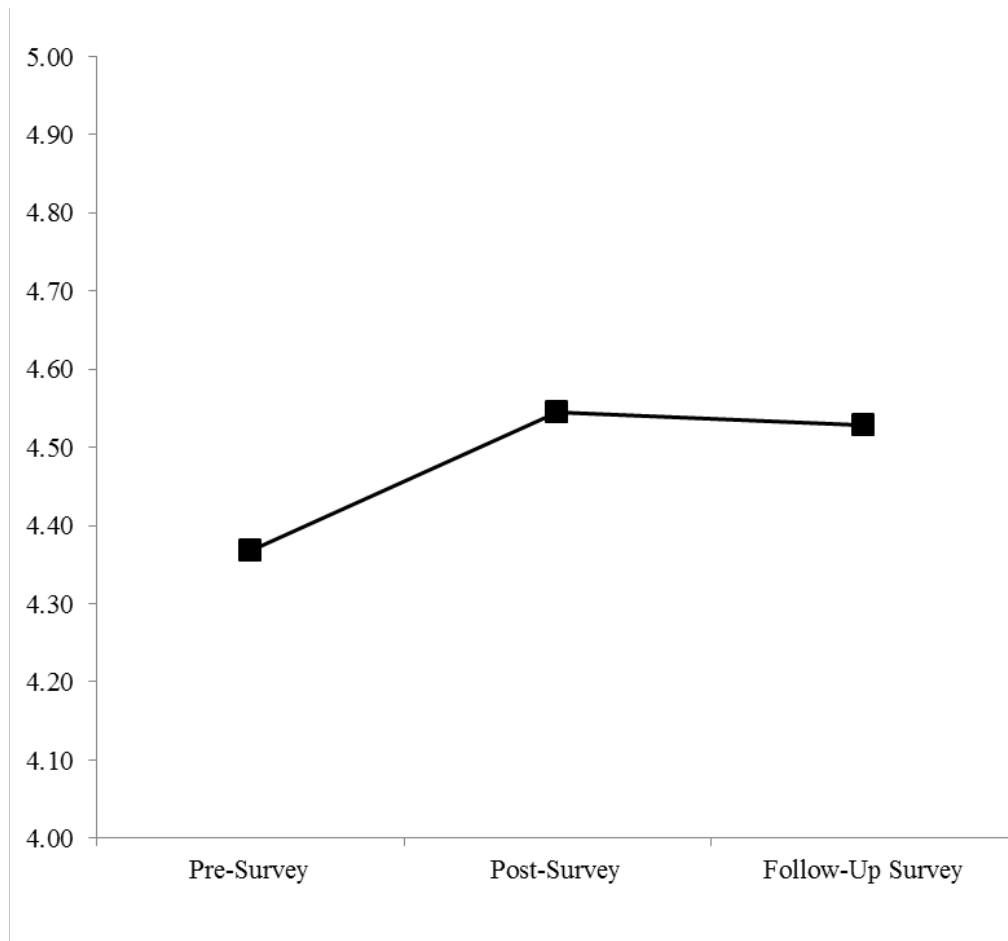
Figure 5.23: Change of Integrative Learning, Inter/Intrapersonal dimension

Reported in Table 5.21, there was also a significant main effect for the Work with Others dimension, F (2, 112) = 6.718, p=.001, η2=.115. For this dimension, there was a significant increase from the pre-survey mean value to the post-survey (Mean$_{t1}$=4.201, Mean$_{t2}$=4.419, p=.001). Again, though there was a slight decrease from the post-survey to the follow-up survey, these means were not significantly different (Mean$_{t2}$=4.419, Mean$_{t3}$=4.368, p=.367). Finally, comparing the pre-survey and follow-up survey results, students reported significantly stronger abilities to work with others to identify and address complex problems two years after going through the MPortfolio process (Mean$_{t1}$=4.201, Mean$_{t3}$=4.368, p=.014). Figure 5.24 represents the change that students experience for the Work with Others dimension.

Table 5.21: Three-Level Repeated Measures ANOVA for Integrative Learning, Work with Others dimension

	df	MS	F	p		η^2
Within-Subjects						
Time	2	0.560	6.718	0.001	**	0.115
Error(Time)	112	0.114				

** Significant at .01 level
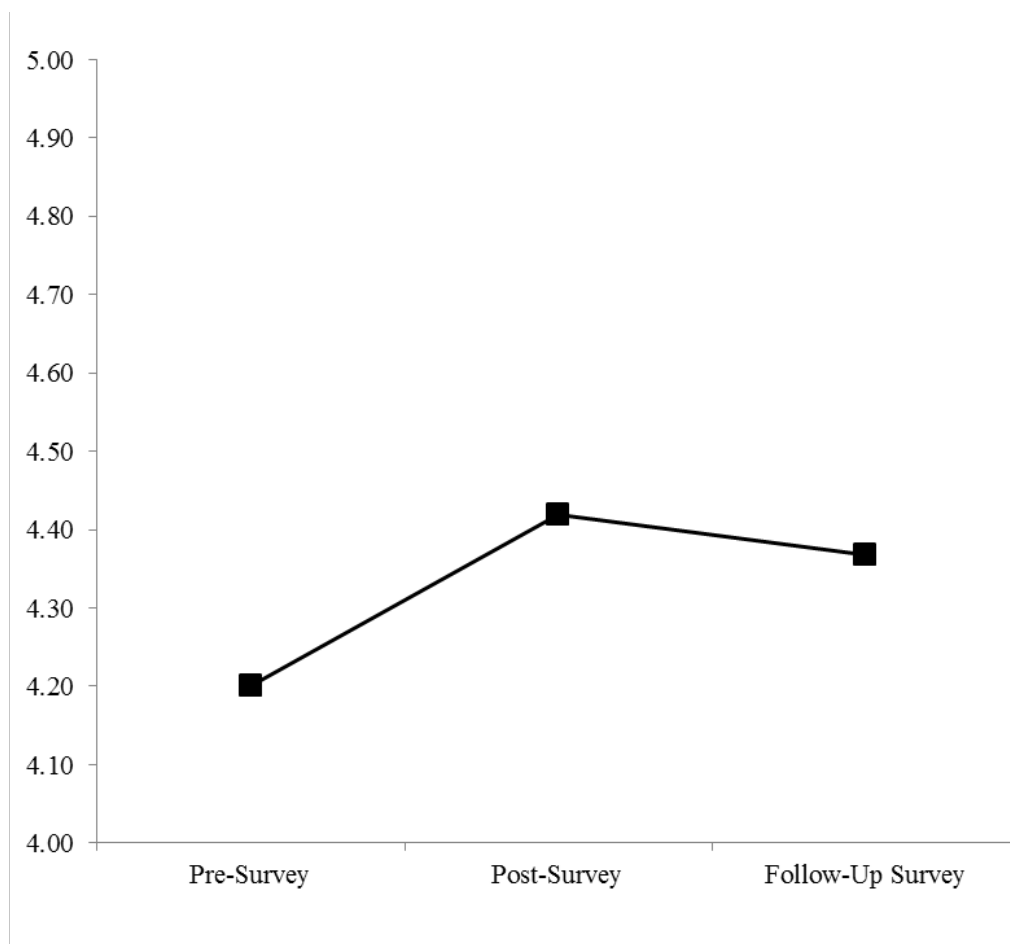
Figure 5.24: Change of Integrative Learning, Work with Others dimension

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Table 5.22 shows that, for the Professional Digital Identity dimension, there was a significant main effect, $F(2, 116) = 13.396$, $p<.001$, $\eta2=.118$. However, Figure 5.25 demonstrates that the change that students experience is different from what they undergo with other dimensions of integrative learning. Like the other dimensions, the post-survey mean was significantly higher than the pre-survey mean ($Mean_{t1}=3.350$, $Mean_{t2}=3.960$, $p<.001$). From the post-survey to the follow-up survey, there was a significant decrease ($Mean_{t2}=3.960$, $Mean_{t3}=3.209$, $p<.001$) in the mean for develop a professional digital identity. Two years after the MPortfolio process, students reported that, on average, their ability to develop a professional digital identity was no different from when they started MPortfolio ($Mean_{t1}=3.350$,

Mean$_{t3}$=3.209, p=.389). This means that students' learning gains related to developing a

professional digital identity evaporated within two years.

Table 5.22: Three-Level Repeated Measures ANOVA for Integrative Learning, Professional Digital Identity dimension

	df	MS	F	p		η^2
Within-Subjects						
Time	2	9.409	13.396	<.001	***	0.118
Error(Time)	116	0.702				

*** Significant at .001 level
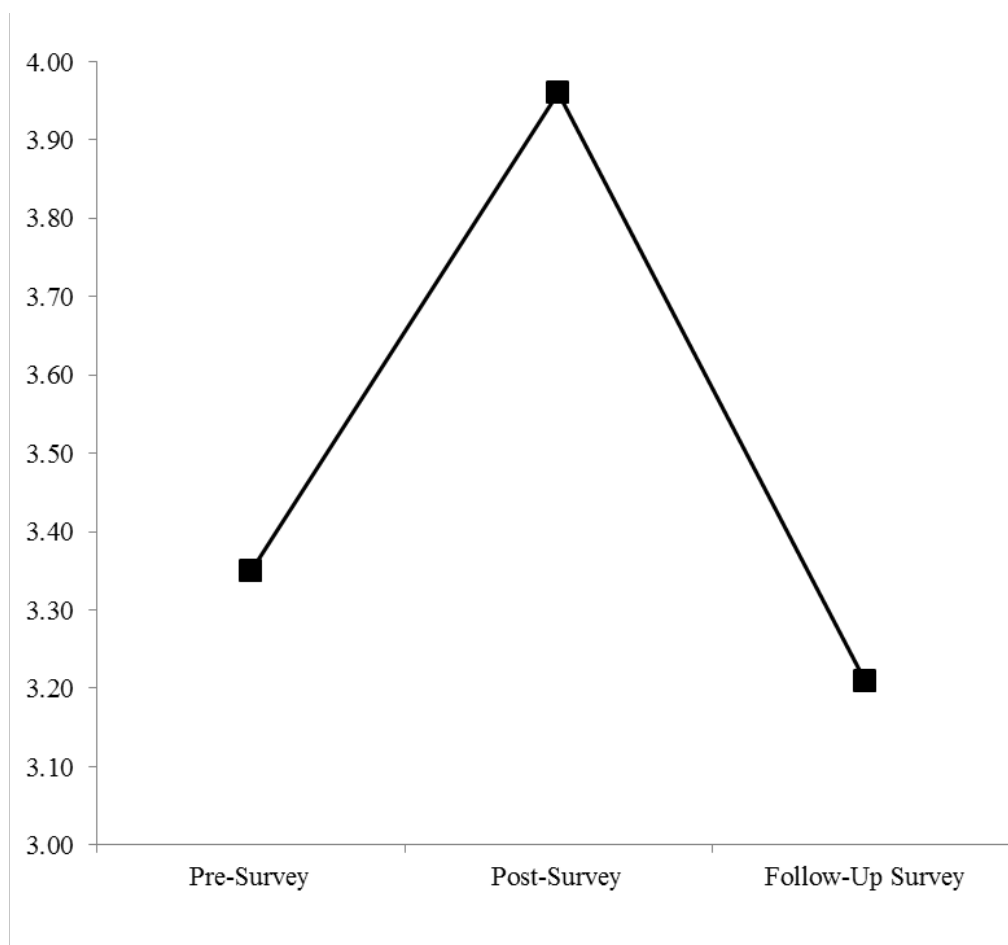
Figure 5.25: Change of Integrative Learning, Professional Digital Identity dimension

Summary of results related ePortfolio engagement and long-term integrative learning gains. In this section, I explored whether the changes that students undergo over the course of the reflective ePortfolio process persist two years after the initial experience. For four of the five dimensions, the mean value two years later was significantly greater than the pre-survey mean. The one exception was the Professional Digital Identity dimension. After increasing significantly over the course of the process, the Professional Digital Identity mean value declined over the next two years and was not significantly different from the start of the process.

Summary of Chapter

In this chapter, I have summarized the results of the quantitative analyses that I have employed in order to answer the research questions that guide this study. Specifically, the results described in this chapter provide evidence of whether students experience positive changes in integrative learning over the course of the MPortfolio process and if it is possible to claim that there is a causal relationship between engagement in this process and integrative learning. Additionally, the results of the analyses provide insight into the student-level and site-level characteristics that explain differences in integrative learning through this process and whether the learning gains that students potentially achieve persist two years beyond the initial MPortfolio experience. The results described throughout the chapter provide compelling evidence in support of MPortfolio as a process that can be used to facilitate integrative learning. In the next chapter, I discuss the findings that have emerged as a result of the analyses, the implications of this study, and recommendations for future research.

Chapter 6: Discussion and Conclusion

By exploring the relationship between the use of ePortfolios and integrative learning, my intent in carrying out this study has been to improve our understanding of how educators can facilitate integrative learning for students in postsecondary education and, more broadly, how assessment approaches, such as an ePortfolio, can contribute to student learning. In this concluding chapter, I first provide a brief summary of the results presented in the previous chapter. Next, the study's findings, summarized in Table 6.1, guide a discussion that should be useful to both practitioners and researchers seeking to understand how to foster environments that lead to integrative learning. Following the discussion of results, I summarize the implications of this study. To conclude the chapter and this dissertation, I present recommendations for future research and then end with some concluding thoughts.

Summary of Results

In this section, I briefly recap the results that were presented in the previous chapter and that will guide the discussion later in the current chapter. A concise list of the study's findings is presented in Table 6.1. The primary goal of this study is to answer the overarching question, to what extent do ePortfolios facilitate the development of integrative learning? The results in the previous chapter established that, on average, students who engaged in the reflective ePortfolio process experienced significant positive changes from the start of the process to the end for all five dimensions of integrative learning. Though this positive growth is encouraging, it is impossible to attribute this student development to the process alone. Using a delayed-treatment control group design, the results provide evidence of a causal relationship between engagement

in the reflective ePortfolio process and students' development of the integrative learning outcome. For four of the five dimensions of integrative learning, there was a significant positive effect. The fifth dimension, the Professional Digital Identity dimension, had a positive but only marginally significant effect associated with engagement in the reflective ePortfolio process.

To explore group differences, I employed hierarchical linear modeling as a multivariate approach and used slopes and intercepts as outcomes. At the student level, there were three categories of characteristics: student background characteristics, academic characteristics, and co-curricular involvement. Controlling for other factors, students experienced similar integrative learning gains regardless of their student background characteristics. The one exception was for Asian students on the Digital Professional Identity dimension; compared to White students, Asian students had a higher mean pre-survey value and a flatter slope representing the change from the pre-survey to the post-survey. There were a few differences related to academic characteristics. Compared to sophomores, first-year students experienced greater learning gains on the Identify Knowledge, Skills, and Values dimension. Also, there was an inverse relationship between academic performance measures and the Provide Evidence dimension on the pre-survey and students in the lowest quartile experienced weaker learning gains on this dimension, relative to students in the higher quartiles. There were also differences related to field of study on the Professional Digital Identity dimension; students in the social sciences and professional fields had higher pre-survey values and experienced weaker learning gains. There were also several differences related to co-curricular involvement. Students who participated in student organizations experienced greater gains on the Identify Knowledge, Skills, and Values dimension than those not participating in student organizations. Students who had at least one internship started the process with a higher mean value on the Provide Evidence dimension and

then experienced weaker learning gains on this dimension relative to those who did not have an internship. Students who had research experiences demonstrated stronger learning gains on the Provide Evidence dimension. Students in fraternities or sororities exhibited weaker growth on the Identify Knowledge, Skills, and Values dimension and the Inter/Intrapersonal dimension.

Learning process characteristics were categorized at the student level and the site level. At the student level, there was a positive relationship between the intercepts and slopes of all dimensions of integrative learning and the reflective process scale ("Reflection and creation process helped me recognize the value of my learning experiences and understand how these experiences connect"). In other words, students with higher values on this scale tended to have higher integrative learning dimension values at the start of the process and greater integrative learning gains. There was no variation in integrative learning associated with the sharing scale ("Engaging with others was an important part of the process"). At the site level, there were no significant differences associated with the length of the program, term of the experience, and facilitation type, but there was a difference related to the number of students in the site. Students engaging in MPortfolio through the largest sites (50 students or more) had higher pre-survey values on Identify Knowledge, Skills, and Values dimension and Provide Evidence dimension, but then they experienced weaker growth from the pre-survey to the post-survey.

Regarding whether integrative learning gains persist beyond the initial MPortfolio experience, for four of the five dimensions, the mean value two years later was significantly greater than the pre-survey mean. The Professional Digital Identity dimension was the one exception. On average, there was a significant positive change from the pre-survey to the post-survey for this dimension. However, this learning gain disappeared over the next two years because the pre-survey and follow-up survey mean values were not significantly different.

Table 6.1: Summary of Research Findings

Research Question	Findings
What is the correlational relationship between engagement in reflective ePortfolios and integrative learning?	• On average, students experience significant positive changes from the pre-survey to the post-survey for all five dimensions of integrative learning.
What is the causal impact of ePortfolio use on integrative learning?	• For four of the five dimensions of integrative learning, there was a significant positive effect associated with ePortfolio engagement. • For the Professional Digital Identity dimension, the effect was positive but marginally significant ($p=0.063$).
What student characteristics contribute to variation in integrative learning through the use of ePortfolios?	• There was only one significant difference related to student background characteristics. Asian students had a significantly flatter slope than White students for the Digital Professional Identity dimension (though they also had a significantly higher intercept). • Controlling for other factors, there was an inverse relationship between standardized test score and the Provide Evidence dimension on the pre-survey. Students with higher test scores experienced significantly greater growth relative to those with lower test scores for the Provide Evidence dimension. • Controlling for other factors, students in the lowest grade point average quartile had significantly flatter slopes than students in the second and fourth quartiles on the Identify Knowledge, Skills, and Values dimension, students in the second quartile on the Provide Evidence dimension, and students in the fourth quartile on the Interpersonal dimension. • Compared to sophomores, first-year students demonstrated significantly greater growth from the pre-survey to the post-survey for the Identify Knowledge, Skills, and Values dimension. • There were significant differences associated with field of study for the Professional Digital Identity dimension. Controlling for other factors, students in the social sciences and in professional fields had significantly higher pre-survey mean values for this dimension. However, students in these fields had demonstrated significantly weaker growth from the pre-survey to the post-survey for these dimensions. • Students who participate in student organizations demonstrated significantly greater growth in the Identify Knowledge, Skills, and Values dimension, compared to students who did not participate in student organizations and controlling for all other factors. • Students who had internships had significantly higher mean pre-survey values, controlling for other factors, for the Provide Evidence dimension but had significantly weaker growth from the

pre-survey to the post-survey, relative to students who had not participated in internships.
• Students who had research experiences exhibited significantly stronger growth in the Provide Evidence dimension, compared to those without research experiences.
• There were a couple significant differences related to participation in fraternities and sororities. Compared to students not involved in Greek life, students in fraternities and sororities demonstrated significantly weaker growth in the Identify Knowledge, Skills, and Values dimension and the Interpersonal dimension.
• Across all student background characteristics, academic characteristics, and types of co-curricular involvement, there were no variables that explain significant variation in the change from the pre-survey to the post-survey for the Work with Others dimension.

What learning process characteristics contribute to variation in integrative learning through the use of ePortfolios?

• There were significant positive relationships between the reflective process scale and both the pre-survey mean values for all dimensions, controlling for other factors, and the degree to which students change from the pre-survey to the post-survey.
• There was no variation in integrative learning associated with the sharing scale, when controlling for other factors.
• The only site-level learning process characteristic for which there was a significant difference was the number of students participating in the reflective ePortfolio experience. Students engaging in the process with a large group of students reported significantly higher mean pre-survey values for the Identify Knowledge, Skills, and Values dimension and the Provide Evidence dimension, controlling for other factors. However, these students exhibited significantly weaker growth in these dimensions, compared to students in medium-sized sites.

Does the development that students experience persist beyond their initial experiences using ePortfolios?

• There was a significant time effect for all five dimensions of integrative learning. For each of the dimensions, the post-survey mean was significantly greater than the pre-survey mean.
• For four of the five dimensions, the follow-up survey mean was significantly greater than the pre-survey mean. The one exception was the Professional Digital Identity dimension. After increasing significantly from the pre-survey to the post-survey, the Professional Digital Identity mean value declined on the follow-up survey and was not significantly different from the pre-survey mean.

Discussion of Findings

At the most basic level, this study is about determining whether a particular educational intervention promotes student learning. The outcome being explored is hardly a new concept. For centuries, a cornerstone of liberal education has been the process of making connections between disciplines. In order for college graduates to be prepared to address the challenges of a complex global 21st Century society, the ability to integrate learning has never been more important. Educators seeking ways to foster this ability in students may see assessment as a pathway to facilitating integrative learning. Organizing for integrative learning tends to go against the grain of the established structures of many academic organizations, such as disciplinary majors, credit requirements, and the ability for students to transfer in and out of institutions (Schneider & Shoenberg, 1999). Portfolios can help educators overcome these structural challenges and provide students with an opportunity to collect, connect, and reflect upon their learning (Huber & Hutchings, 2004). Established in the literature review, despite the importance of integrative learning as a postsecondary outcome and the promise of portfolios as a tool for facilitating the development of this outcome, there is relatively little research exploring integrative learning as an outcome and determining whether assessment approaches can lead to student learning and only one study examining the relationship between ePortfolio usage and integrative learning (Peet et al., 2011). Given these gaps in the research, the current study makes a promising contribution to both the body of literature on integrative learning and the extant research on the relationship between assessment approaches and student achievement.

Though the AAC&U has promoted portfolios as "a vehicle for fostering integrative abilities" as well as "a vehicle for assessment" (Huber & Hutchings, 2004, p. 10), there is little empirical evidence that portfolios contribute to integrative learning. The current study provides

support to the notion that ePortfolios are an effective approach for fostering integrative learning. Not only did students grow through the reflective ePortfolio process, on average, they experienced significant growth across all five dimensions of integrative learning. By the end of the process, students reported stronger abilities to identify and provide evidence of the knowledge, skills, and values that they had acquired through their disparate learning experiences. Recalling the underlying theoretical constructs of integrative learning, an essential part of integrative learning is the *explicit* connection of previous learning experiences to new and different settings. This recognition of prior learning provides evidence of both the students' effort to make tacit knowledge explicit and the explicit transfer of learning that characterizes integrative learning. This metacognitive process encourages students to consider how they know what they know is what they know, consistent with development of the cognitive domain as described in the self-authorship literature (Kegan, 1994; Baxter Magolda, 1998, 2001). Significant gains in students' abilities to recognize and adapt to differences in order to create solutions provide evidence of student development in the interpersonal and intrapersonal domains, as well. Through the reflective ePortfolio process, students learn that their identity is inextricable from the knowledge, skills, and values that they have acquired through their lives. Students become aware of how their backgrounds and social identities influence how they see the world and make sense of things. Regarding interpersonal development, through this reflective process, students gain a greater appreciation of how interacting with people from different backgrounds and cultures enhances their work and learning. Significant gains in students' abilities to work with others to identify and address complex problems suggest that students are reflecting on their learning in ways that prepare them to deal with the complexity of their adult lives, as Kegan (1994) described in *In Over Our Heads*. Finally, significant gains in

the Digital Professional Identity dimension provide support that students are developing along the integrated communication aspect of integrative learning. By recognizing the importance of the ePortfolio as an expression of one's self and one's learning, students are encouraged to explicitly connect the content and design of their portfolios, demonstrating awareness of purpose and audience. By developing across all five of the dimensions of integrative learning, students by the end of the process should have a capacity to connect and synthesize the knowledge, skills, and values they have acquired from disparate learning experiences and be prepared to apply what they have learned when confronted by new and complex problems.

The correlational results alone suggest that students develop as integrative learners through the reflective ePorfolio process. However, in the absence of a true causal design, the question persists; can you really attribute this learning to the portfolio process itself? Or is this just the natural development that students experience in college? These questions are why the delayed-treatment, control group design is so important to this research. For both the assessment literature and the integrative learning literature, studies providing evidence of true causal impact of educational interventions are largely absent. The design employed in the current study eliminates selection bias, which is necessary to determine whether a treatment truly has an effect. Here, there was a significant positive effect associated with ePortfolio engagement for four of the five dimensions of integrative learning and for the fifth dimension, the Professional Digital Identity dimension, the positive effect was nearly significant (p=0.063). With moderate to large effect sizes, these results provide powerful evidence that reflective ePortfolios can facilitate integrative learning. Acknowledging the small number of students in the control group, the causal design in this study, at worst, serves as a remarkably promising pilot for future research.

Also promising are the findings related to the long-term persistence of learning gains. The positive changes that students experienced over the course of the reflective ePortfolio process were largely present two years after the initial ePortfolio experience. For four of the five dimensions (the Identify Knowledge, Skills, and Values dimension, the Provide Evidence dimension, the Interpersonal dimension, and the Work with Others dimension), the follow-up survey means were significantly greater than the pre-survey means, providing evidence that students' learning gains do not evaporate at the end of the process. This is particularly encouraging because integrative learners are expected to have developed habits of mind that they will carry with them throughout their lives. The dimension that did see its learning gains disappear was the Professional Digital Identity dimension. After a significant increase over the course of the reflective ePortfolio process, the mean value for this dimension was declined on the follow-up survey to the point that it was not significantly different from the pre-survey mean. This finding suggests that, while students believe that they have the capacity to engage in the cognitive tasks associated with integrative learning so that they can address the complexity of adult life, they do not see the ePortfolio as a valuable tool to continue to use in order to collect and reflect upon one's learning. Additional survey results support this notion, as 82% of respondents to the follow-up survey reported that they had not looked at their ePortfolio since the conclusion of the course in which they created it and only 9% had updated it in the past year. This raises the question of what the role of the ePortfolio should be after the initial experience. If students are maintaining their learning gains without the continued use of the ePortfolio, should educators encourage students to continue to update it? However, it is conceivable that the abandonment of the ePortfolio is a missed opportunity because the continued use of the ePortfolio could result in additional student development.

Most of this study's findings relate to the within-group differences of students who participated in the reflective ePortfolio process. Recalling the theoretical foundations presented at the end of the literature review on assessment, Astin's (1970a, 1970b, 1977, 1993) I-E-O model serves as an organizing theoretical framework for the current study as well as numerous assessment studies. The within-group differences provide insight into the inputs and environmental characteristics that lead to the integrative learning outcome. This is particularly important because neither the body of research on assessment nor the body of research on integrative learning has generated much evidence of how differences in inputs and environment result in variation in outcomes. These findings are also useful for educators who are developing programs aimed at fostering integrative learning, since they can identify the types of students who might benefit most from the reflective ePortfolio process and the optimal environmental characteristics for facilitating integrative learning.

The lack of significant differences related to student background characteristics is an encouraging finding. This result demonstrates that students are likely to develop at similar rates, regardless of their gender, race/ethnicity, citizenship, or first generation status. For example, the reflective ePortfolio process does not favor males over females, White students over students of color, United States citizens over international students, students whose parents went to college over first generation students, or vice versa. It is refreshing to know that the process can benefit students equally regardless of their background. The lone exception was the weaker development among Asian students, relative to White students, for the Digital Professional Identity dimension. This difference, however, can likely be contributed to Asian students' recognition of the importance of a professional digital identity at the start of the process rather than substantive differences in how the process affects Asian students and White students.

Though Asian students had a flatter slope for this dimension, they also had a higher mean values on the Digital Professional Identity dimension, controlling for other factors, at both the beginning and end of the process.

While student background characteristics did not contribute to variation in learning gains, there were several academic characteristics that accounted for differences in learning over the course of the reflective ePortfolio process. Notably, regarding measures of academic achievement, there were multiple examples of students with the lowest levels of achievement rating their abilities higher than students at higher levels of achievement. Controlling for other factors, students in the lowest standardized test score quartile had the highest mean values on the Identify Knowledge, Skills, and Values dimension and the Provide Evidence dimension at the start of the process. Similarly, students in the lowest grade point average quartile had the highest mean values, controlling for other factors, on the same dimensions (though these differences were not significant). The upper quartiles of the standardized test score and grade point average variables tended then to have steeper slopes compared to the lowest quartiles. It seems reasonable to interpret these results as students with lower levels of academic performance having difficulty self-assessing their abilities, particularly at the start of the process, rather than the process having a weaker effect on students with the lowest academic performance.

Regarding other academic characteristics, there were few differences related to class year and field of study. For class year, the only significant difference was that sophomores had weaker change in the Identify Knowledge, Skills, and Values dimension over the course of the process, compared to first year students and controlling for other factors. Sophomores also had a marginally higher mean value on this dimension at the start of the process, controlling for other factors, so this likely contributed to differences in the slopes of these two groups. Differences in

slope related to field of study were restricted to the Digital Professional Identity dimension.

Compared to students who had not determined a field of study, students in the natural sciences,

social sciences, and, in particular, professional fields had significantly higher mean values at the

start of the process, when controlling for other factors. As a result, students in the social sciences

and professional fields developed at much flatter trajectories. By the end of the process, students

in professional fields still were among those with the highest mean values on this dimension;

those in the social sciences, on the other hand, had the lowest mean value on this dimension at

the end of the process, controlling for other factors. The differences based on field of study for

this dimension are not surprising given anecdotal feedback from educators. Students in

professional fields occasionally complained about having to engage in this process when they

already had an online professional presence of their own. However, there were also objections

from Engineering students who desired the flexibility to develop an ePortfolio that would allow

them to put their technical expertise to use. Thus, it is also notable that, despite the significantly

higher pre-survey mean value for students in the natural sciences (including Engineering

students), this group had a slope no different than that of the comparison group of undeclared

students.

Co-curricular activities were also a source of variation in integrative learning gains over

the reflective ePortfolio process. One might expect that engagement in co-curricular activities

would be positively correlated with integrative learning; it provides students with opportunities

to integrate out-of-class learning experiences and connect their out-of-class learning to their

classroom learning. There were no differences in slopes related to engagement in paid work or

mentorship experiences. There were differences related to student organizations, internships,

research experiences, and fraternities or sororities, though these activities were not always

positively associated with integrative learning. At the start of the process and controlling for other factors, students who had participated in student organizations were no different on the Identify Knowledge, Skills, and Values dimension from those who had not participated in student organizations. However, all things equal, student who had engaged in student organizations experienced greater gains on the Identify Knowledge, Skills, and Values dimension relative to those who had not participated in student organizations. Similarly, controlling for other factors, students who had engaged in research experiences were similar on the Provide Evidence dimension to students who did not have any research experiences at the start of the process. Students who had research experiences, though, saw greater gains on this dimension, ceteris paribus, to those who did have research experiences. It was surprising, however, that engagement in some co-curricular activities was negatively associated with the reflective ePortfolio process. Notably, despite reporting similar levels of integrative learning at the start of the process to those not participating in Greek life, students in fraternities or sororities experienced significantly weaker growth in the Identify and Interpersonal dimensions and marginally weaker growth in the Work with Others dimension. Students who had internships also experienced weaker learning gains in the Provide Evidence dimension (and marginally significantly weaker gains in the Identify and Work with Others dimensions). These weaker gains can be explained by how students with internships tended to have higher mean values on both the pre-survey and the post-survey, controlling for other factors, compared to students who had not done internships.

Though there are explanations for weaker learning gains related to co-curricular activities (e.g., students with internships starting the process at a higher level), it is difficult to pinpoint an explanation for the weaker growth related to Greek life. Research on the relationship between

fraternity and sorority participation and student outcomes is fairly limited and tends to focus on negative behaviors such as alcohol abuse, sexual assault, and hazing (Martin, Hevel, Asel, & Pascarella, 2011; Molasso, 2005). Results from the Wabash National Study tend to dispel prior negative research about Greek life; Pascarella and Blaich (2013) report that fraternity members had significantly greater growth in the first-year than those not in fraternities in the citizenship and change scales of socially responsible leadership, while sorority members similarly demonstrated stronger growth than non-sorority members in first-year gains on the citizenship and common-purpose scales of the socially responsible leadership measure. Also, according to the Wabash National Study, there were no differences in first-year gains in critical-thinking skills, need for cognition, positive attitude toward literacy activities, moral reasoning, and intercultural competence between those engaging in Greek life and students not participating. Though integrative learning was a component of the Wabash National Study, the authors did not report on any potential differences in integrative learning related to Greek life. It is disappointing that the results of the current study do not support the generally positive relationships between participation in Greek life and student outcomes that had been found in the Wabash National Study. To be consistent with the design that led to the findings from the Wabash National Study, exploring interactions between Greek life and student characteristics such as sex and class year as well as learning process characteristics might provide some insight into differences in integrative learning gains and participation in fraternities and sororities.

Moving on to the environmental factors that contribute to integrative learning, there were both student-level and site-level factors that explain differences in integrative learning gains through the reflective ePortfolio process. These results demonstrate that it matters both how a student engages in the process and how sites are structured. At the student level, there is strong

evidence that a student's level of engagement in the reflective process explains differences in integrative learning at the start of the process and the extent to which a student experiences learning gains through the process. To clarify, on the post-survey students were asked to indicate their level of agreement with statements about whether various aspects of the process (i.e., reflection, completion of portfolio pages, describing examples of work, creating a philosophy statement) helped them understand what they have learned, why it is important, and how these different learning experiences connect. Not only did agreement with these statements correlate with learning gains through the process, but it also correlated with the level of integrative learning at which students started the process. Given the hypothesis that reflection would lead to integrative learning gains, it is not surprising that the reflective process scale is positively correlated with the slopes of each of the integrative learning dimensions. This result provides strong support to the notion that Kolb's (1984) Experiential Learning Theory is an appropriate way to understand how the environment can foster integrative learning. Students who are willing to engage in the reflective process and transform their learning are more likely to experience learning gains. The significant positive relationships between the reflective process scale and the intercepts for each dimension of integrative learning are more surprising. What might the significant intercepts mean? First, though students in the sample may not have previously participated explicitly in a reflective ePortfolio process, they may have engaged in other reflection activities that enhanced integrative learning and instilled an affinity for reflection. Second, even if students had not engaged in reflection previously, students' high ratings on the reflective process scale are perhaps indicative of a propensity for reflection. In the absence of formal reflective activities, this propensity for reflection may contribute to the development of habits of mind that are consistent with the "understanding and a disposition that

a student builds across the curriculum and co-curriculum" described in the definition of integrative learning. The types of students who are likely to go into the process reporting they are able to identify and provide evidence of knowledge, skills, and values or work with others, for example, are the same type of students who would find value in activities such as creating a philosophy statement or describing their work. In other words, if a student recognizes and appreciates integrative learning at the start of the process, he or she might value the activities associated with the reflective ePortfolio experience; that value of the tasks then translates to a greater level of engagement in the process, which results in stronger learning gains. Third, another possibility is that a high value on the reflective process scale is representative of a student's openness to engage in the reflective ePortfolio process or, more broadly, a general enthusiasm or motivation for learning. It is plausible that, controlling for direct measures of student performance such as grades and standardized test scores, the reflective process scale serves as a proxy for student motivation. Hypothetically, more motivated students excel more in general, coming into the process with higher levels of integrative learning and then experiencing stronger learning gains due to their high level of motivation. Whatever the explanation may be, the results demonstrate that greater levels of engagement in reflection and other reflective ePortfolio activities leads to stronger integrative learning gains.

Though engagement in the reflective process was positively associated with learning gains in each dimension of integrative learning, sharing with others as a part of this process did not have a significant relationship with learning gains in any of the five dimensions, when controlling for other factors. That is not to say that engaging with others is not an important component of the reflective ePortfolio process. Rather, it takes a backseat to the personal reflection that is required of individuals. With the reflective process scale in the model, the

slopes for the sharing scale are not significant. However, with the reflective process scale removed from the model, the sharing scale is a significant, positive predictor of learning gains for all five dimensions of integrative learning. Conceptually, though, it is essential to include the reflective process scale in the model; it is not possible to share one's reflections in a meaningful way if they have not engaged in the work personally already. Future research could include a deeper exploration of how these variables contribute to integrative learning gains, perhaps by testing interactions of these scales with other variables to determine whether reflection and sharing activities are more meaningful for some populations compared to others. If there are not significant interactions related to the sharing scale, it might be worth testing interventions that do not feature sharing to see if they result in similar integrative learning gains.

Significant differences related to site-level learning process characteristics are promising because they provide insight into possible ways to structure programs to optimize student learning. Among the site-level learning process characteristics accounted for in this research (i.e., term, length of process, number of students, facilitation type), only the number of students in a site was correlated with integrative learning gains. On the one hand, it would be useful to identify some differences in order to design programs structured to maximize student success. Even the significantly weaker learning gains associated with a large number of students can be attributed to significantly higher mean values at the start of the process (for the Identify and Provide Evidence dimensions). On the other hand, it is encouraging that students can experience similar learning gains, on average, regardless of the term of the experience, the length of the process, or the type of facilitation.

Having explored integrative learning through the lens of a multi-theoretical framework of transfer of learning, reflective practice, and self-authorship, it is reasonable to consider whether

these are appropriate theories to use to understand integrative learning. Recalling the definition I proposed in the literature review, integrative learning is a mindset in which individuals seek to explicitly connect, evaluate, and synthesize learning from curricular, co-curricular, and personal experiences, in ways that enable them to apply their knowledge, skills, and values in new, complex settings in their personal, professional, and academic lives and over time. Taking this definition into account, I believe that these theories provide an excellent explanation not only of how individuals reflect upon their learning experiences and make connections between these experiences but also of how individuals can grow and understand themselves better by making these connections. However, I also believe that there is an opportunity to link these theoretical constructs to the dimensions of integrative learning more directly. Though the dimensions and the theories are representative of integrative learning, the dimensions and the theories are only loosely connected to each other.

Not only is transfer of learning important to our understanding of integrative learning, but also the distinction between low-road transfer and high-road transfer (Salomon & Perkins, 1989) is critical to our interpretation of integrative learning. Opposed to the reflexive activity of low-road transfer, integrative learning requires explicit connections that are characteristic of high-road transfer. Individuals must recognize their prior learning in order to apply it to new situations. Though individuals can engage in this type of transfer on their own, it requires a higher level of cognitive effort and motivation; educators can facilitate the high-road transfer process by "bridging," explicitly identifying and emphasizing underlying principles behind the concepts that they expect students to connect (Perkins & Salomon, 2012). This study provides encouraging evidence that students make strides in their abilities to identify their knowledge, skills, and values. This is an essential first step if they are to make explicit connections of their

knowledge, skills, and values to new settings. Providing evidence of knowledge, skills, and values might be indicative of transfer, but it is not necessarily so. One might be able to articulate his or her knowledge, skills, and values to others, but be unable to take what he or she has learned and recognize how it applies in an unfamiliar setting. The Integrative Learning Self-Assessment used in this study includes questions that specifically address applying knowledge to new settings, but the dimensions of integrative learning do not neatly capture transfer. Because of this limitation, it might be worthwhile in future analyses to explore reducing the survey items differently so that they are more closely aligned with the theory of transfer in order to develop a stronger understanding of how students transfer their learning. Additionally, the portfolios themselves could provide qualitative evidence of whether students transfer learning to different settings. In summary, while transfer of learning is an essential component of integrative learning, the dimensions of integrative learning in the current study do not provide strong evidence of transfer. Practitioners will want to explore if and how students truly transfer their learning as a result of the reflective ePortfolio process.

Reflective practice is an important bridge between the connections and application associated with transfer of learning and the personal development of self-authorship. Through reflective practice, individuals challenge their assumptions and make their tacit knowledge explicit. The benefit of such reflection is that individuals can identify differences in their espoused theories of action, the conscious values and beliefs that they claim to guide their actions, and theories-in-use, the subconscious ideas that develop over time and shape their behavior directly and consistently. Again, the dimensions of integrative learning do not align specifically with the concept of reflective practice; the integrative learning dimensions do not capture the extent to which students are forced to challenge their assumptions. This study,

however, does have an advantage relative to other research on integrative learning. As students

engage in MPortfolio, they are expected to recognize that one's self is inextricable from one's

knowledge, skills, and values. Evidence of significant learning gains on the Inter/Intrapersonal

dimension and the Work with Others dimension in this study are encouraging, as they provide

evidence that students are reflecting on their own identity, how they relate to others, and how

they interact with others in work settings. Actively reflecting upon these things may be an

important part of challenging one's assumptions about the world, but again not necessarily so.

There may be an opportunity in future research to use the survey data to understand the ways in

which students challenge their assumptions and develop a greater understanding of the world;

however, it may be necessary to adapt the survey to specifically address reflective practice. In

addition, the portfolios themselves might provide evidence, if students use them to articulate how

they may have challenged their assumptions.

Self-authorship also contributed to the current study's multi-theoretical construct of

integrative learning. Where transfer and reflective practice represent activities in which students

are expected to engage as they integrate learning, self-authorship represents the development that

they may experience as a result of integrative learning. As students challenge their assumptions,

they may be forced to reevaluate diverse perspectives that they previously took at face value.

Because students are challenged to reflect on their learning and to consider how one's self shapes

his or her knowledge, it is reasonable to expect that students might develop into relativistic

thinkers who connect their learning as they confront complex problems (Newell, 1999). On the

journey to self-authorship, individuals experience development in cognitive, intrapersonal, and

interpersonal domains (Baxter Magolda, 1999). In the current study, the dimensions of

integrative learning do not reflect the distinct features of these domains. The cognitive domain

addresses the question, "How do I know?" Students may ask themselves this question as they identify and provide evidence of their knowledge, skills, and values, though it is more likely that they ask the question, "What do I know?" as they engage in these processes. Additionally, the Inter/Intrapersonal dimension is not separated into two dimensions to reflect the distinct features of the interpersonal and intrapersonal domains. Although the Work with Others dimension might provide some additional insight into interpersonal development, researchers and theorists may want to understand whether students develop differently in each of these domains. Because the idea that one's self is integral to one's knowledge is central to the concept of integrative learning, the dimensions of integrative learning are probably satisfactory as constructed, but they do not provide sufficient detail in order to develop a strong understanding of students on their path to self-authorship.

Identification of these limitations of the current measures and of this research provides invaluable information for future studies. These discrepancies between the measures and the study's theory base suggest how to look at this data in new and interesting ways, and how to improve studies of integrative learning in the future. I hope that the current study serves as a starting point, and that these individual theories can be explored in greater depth in future research.

Implications

Integrative learning has been championed by the AAC&U as an essential learning outcome in postsecondary education. The AAC&U (2004) has proposed that a variety of educational experiences can foster integrative learning: first-year seminars, learning communities, interdisciplinary studies programs, capstone experiences, advising, student self-assessment, and, foremost, portfolios. The question remains whether these types of educational

experiences are pathways to integrative learning. Can educators structure interventions that facilitate integrative learning? Based on the results of this study, the answer to this question is clearly "yes." The study provides strong evidence that engagement in the reflective ePortfolio process leads to gains in integrative learning and that these learning gains are lasting. So, yes, this is an educational intervention that can foster integrative learning. How can educators structure this intervention to provide an optimal learning experience for students?

To answer this question, it is helpful to recall the Learning Partnerships Model (LPM) (Baxter Magolda & King, 2004), which was described earlier in this dissertation. Situated in the self-authorship literature, LPM aims to serve as a framework for environments that successfully promote self-authorship. This model features a set of assumptions (e.g., the self is central to knowledge construction) and principles (e.g., situate learning in the learner's experience) that are consistently characteristics of environments that promote self-authorship. An important aspect of the model is the idea that there may be a disconnect between learners' capacities and the learning goals of educators and that educators need to build an evolutionary bridge that helps students achieve intended learning outcomes by facilitating the development of their meaning-making capacities (Baxter Magolda & King, 2004; Kegan, 1994; King & Baxter Magolda, 1996). Kegan (1994) writes, "We cannot simply stand on our favored side of the bridge and worry or fume about the many who have not yet passed over. A bridge must be well anchored on both sides, with as much respect for where it begins as for where it ends" (p. 62). In other words, educators need to meet students where they are and have clear learning goals in mind. Though much of the discussion of the results of this study has focused on differences in integrative learning gains (the slopes), it is important to acknowledge that the intercepts matter as well

because they provide insight into where educators may need to meet students along this developmental bridge.

When implementing an educational experience employing a reflective ePortfolio process, educators should consider the characteristics of students who would be engaging in the process. For what students would this intervention work best? One of the most encouraging findings of the study is that students experience similar learning gains, regardless of their demographic background, when controlling for other factors. The fact that this intervention does not favor some student background characteristics over others means that educators can welcome all types of students into this process and expect them to experience similar learning gains. Though student background characteristics do not explain differences in integrative learning gains, it is important to affirm how critical student background characteristics are to the learning process. One of the assumptions of LPM is that the self is central to knowledge construction. With that in mind, students' backgrounds, especially their social identities, inform how they perceive the world. When reflecting on their learning experiences, educators should encourage students to consider how their identities contribute to their knowledge, skills, and values.

Educators should be mindful of students' academic backgrounds. Though differences in learning gains related to class year tended not to be significant, the reflective ePortfolio process appears to be particularly useful for first-year students as they begin to identify and provide evidence of their knowledge, skills, and values. Not only is this promising for being able to foster integrative learning in new students, but it is also encouraging because it provides evidence that this process can help first-year students establish habits in such important practices as documenting learning, reflecting upon one's learning, and being an accountable learner. This finding was initially surprising because educators at the University of Michigan assumed that

first-year students would not yet have enough experiences to reflect upon and integrate.

However, many of the first-year students who engaged in this process at the University of

Michigan had pivotal learning experiences in high school (e.g., study abroad, volunteer work)

and also immediately became involved in co-curricular experiences after matriculation. As a

result, first-year students tended to have more than enough experiences for them to engage

meaningfully in the reflective process. Recognizing that the University of Michigan is a highly

selective institution with students who tend to have strong high school preparation, this may not

be the case for other types of institutions. The results suggest that, at the start of the process,

students with lower levels of academic preparation overrate their abilities associated with

integrative learning. Since it is important to understand where students are developmentally

when they start the process and at to meet them at an appropriate developmental level, educators

should take into account that some students may not have a strong grasp of their own level of

development.

Another aspect of academic background that educators may want to consider is field of

study. For four of the five dimensions of integrative learning (Identify Knowledge, Skills, and

Values dimension, Provide Evidence dimension, Inter/Intrapersonal dimension, Work with

Others dimension), the results were fairly unremarkable. Students in professional fields had

higher mean values at the start of the process, controlling for other factors, but there were no

significant differences in learning gains for any of these four dimensions. The Digital

Professional Identity dimension, however, yielded results that illustrated how students

experience this process differently based on their field of study. Controlling for other factors,

students in professional fields, the social sciences, and natural sciences (including engineering)

started the reflective ePortfolio process with significantly higher mean values on the Digital

Professional Identity dimension. In particular, students in professional fields had a considerably higher mean rating at the start of the process. Also, on this dimension, students develop at much different trajectories based on their field of study and controlling for other factors. Based on their fields of study, students come into the process with different conceptions about what constitutes a professional digital identity and the importance of a professional digital identity. The preconceived notions that students bring to the process may influence their experience, positively or negatively. For example, students who have prior experience developing a professional digital identity, perhaps through a LinkedIn profile, personal website, or an ePortfolio showcasing their work, may misunderstand the purpose of the reflective ePortfolio process and not recognize how it differs from these online representations of themselves. These students may see the process as a waste of time because they feel that they have already spent time cultivating their digital professional identity. Many students engage in the process thinking that the goal is to create a "sexy resume" (a term used by program administrators at the University of Michigan). By misinterpreting the intent of the process, students are likely to fail to engage in the deep reflection that is expected of them through this process. To avoid this, educators should be as clear as possible when describing the purpose of the reflective ePortfolio process and transparent about what they expect students to do as a part of this process. Educators, too, should encourage students to use their existing online identities as they engage in the reflective ePortfolio process. LinkedIn profiles and work showcase ePortfolios are likely to contain pivotal learning experiences; the next steps for students are to identify the things that they learned as a part of these experiences, to recognize what is important about these experiences, and understand how these experiences relate to each other. Students who have already taken time to collect important learning experiences are one step ahead in the learning

process and educators should use this to the advance of these students so that they might enhance their learning.

When structuring the reflective ePortfolio process, educators should also take into account the co-curricular activities in which their students engage. Participation in co-curricular activities is associated with differences both at the start of the process and in the learning gains over the course of the process. Additionally, the types of co-curricular experiences matter. Some types of activities were positively associated with certain dimensions of integrative learning (student organizations, research), while students in fraternities and sororities experiences weaker learning gains than those not participating in Greek life. There were no differences based on paid work, though students who had participated in internships tended to start the process at higher levels of integrative learning and then experience weaker learning gains. Although there may be inconsistency with how co-curricular activities relate to integrative learning, educators should remember how important it is for students to reflect upon their co-curricular experiences and understand the connections between what they learn through these experiences and what they learn through their coursework. Recalling a quote shared earlier in this dissertation, "It makes little difference to them whether the perspectives are held by an author they read, another student, their professor, or the guy standing beside them in the soup kitchen where they volunteer… Students in general, I find, do not privilege academic disciplines over the lived experience of self and others" (Newell, 1999, p. 18). Co-curricular experiences are important to students and students learn from these experiences, whether their learning is tacit or explicit. These learning experiences become so much more powerful when students are given the space to reflect upon what they have learned, why these experiences are important, and how they relate to the learning they experience in the classroom.

The results also demonstrate how important it is for educators to emphasize reflection as a part of this process. Students who engage in the reflective process at the highest levels experience the greatest gains in every dimension of integrative learning, controlling for other factors. As a college student, though, it can be difficult to find time to engage in reflection. It is easy for reflection to be put aside and not given the attention that it needs as a part of the process. Taking 15 minutes before class to write down some thoughts is entirely insufficient, though it is easy to see how students might do this with all of the competing demands in their lives (e.g., coursework, co-curricular activities, paid work, and social experiences). Forcing a student to reflect (and reflect meaningfully) is not something that one can easily do. However, educators should consider building in time to reflect when the class or group meets. This does not have to be a time in which students sit in silence and solitude, deep in thought; it can feature activities such as paired reflection with a classmate or reflective writing and can be guided by specific prompts. A key component of MPortfolio is generative listening, an exercise in which students discuss key experiences and why these experiences were important to them. Recognizing how critical it is to engage in meaningful reflection as part of this process, educators need to take special care to ensure that the experience is structured in ways that encourage students to take the time to reflect and make the effort to reflect productively.

The implications for practice thus far have focused on the student. What about differences at the site level? What are the characteristics of a program that produces the greatest learning gains? Surprisingly, site-level characteristics were largely not significant predictors of integrative learning gains. Students engaging through sites with a large number of students had significantly weaker gains in the Identify and Provide Evidence dimensions. However, this difference could be explained by the significantly higher mean values, controlling for other

factors, at the start of the process. On the surface, the absence of significant differences appears to provide little insight into how to structure an effective program. The outlook, however, is not so bleak. The findings that students experience similar gains, regardless of the length of the program or the facilitation type, are encouraging, particularly when the scarcity of resources is a major consideration. Educators structuring reflective ePortfolio programs might want to consider student facilitation and shorter process lengths (i.e., a half term experience), considering that these characteristics are associated with similar levels of learning gains as faculty/staff facilitation and semester-long experiences, respectively. Based on the differences associated with the number of students in a site, educators might want to focus on small- and medium-sized groups of students (fewer than 10 students and 10 to 49 students, respectively). Finally, the semester of the experience appears not to matter. Taking these findings into account, educators have a considerable amount of flexibility when designing a reflective ePortfolio process. Aside from possibly focusing on a smaller number of students, educators can explore interventions of different lengths, terms, and approaches to facilitation and expect similar learning gains.

One other consideration for educators is structuring a reflective ePortfolio process that facilitates learning gains that last. The current study demonstrates that students who engage in the process experience learning gains that are maintained two years later. These learning gains persisted despite the fact that the vast majority of students did not continue to update their portfolios after completing the course or program in which they engaged in the reflective ePortfolio process. The results suggest that continued engagement in the process may not be necessary in order to maintain integrative learning gains. However, it is difficult to imagine that continued engagement in the process would not be beneficial to individuals (both as students and in their post-graduate lives). While the initial experience develops the habits of mind one would

expect of integrative learners, the continued engagement in reflection and updating of one's ePortfolio could be particularly useful as individuals participate in new experiences about which they can reflect and connect to prior learning experiences. Also, related to the long-term persistence of integrative learning gains, the current study does not explore student-level and site-level characteristics that might explain differences in integrative learning gains beyond the initial experience. As a result, educators should not assume that long-term integrative learning gains will be uniform across student and site characteristics since additional research is needed.

Another consideration for educators is how to incorporate integrative learning portfolio work into other institutional initiatives focused on teaching and learning. Focusing on the University of Michigan as an example, the institution has invested heavily into engaged learning and learning analytics as pathways to enhancing teaching and learning. The Center for Engaged Academic Learning champions engaged academic learning as a pedagogical strategy emphasizing hands-on experiences in the community and involving reflection on these experiences. Though it is not articulated in the center's goals, fostering integrative learning aligns closely due to the emphasis on reflection and learning experiences inside and outside the classroom. The community-engagement component of engaged academic learning might be the type of experience about which a student would reflect as he or she develops integrative learning but not necessarily so. Additionally, it is implicit that the experiences that are part of engaged academic learning are academic or curricular and integrative learning more holistically incorporates learning experiences, recognizing that curricular, co-curricular, and personal experiences can contribute equally to students' learning. Though there are some differences between the two concepts, one would expect that initiatives promoting engaged academic learning and integrative learning could go hand-in-hand. Another major initiative focused on

enhancing teaching and learning on the University of Michigan campus is learning analytics. Guided by a task force on learning analytics, the university has adopted several programs focused on leveraging institutional data to understand student learning. At a large research university like the University of Michigan, it is possible to use a "big data" approach in order to address something that is seemingly small: optimizing an individual student's learning experiences. Can institutional data identify students who are at risk for failing a course? Do students who log into CTools, the university's online course management environment, at greater frequencies experience greater success in their classrooms? These are the types of questions that educators aim to answer through this initiative. The institutional data, like the integrative learning surveys and portfolios, are a rich source of data and there may be an opportunity to add depth to both analyses by incorporating the other's data sources. On campuses, there may be multiple efforts to understand and improve teaching and learning. Educators might want to consider how to incorporate integrative learning into these efforts because of how it is central to the learning of all students, emphasizing learning both inside and outside the classroom and recognizing how one's self is inextricable from one's learning.

Future Research

Though the current study has produced some much needed findings about the relationship between ePortfolios and integrative learning and, more broadly, the ways assessment approaches can influence student learning, there is a need for additional research on these topics. Although organizations such as the AAC&U have emphasized integrative learning as an essential outcome for college graduates and a path to success in the workplace in a knowledge society, there are still few studies that explain how educators can foster integrative learning. Regarding assessment, calls for more assessment of student learning have been abundant as part

of the movement toward greater accountability, but the body of research establishing a link between assessment and its potential influence on student achievement is scant. In this section, I propose possibilities for future research that might strength our knowledge of integrative learning, ePortfolios, and the relationship between the two.

One of the limitations of the research on assessment was that, in studies exploring the influence of integrated assessment approaches on student learning, it was unclear to what extent contributions to student learning could be attributed to the assessment tool or pedagogical approach. The reflective ePortfolio process at the University of Michigan is based on a set curriculum and pedagogy and supported by an ePortfolio tool and these elements have been inextricable. It is reasonable to ask, "How essential is the portfolio?" Perhaps the ePortfolio is merely window dressing and that student learning could be attributed to the curriculum and pedagogy alone. In fall of 2012, I conducted interviews with individual who engaged in the reflective ePortfolio process first as students and again as student facilitators. These interviews focused on a wide range of topics related to the reflective ePortfolio process, including the importance of the ePortfolio to the process. Student facilitators indicated that the ePortfolio is an important, if not essential, component of the process. Multiple student facilitators reported that it is an essential component due to its function as a place to visualize learning experiences and document reflections. One facilitator shared, "The MPortfolio is a really good way to structure your thoughts and get them on something that they can refer back to later. They can see where they're going and where they've been. It helps learning a lot for people." Another theme was the importance of the ePortfolio as a way to engage students: "Every time that we came into class, everyone's portfolio was so different than when we left. They would go outside and talk to each other about it. They'd sit and make their portfolios with each other." This facilitator feared that

students would be likely to disengage with the process if they did not have this creative outlet for their work and that sharing their ePortfolios with their classmates encouraged students to dedicate time and effort to the process. While these are compelling arguments in favor of the use of the ePortfolio tool, there is no empirical evidence that the use of the ePortfolio contributes positively to student learning. The creation of ePortfolios can be time consuming for students, time that could be used for other activities, and, at the institution level, the implementation of ePortfolio technology is a use of institutional resources both in terms of financial cost and staffing. In the future, an experimental study comparing the existing reflective ePortfolio process to a control group with only the curriculum and pedagogy would provide useful information about the value of the ePortfolio.

Another direction for future research is to expand upon the current study by exploring differences in the context of the causal design and the research addressing the relationship between the reflective ePortfolio process and long-term integrative learning gains. The overall correlational analysis provided insight into differences in integrative learning gains based on student- and site-level characteristics and this was possible due to the large number of students in the population. In the causal and long-term analyses, due to the small populations, I was not able to explore differences based on these same characteristics. As additional data are collected, it would be informative to expand these analyses so that they account for differences based on student and site characteristics.

The current research features pre- and post-survey responses from more than 1,500 students who have engaged in MPortfolio at the University of Michigan. These data are a valuable source of information. Throughout the review of both bodies of literature (and even in the Methodology chapter of this dissertation), the limitations associated with self-reported

measures have been well-documented. Using an additional data source to validate the survey

data would strengthen the research to address this limitation. Fortunately, another valuable data

source exists and has thus far gone untapped; that source is the portfolios themselves. Thousands

of students have created ePortfolios as part of this process and these ePortfolios all contain

information about student learning experiences, reflections on their learning, philosophy

statements, examples of work, among other things that students choose to include. There is a

major opportunity for an analysis of this content both on its own and supplementing the survey

data. A direction for future research could be to develop a rubric to measure integrative learning

based on survey content to use the portfolios themselves to determine whether students are

achieving the intended integrative learning outcome. By incorporating the content analysis with

the analysis of survey data, this research could validate the self-reported data from the surveys

and identify elements of the ePortfolio that explain differences in integrative learning gains. The

content analysis would be a time-consuming process, but it would reveal rich data about

ePortfolios and student learning.

Similarly, the current research might benefit by being expanded to include a qualitative

component. The quantitative approach employed in the current study has been valuable in that it

provides strong evidence that students change over the course of this process and that there are

certain characteristics that contribute to differences in this change. A qualitative approach might

be valuable in exploring what happens to students as they experience these changes. Barber

(2009), based on interviews with undergraduate students, established an "integration of learning

arc," explaining how integrative learning develops in college. This might be a valuable

framework for understanding how students change throughout this process. According to this

arc, there are three degrees of integration: connection, application, and synthesis. It may be

possible to determine a student's level of development along this arc from the portfolio itself. However, it may also be valuable to interview students to explore the changes they experienced through this process. Are there specific moments that led them to become integrative learners? Can they describe how they are now able to integrate their learning in ways that they were unable to previously? It may be more meaningful to answer these and similar questions qualitatively. Additionally, based on the constructivist nature of the process, it might be valuable to give students the opportunity (beyond the ePortfolio) to explain how their experiences and their reflections on these experiences shape their understanding of the world.

In future research, it would be valuable to develop a greater understanding of the effect of engaging in the reflective ePorfolio process multiple times. The current research only explores the experiences of students engaging in the process for the first time. However, as the scale of ePortfolio usage expands, there are increasingly students who engage in the process more than once. For this dissertation, students who had participated multiple times and responded to both the pre-survey and post-survey for multiple experiences had only their initial responses included in the analysis. This was done for statistical reasons (cases in the analysis must be independent), but also because I would like to give more thought to how to treat change over time for students with multiple experiences. How might student learning change over time when students engage multiple times? Since experiences are likely not continuous, what is the effect of varying intervals between experiences and what is the appropriate analytical approach for determining this effect? There is a different set of hypotheses to develop and issues to consider in order to understand the effect of multiple ePortfolio experiences. As this becomes more prevalent, it would be worthwhile to explore this in greater depth as the ePortfolio research agenda develops.

Another potential direction for future research is exploring the role of motivation in the reflective ePortfolio process. The post-survey includes an open-ended question asking students, "What do you think was the purpose of MPortfolio?" Many students had a weak grasp of the purpose of the process; those with a complete misunderstanding responded that the purpose was analogous to creating a LinkedIn profile and fair number of students confused the means (reflection) with the intended outcome (integrative learning). I hypothesize that, if students do not understand the purpose of the process, they will have little value for the tasks involved and are likely to disengage from the process. This threat is particularly salient for students who engage in the process because it is a component of another experience into which they have opted (e.g., ResStaff training, undergraduate research). These students may see this process as an annoying distraction as they pursue their intended goals. If this hypothesis is true, educators may want to think about ways to impress upon students the value of the process, in order to ensure that they are sufficiently engaged. The second reason to explore student motivation is related to the mechanisms that educators use to incentivize engagement in the process. Do students need to be part of a for-credit educational experience in order to motivate them to engage at the level required to facilitate integrative learning gains? For faculty and staff supervising student employees, can they motivate students to engage in the process as part of their work responsibilities? Can educators create stand-alone modules in which students can participate on their own time, independent from other structured learning experiences? How do learning gains compare in these settings? At the University of Michigan, educators would like to increase scale and engage more students in the reflective ePortfolio process, but there is an assumption that students need to be extrinsically motivated, usually by offering course credit. This is a fair assumption, due to the many competing demands of students. Even those who may

be quite interested in engaging in such a reflective process might have to put aside their ePortfolio work in favor of their graded coursework or jobs that provide them with an income. This assumption, however, has not yet been tested and would be a useful topic for future research. An extension of this would be to explore ways in which the process might intrinsically motivate students to engage. Some students enjoy the reflective and creative aspects of the process, so finding ways to emphasize these to students might encourage them to engage in the process merely because they enjoy it.

Our understanding of how to foster integrative learning would benefit from further exploration of environmental factors. In the current study, I explored variation related to facilitation type, length of the intervention, the term of the experience, and the number of students involved. A key distinction that could be addressed in future research is whether the intervention is situated in a traditional academic setting, a co-curricular experience, or some hybrid of the two. Within academic settings, previous research provided evidence that there was significant variation in engagement in integrative learning activities between general education and non-general education courses and between disciplines (Nelson Laird & Garver, 2010; Nelson Laird, Shoup, Kuh, & Schwarz, 2008). On the co-curricular side, Barnhardt, Lindsay, and King (2006) found that experience in a learning community and engagement in diverse interactions were positively predictors of integrative learning. With these findings in mind, it is important not only to consider the variation between these different types of contexts but to also determine the characteristics of each of these types of settings that successfully promote integrative learning.

Another potential area for future research is to explore whether integrative learning gains are associated with the development of other student outcomes. In other words, by fostering

integrative learning, do educators increase students' capacity to achieve other student outcomes? Prior literature established positive links between integrative learning activities and personal and intellectual development, student satisfaction, grades (Nelson Laird, Shoup, Kuh, & Schwarz, 2008), and moral reasoning (Mayhew, Seifert, Pascarella, Nelson Laird, & Blaich, 2012). If a student is better able to identify and articulate his or her knowledge, skills, and values, it is reasonable to expect that this development might improve his or her ability to succeed in a job interview or write an essay for a graduate school admissions application. Are there labor market outcomes or educational attainment outcomes that can be attributed to the reflective ePortfolio process? In what other ways might students achieve success through integrative learning?

Finally, there is a need to expand research on the facilitation of integrative learning in order to understand how different interventions can foster this important learning outcome. AAC&U (2004) and the Carnegie Foundation highlighted portfolios as a way to foster integrative learning, but there were quite a few other learning experiences that they proposed as means to facilitating integrative learning: first-year seminars, learning communities, interdisciplinary studies programs, capstone experiences, advising, and student self-assessment. These experiences might be effective pathways to integrative learning, but there is little research supporting this notion. Not only is there an opportunity to explore the relationship between engagement in these experiences and integrative learning, but there is also the possibility of researching how the reflective ePortfolio process interacts with these types of experiences. For example, does having students engage in the reflective ePortfolio process as part of a first-year seminar or a capstone experience influence their integrative learning gains? The reflective ePortfolio process might be better suited in some types of experiences more than others. The current research explores this to some extent, but there is definitely an opportunity to investigate

this more deeply, especially in the context of the learning experiences proposed by the AAC&U and the Carnegie Foundation.

Conclusion

Though integrative learning has been recognized as "a cornerstone of a twenty-first century education" (AAC&U, 2004, p. 1), the ability to make connections and synthesize knowledge has long been a core outcome of a college education. Despite this learning goal being a central part of higher education, students frequently fail to understand how their curricular, co-curricular, and personal experiences are linked and do not recognize the common skills and knowledge they develop through these experiences. An inability to integrate learning across contexts and over time is problematic, as college graduates enter a workforce that prioritizes knowledge and the ability to solve complex problems. Educators continue to seek ways to help students connect their learning experiences and to develop habits of mind so that students intuitively make these types of connections on their own.

Empirical research on integrative learning suggests that educators can create settings and interventions that may effectively facilitate integrative learning, though few such studies exist. In this dissertation, I have aimed to determine whether one type intervention, the ePortfolio, can foster integrative learning. Portfolios have been proposed as an effective approach to facilitating integrative learning as they provide students with the opportunity to document their learning experiences, make connections between these experiences, and reflect upon the knowledge, skills, and values they have developed. Though portfolios have shown promise as a pathway to integrative learning, there has been little empirical research linking their use to integrative learning gains. Additionally, there have been few studies providing evidence that ePortfolios (and assessment approaches, in general) influence the achievement of student outcomes, broadly.

The current study has aimed to fill these gaps in the extant body of research by determining whether engagement in a reflective ePortfolio process contributes to students' abilities to reflect on and synthesize their academic and co-curricular experiences so that they are better able to identify and articulate their knowledge, skills, and values and apply their knowledge, skills, and values to multiple settings.

This study has produced strong evidence supporting the notion that educators can create settings that facilitate integrative learning. Not only did the current study demonstrate that students experience positive changes across all dimensions of integrative learning by engaging in the reflective ePortfolio process, but it also established that there is a causal relationship between engagement in this process and the achievement of integrative learning outcomes. Additionally, the results of the research show that student learning gains through the reflective ePortfolio process persist years beyond their initial experience with the process. Finally, the research provides insight into the student and program characteristics that are representative of a successful ePortfolio intervention. In addition to filling substantial gaps in the bodies of research on integrative learning and assessment, the study should be of particular value to educators who are aiming to establish similar programs.

APPENDICES

Appendix A. Characteristics of MPortfolio Sites				
	Term	Number of students	Length	Facilitation type
Arts at Michigan	Winter	Small (10 or fewer)	< One term	Faculty/Staff-facilitated
English 125	Fall	Medium (11 to 50)	One term	Faculty/Staff-facilitated
Foundations for Student Affairs Educators	Fall	Medium (11 to 50)	One term	Mixed facilitation
Ginsberg Project Community	Fall	Small (10 or fewer)	One term	Mixed facilitation
Intergroup Relations	Fall & Winter	Medium (11 to 50)	One term	Faculty/Staff-facilitated
International Center Student Council	Fall	Small (10 or fewer)	One term	Faculty/Staff-facilitated
International Center: MIISP	Fall	Small (10 or fewer)	< One term	Faculty/Staff-facilitated
Living Arts	Winter	Large (More than 50)	One term	Faculty/Staff-facilitated
MRC/WISE	Winter	Medium (11 to 50)	One term	Mixed facilitation
Psych 322: First-Year Experience Course	Fall & Winter	Medium (11 to 50)	< One term	Peer-facilitated
School of Information	Spring/Summer	Large (More than 50)	One term	Mixed facilitation
School of Social Work Policy Class	Fall	Medium (11 to 50)	One term	Faculty/Staff-facilitated
School of Social Work	Fall	Medium (11 to 50)	One year	Faculty/Staff-facilitated
Sexual Assault Prevention & Awareness Center	Fall	Small (10 or fewer)	One year	Faculty/Staff-facilitated
Sweetland Writing Center	Fall	Large (More than 50)	One term	Faculty/Staff-facilitated
UC 421: ResStaff Class	Winter	Large (More than 50)	One term	Faculty/Staff-facilitated
UM-Dearborn School of Education	Fall & Winter	Large (More than 50)	One term	Faculty/Staff-facilitated
Undergraduate Research Opportunity Program	Winter	Large (More than 50)	One term	Mixed facilitation

Appendix B. Integrative Learning Self-Assessment Pre-Survey

<u>Consent</u>

Your answers to the following questions will not affect your participation in the class or ability to create a portfolio.

Do you consent to the use of your data, in aggregated form, for research and publication purposes?

Agree
Disagree

Do you consent to have quotes from your portfolio or survey, without attribution, to be used for future research, presentations, and publications?

Agree
Disagree

<u>Integrative Learning Self-Assessment</u>

The purpose of this pre/post survey is to help researchers understand the development of your integrative learning skills during your time at UM. This initial survey will provide a baseline of your responses that will then be compared to your responses on future surveys (this is why we ask you to provide your unique name). The knowledge/skills presented on this survey reflect the ideal abilities of UM students at the time they leave the university. Thus, if some or many of the skills seem strange or unfamiliar to you, do not worry. If you already possessed all the knowledge and skills described in this survey, there would be no need for you to attend the university! Your responses to this survey are for research purposes only and will be kept absolutely confidential. They will not be shared with anyone else within or outside of the university (e.g., advisors, instructors, or professors). Your responses will have no influence on your grade in any course or program.

Please provide your UM unique name:

Please enter ALPHA characters only:

Please indicate the program/course in which you are creating your portfolio:

<u>Learning Outcomes</u>

Please indicate your level of agreement with the following statements:
Scale: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree

Recognize personal strengths and challenges

1. I can identify my strengths and types of challenges (i.e. gaps in my knowledge) I encounter in specific learning or work situations (e.g. in writing a paper or doing a research project).
2. I make choices to enhance my strengths and address my gaps/challenges in specific work or learning situations (e.g. going to office hours when I am struggling to understand something).
3. I can provide evidence (i.e. in an essay, story, ppt., or ePortfolio) of how I have expressed my strengths and/or taken action to address my challenges in specific situations.

Identify personal values and beliefs

4. I can articulate specific examples of my personal values and beliefs (e.g. believing in values such as "self-motivation" or "contributing to the well-being other others).
5. I can identify examples of how my persona l values and beliefs influence my learning, decisions, and actions (e.g. in the subjects I have chosen to study, or the groups I chosen to join).
6. I can provide evidence (i.e. in a reflective essay, video, or an ePortfolio page) of how my personal values and beliefs have informed my decisions and actions.

Explore personal background, social identities, and perspective

7. I am aware that my background and social identities (e.g. my race, gender, nationality, social class, religion, sexual orientation, etc...) influence my perspective – how I see the world and make sense of things.
8. I can identify specific experiences (e.g. moments in my classes or in social situations) where I have learned about the strengths, limitations, and/or biases inherent in my own perspective.
9. I can provide evidence (i.e. within a reflection essay, ppt. or an ePortfolio page) of the knowledge and insights I've gained with regards to the strengths, limitations, and biases within my own perspective.

Work across social and cultural differences

10. I recognize how interacting with people from backgrounds and cultures different from my own enhances my work and learning.
11. I actively seek to understand the views of people with backgrounds and perspectives different from my own.
12. I can demonstrate (i.e. through stories, reflective, video, ppt. or an ePortfolio page) the specific ways I have sought out and learned from people with backgrounds, cultures, and/or perspectives different from my own.

Recognize knowledge and skills gained from different types of learning experiences

13. I understand that different types of knowledge and skills are gained from different kinds of experiences (e.g. in general, the knowledge/skills gained from taking an English class are different from the knowledge/skills gained from work in an internship, or participating in a student organization, or sports team).
14. I can clearly identify the specific types of knowledge and skills I've gained from different learning and life experiences (from academic classes, paid work, personal challenges, leadership opportunities, etc.).
15. I can clearly demonstrate (i.e. through a reflective essay, video, ppt. or ePortfolio page) the specific types of knowledge and skills I've gained from a wide range of learning and life experiences.

Transfer and apply knowledge and skills to new contexts

16. I understand the need to connect knowledge I've gained from one place (e.g. the skills gained from participating on a sports team), to other situations (e.g. working with a group to solve a math or chemistry problem).
17. I can identify several different examples of how I have applied the knowledge or skills I've gained from one experience (e.g. learning to convey the essence of complex information for a science presentation), to other situations (e.g. creating an interesting web-site for a student organization).
18. I can provide evidence (i.e. though an essay, video, ppt. or an ePortfolio page) of the specific ways in which I have applied the knowledge/skills I've gained in one experience to other situations or contexts.

Work within my passion, interests, and sources of curiosity

19. I can clearly identify the passions, interests, and sources of curiosity that influence my learning, work and social life.
20. I have the habit of creating learning and/or professional goals that are informed by my passions, interests, sense of purpose, or sources of curiosity.
21. I can demonstrate (i.e. through a ppt. presentation, paper, video, or an ePortfolio page) the knowledge/skills I've gained from pursuing an area of study, or engaging in a series of actions, that reflect my passions and interests.

Develop an on-line professional identity

22. I understand the need to develop an on-line professional identity that is different from a typical Facebook, Linked-in, or MySpace identity (e.g. through the development of a professional web-page or an integrative ePortfolio).
23. I am taking steps to develop a professional on-line identity that demonstrates my knowledge, skills, values, goals and contributions to others (e.g. through a professional web-page or an integrative ePortfolio).

24. I am continually updating and expanding my on-line professional identity (i.e. through a personal web-page, or an integrative ePortfolio) in order to demonstrate my knowledge, skills, values, goals and contributions to others.

Work effectively in groups or teams

25. In a group or team situation, I pay attention to who is, and who is not, participating fully in the discussion and the activities of the group.
26. I ask questions and listen to others in order to understand if and how the needs, goals, perspectives, interests, etc.. of all group members are being addressed in the group's decision-making and activities.
27. I can provide evidence (i.e. through a story, video, ppt., letter of recommendation or an ePortfolio page) of the ways in which I have learned how to positively contribute to the functioning of a group or team.

Evaluate and modify my work

28. I can identify the standards that both myself and others will use to evaluate my learning and/or work (e.g. the criteria a professor or supervisor will use to assess my work as "excellent" "good" or "needs improvement").
29. I often reflect on if and how my work (academic and otherwise) is meeting my own standards and expectations.
30. I seek feedback on a regular basis in order to understand if and how my work (academic and otherwise) meets the needs, standards, and/or expectations of others.
31. I can demonstrate (i.e. through a reflective essay, feedback from supervisors, or as an ePortfolio page) how I have changed my perspective, decisions, or actions as a result of my own reflections or feedback from others.

Work with others to make a difference

32. I can work with others to identify a problem or need within a specific field, group, organization, or community (e.g. a school or non-profit organizations needing additional funds or resources in order to fulfill their mission).
33. I can work with others to develop a plan and take action in order to address the needs of a group, organization, or community (e.g. creating a stable funding stream to support a nonprofit organization in an on-going basis).
34. I can provide evidence (through a ppt., video, letters from others, or ePortfolio page) of how I have worked with others to identify and address a problem, need, or challenge within a group, organization, or community.

Engage in ethical decision-making and actions

35. I recognize the need to reflect on how my decisions and actions affect others (i.e. asking myself, "Do my decisions contribute to the overall care, well-being, or positive functioning of individuals, groups, organizations and communities that are a part of my life?").

36. I can identify specific moments or experiences where I have developed or practiced ethical principles (e.g. the principles of equity, justice, fairness, compassion, care, etc..) in my decision-making and actions.
37. I can provide evidence of decisions and actions where I have either developed, or expressed, one or more ethical principles (e.g. equity, justice, fairness, compassion, care, etc..) in the context of working with individuals, groups, organizations or communities that are a part of my life.

What kinds of activities do you participate in outside of your academic courses? (Check all that apply)

Student organizations
Paid work
Internships
Peer teaching and/or mentoring
Resident advising
Research
Sororities or fraternities
Taking care of a family member or loved one (e.g., parent, child, or partner)
Other (please specify)
I don't participate in other activities.

Do you experience yourself as a member of a minority group within your program or school?

Yes (please explain)
No

What is the educational level of your parents and/or your legal guardians? (Check all that apply)

	Mother	Father	Legal guardians
Grade school			
High school			
Some college			
Vocational certificate			
Associate's degree			
Bachelor's degree			
Advanced degree (e.g., M.D., M.S.W., M.B.A., M.P.H., Ph.D., or J.D.)			
Not applicable			

Appendix C. Integrative Learning Self-Assessment Post-Survey

UM Integrative Learning Post Self-Assessment

The purpose of this pre/post survey is to help researchers understand the development of your integrative learning during your time at UM. This 'post' self-assessment survey will be compared to your responses on the 'pre' self-assessment survey (this is why we ask for your unique name). Additionally, this survey also asks for your feedback on what it was like for you to reflect on your learning and create your Mportfolio pages. The knowledge/skills presented here reflect the ideal abilities of UM students at the time they leave the university. Thus, if some or many of the skills seem strange or unfamiliar to you, do not worry. If you already possessed all the knowledge and skills described in this survey, there would be no need for you to attend the university! Your responses to this survey are for research purposes only and will be kept absolutely confidential. They will not be shared with anyone else within or outside of the university (e.g., advisors, instructors, or professors). Your responses will have no influence on your grade in any course or program.

UM Uniqname:

Please enter ALPHA characters only:

Please indicate the program/course in which you are creating your portfolio:

<u>Learning Outcomes</u>

Please indicate your level of agreement with the following statements:
Scale: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree

Recognize personal strengths and challenges

1. I can identify my strengths and types of challenges (i.e. gaps in my knowledge) I encounter in specific learning or work situations (e.g. in writing a paper or doing a research project).
2. I make choices to enhance my strengths and address my gaps/challenges in specific work or learning situations (e.g. going to office hours when I am struggling to understand something).
3. I can provide evidence (i.e. in an essay, story, ppt., or ePortfolio) of how I have expressed my strengths and/or taken action to address my challenges in specific situations.

Identify personal values and beliefs

4. I can articulate specific examples of my personal values and beliefs (e.g. believing in values such as "self-motivation" or "contributing to the well-being other others).
5. I can identify examples of how my persona l values and beliefs influence my learning, decisions, and actions (e.g. in the subjects I have chosen to study, or the groups I chosen to join).
6. I can provide evidence (i.e. in a reflective essay, video, or an ePortfolio page) of how my personal values and beliefs have informed my decisions and actions.

Explore personal background, social identities, and perspective

7. I am aware that my background and social identities (e.g. my race, gender, nationality, social class, religion, sexual orientation, etc...) influence my perspective – how I see the world and make sense of things.
8. I can identify specific experiences (e.g. moments in my classes or in social situations) where I have learned about the strengths, limitations, and/or biases inherent in my own perspective.
9. I can provide evidence (i.e. within a reflection essay, ppt. or an ePortfolio page) of the knowledge and insights I've gained with regards to the strengths, limitations, and biases within my own perspective.

Work across social and cultural differences

10. I recognize how interacting with people from backgrounds and cultures different from my own enhances my work and learning.
11. I actively seek to understand the views of people with backgrounds and perspectives different from my own.
12. I can demonstrate (i.e. through stories, reflective, video, ppt. or an ePortfolio page) the specific ways I have sought out and learned from people with backgrounds, cultures, and/or perspectives different from my own.

Recognize knowledge and skills gained from different types of learning experiences

13. I understand that different types of knowledge and skills are gained from different kinds of experiences (e.g. in general, the knowledge/skills gained from taking an English class are different from the knowledge/skills gained from work in an internship, or participating in a student organization, or sports team).
14. I can clearly identify the specific types of knowledge and skills I've gained from different learning and life experiences (from academic classes, paid work, personal challenges, leadership opportunities, etc.).
15. I can clearly demonstrate (i.e. through a reflective essay, video, ppt. or ePortfolio page) the specific types of knowledge and skills I've gained from a wide range of learning and life experiences.

Transfer and apply knowledge and skills to new contexts

16. I understand the need to connect knowledge I've gained from one place (e.g. the skills gained from participating on a sports team), to other situations (e.g. working with a group to solve a math or chemistry problem).
17. I can identify several different examples of how I have applied the knowledge or skills I've gained from one experience (e.g. learning to convey the essence of complex information for a science presentation), to other situations (e.g. creating an interesting web-site for a student organization).
18. I can provide evidence (i.e. though an essay, video, ppt. or an ePortfolio page) of the specific ways in which I have applied the knowledge/skills I've gained in one experience to other situations or contexts.

Work within my passion, interests, and sources of curiosity

19. I can clearly identify the passions, interests, and sources of curiosity that influence my learning, work and social life.
20. I have the habit of creating learning and/or professional goals that are informed by my passions, interests, sense of purpose, or sources of curiosity.
21. I can demonstrate (i.e. through a ppt. presentation, paper, video, or an ePortfolio page) the knowledge/skills I've gained from pursuing an area of study, or engaging in a series of actions, that reflect my passions and interests.

Develop an on-line professional identity

22. I understand the need to develop an on-line professional identity that is different from a typical Facebook, Linked-in, or MySpace identity (e.g. through the development of a professional web-page or an integrative ePortfolio).
23. I am taking steps to develop a professional on-line identity that demonstrates my knowledge, skills, values, goals and contributions to others (e.g. through a professional web-page or an integrative ePortfolio).

24. I am continually updating and expanding my on-line professional identity (i.e. through a personal web-page, or an integrative ePortfolio) in order to demonstrate my knowledge, skills, values, goals and contributions to others.

Work effectively in groups or teams

25. In a group or team situation, I pay attention to who is, and who is not, participating fully in the discussion and the activities of the group.
26. I ask questions and listen to others in order to understand if and how the needs, goals, perspectives, interests, etc.. of all group members are being addressed in the group's decision-making and activities.
27. I can provide evidence (i.e. through a story, video, ppt., letter of recommendation or an ePortfolio page) of the ways in which I have learned how to positively contribute to the functioning of a group or team.

Evaluate and modify my work

28. I can identify the standards that both myself and others will use to evaluate my learning and/or work (e.g. the criteria a professor or supervisor will use to assess my work as "excellent" "good" or "needs improvement").
29. I often reflect on if and how my work (academic and otherwise) is meeting my own standards and expectations.
30. I seek feedback on a regular basis in order to understand if and how my work (academic and otherwise) meets the needs, standards, and/or expectations of others.
31. I can demonstrate (i.e. through a reflective essay, feedback from supervisors, or as an ePortfolio page) how I have changed my perspective, decisions, or actions as a result of my own reflections or feedback from others.

Work with others to make a difference

32. I can work with others to identify a problem or need within a specific field, group, organization, or community (e.g. a school or non-profit organizations needing additional funds or resources in order to fulfill their mission).
33. I can work with others to develop a plan and take action in order to address the needs of a group, organization, or community (e.g. creating a stable funding stream to support a nonprofit organization in an on-going basis).
34. I can provide evidence (through a ppt., video, letters from others, or ePortfolio page) of how I have worked with others to identify and address a problem, need, or challenge within a group, organization, or community.

Engage in ethical decision-making and actions

35. I recognize the need to reflect on how my decisions and actions affect others (i.e. asking myself, "Do my decisions contribute to the overall care, well-being, or positive functioning of individuals, groups, organizations and communities that are a part of my life?").

36. I can identify specific moments or experiences where I have developed or practiced ethical principles (e.g. the principles of equity, justice, fairness, compassion, care, etc..) in my decision-making and actions.
37. I can provide evidence of decisions and actions where I have either developed, or expressed, one or more ethical principles (e.g. equity, justice, fairness, compassion, care, etc..) in the context of working with individuals, groups, organizations or communities that are a part of my life.

Which of the following activities do you participate in and how important are these to your overall learning and development?

	Never	Once a year	Once a semester	Every month	Every week	Daily
Taking Courses within my major						
Taking Courses outside my major						
Participating in student organizations						
Working for money (on campus)						
Working for money (off campus)						
Volunteering off campus for a group or organization						
Volunteering on campus for a group or organization						
Engaging in peer teaching, mentoring, or resident advising						
Engaging in research						
Doing an internship						
Participating in sororities or fraternities						
Other (please specify below)						

	Not at all important	Not very important	Neutral	Somewhat important	Very important
Taking Courses within my major					
Taking Courses outside my major					
Participating in student organizations					
Working for money (on campus)					
Working for money (off campus)					
Volunteering off campus for a group or organization					
Volunteering on campus for a group or organization					
Engaging in peer teaching, mentoring, or resident advising					
Engaging in research					
Doing an internship					
Participating in sororities or fraternities					
Other (please specify below)					

How might you use the reflection exercises, Generative Knowledge interviews, and/or your MPortfolio in the future? (Check all that apply)

I might use one or all of them to continue to reflect on my experiences.
I might use one or all them to help me identify connections or common themes across my different experiences.
I might use one or all them to help me clarify my underlying philosophy, values, and/or goals.
I might use one or all them to help me think about my future.
I might share one or all them with friends or family.
I might use one or all of them with professors, peers, or others in an academic setting.
I might show my MPortfolio to people who are going to write letters of recommendations for me.
I might use my MPortfolio to help me apply to graduate school (either sending it as a link or copying content for applications).
I might use my MPortfolio to apply for a job or internship.
Other (please specify)

Please indicate your level of agreement with the following statements:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The reflection process helped me understand the value of my learning experiences.					
The completion of several portfolio pages helped me understand the relationship between different types of learning and life experiences.					
The process of creating my Example(s) of Work (or Knowledge Synthesis Pages) helped me understand the knowledge and skills I have gained.					
The process of creating a Philosophy Statement helped me see connections between my experiences.					

While creating your MPortfolio, how important was . . .

	Not applicable	Not at all important	Not very important	Neutral	Somewhat important	Very important	Not at all important
Listening to the experiences of others and sharing my own							
Receiving feedback on the content or design of your portfolio							
Giving feedback on the content or design of your portfolio							
Putting everything together for a completed portfolio							
Sharing your portfolio with others							
Listening to the experiences of others and sharing my own							

Please indicate your level of agreement with the following statements:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed creating my MPortfolio (e.g., choosing a design or finding images to go with my written content).					
I would recommend the MPortfolio experience to others.					

Who (which groups of students) do you think would most benefit from the process of creating an MPortfolio? *[Open-ended]*

What do you think was the purpose of creating an MPortfolio as part of your course or program? *[Open-ended]*

What would you change to make the MPortfolio experience better? *[Open-ended]*

Please share with us what you liked most about creating your MPortfolio: *[Open-ended]*

Please share with us what you liked least about creating your MPortfolio: *[Open-ended]*

Appendix D. Integrative Learning Self-Assessment Follow-Up Survey

The purpose of this survey is to help researchers understand the development of your integrative learning during your time at UM. We ask for your uniqname so that we can link your response to information obtained from UM institutional records (e.g., major, year, GPA). Additionally, if you completed an MPortfolio during your time at UM, your responses will be compared to the surveys that you completed as a part of the MPortfolio experience. Your responses to this survey are for research purposes only and will be kept absolutely confidential. They will not be shared with anyone else within or outside of the university (e.g., advisors, instructors, or professors).

UM Uniqname:

   Please enter ALPHA characters only:

Do you consent to the use of your data, in aggregated form, for research and publication purposes?

Agree
Disagree

Please indicate your enrollment status at the University of Michigan:

I am currently enrolled *(Sees Section A)*
I am not currently enrolled and I have graduated *(Sees Section B)*
I am not currently enrolled and I have not graduated *(Sees Section B)*

Have you completed or did you complete an MPortfolio during your time at UM?

Yes *(Sees Section G)*
No *(Does not see Section G)*

Are you ResStaff (e.g., RA, DPE, PASS)?

Yes *(Sees Section H)*
No *(Does not see Section H)*

[These questions are required]

LEARNING OUTCOMES

Please indicate your level of agreement with the following statements:
(Scale: Strongly agree = 5; Agree = 4; Neutral = 3; Disagree = 2; Strongly disagree = 1)

Recognize personal strengths and challenges

1. I can identify my strengths and types of challenges (i.e. gaps in my knowledge) I encounter in specific learning or work situations (e.g. in writing a paper or doing a research project).
2. I make choices to enhance my strengths and address my gaps/challenges in specific work or learning situations (e.g. going to office hours when I am struggling to understand something).
3. I can provide evidence (i.e. in an essay, story, ppt., or ePortfolio) of how I have expressed my strengths and/or taken action to address my challenges in specific situations.

Identify personal values and beliefs

4. I can articulate specific examples of my personal values and beliefs (e.g. believing in values such as "self-motivation" or "contributing to the well-being other others).
5. I can identify examples of how my persona l values and beliefs influence my learning, decisions, and actions (e.g. in the subjects I have chosen to study, or the groups I chosen to join).
6. I can provide evidence (i.e. in a reflective essay, video, or an ePortfolio page) of how my personal values and beliefs have informed my decisions and actions.

Explore personal background, social identities, and perspective

7. I am aware that my background and social identities (e.g. my race, gender, nationality, social class, religion, sexual orientation, etc...) influence my perspective – how I see the world and make sense of things.
8. I can identify specific experiences (e.g. moments in my classes or in social situations) where I have learned about the strengths, limitations, and/or biases inherent in my own perspective.
9. I can provide evidence (i.e. within a reflection essay, ppt. or an ePortfolio page) of the knowledge and insights I've gained with regards to the strengths, limitations, and biases within my own perspective.

Work across social and cultural differences

10. I recognize how interacting with people from backgrounds and cultures different from my own enhances my work and learning.
11. I actively seek to understand the views of people with backgrounds and perspectives different from my own.
12. I can demonstrate (i.e. through stories, reflective, video, ppt. or an ePortfolio page) the specific ways I have sought out and learned from people with backgrounds, cultures, and/or perspectives different from my own.

Recognize knowledge and skills gained from different types of learning experiences

13. I understand that different types of knowledge and skills are gained from different kinds of experiences (e.g. in general, the knowledge/skills gained from taking an English class are

different from the knowledge/skills gained from work in an internship, or participating in a student organization, or sports team).

14. I can clearly identify the specific types of knowledge and skills I've gained from different learning and life experiences (from academic classes, paid work, personal challenges, leadership opportunities, etc.).
15. I can clearly demonstrate (i.e. through a reflective essay, video, ppt. or ePortfolio page) the specific types of knowledge and skills I've gained from a wide range of learning and life experiences.

Transfer and apply knowledge and skills to new contexts

16. I understand the need to connect knowledge I've gained from one place (e.g. the skills gained from participating on a sports team), to other situations (e.g. working with a group to solve a math or chemistry problem).
17. I can identify several different examples of how I have applied the knowledge or skills I've gained from one experience (e.g. learning to convey the essence of complex information for a science presentation), to other situations (e.g. creating an interesting web-site for a student organization).
18. I can provide evidence (i.e. though an essay, video, ppt. or an ePortfolio page) of the specific ways in which I have applied the knowledge/skills I've gained in one experience to other situations or contexts.

Work within my passion, interests, and sources of curiosity

19. I can clearly identify the passions, interests, and sources of curiosity that influence my learning, work and social life.
20. I have the habit of creating learning and/or professional goals that are informed by my passions, interests, sense of purpose, or sources of curiosity.
21. I can demonstrate (i.e. through a ppt. presentation, paper, video, or an ePortfolio page) the knowledge/skills I've gained from pursuing an area of study, or engaging in a series of actions, that reflect my passions and interests.

Develop an on-line professional identity

22. I understand the need to develop an on-line professional identity that is different from a typical Facebook, Linked-in, or Twitter identity (e.g. through the development of a professional web-page or an integrative ePortfolio).
23. I am taking steps to develop a professional on-line identity that demonstrates my knowledge, skills, values, goals and contributions to others (e.g. through a professional web-page or an integrative ePortfolio).
24. I am continually updating and expanding my on-line professional identity (i.e. through a personal web-page, or an integrative ePortfolio) in order to demonstrate my knowledge, skills, values, goals and contributions to others.

Work effectively in groups or teams
25. In a group or team situation, I pay attention to who is, and who is not, participating fully in the discussion and the activities of the group.

26. I ask questions and listen to others in order to understand if and how the needs, goals, perspectives, interests, etc.. of all group members are being addressed in the group's decision-making and activities.

27. I can provide evidence (i.e. through a story, video, ppt., letter of recommendation or an ePortfolio page) of the ways in which I have learned how to positively contribute to the functioning of a group or team.

Evaluate and modify my work

28. I can identify the standards that both myself and others will use to evaluate my learning and/or work (e.g. the criteria a professor or supervisor will use to assess my work as "excellent" "good" or "needs improvement").

29. I often reflect on if and how my work (academic and otherwise) is meeting my own standards and expectations.

30. I seek feedback on a regular basis in order to understand if and how my work (academic and otherwise) meets the needs, standards, and/or expectations of others.

31. I can demonstrate (i.e. through a reflective essay, feedback from supervisors, or as an ePortfolio page) how I have changed my perspective, decisions, or actions as a result of my own reflections or feedback from others.

Work with others to make a difference

32. I can work with others to identify a problem or need within a specific field, group, organization, or community (e.g. a school or non-profit organizations needing additional funds or resources in order to fulfill their mission).

33. I can work with others to develop a plan and take action in order to address the needs of a group, organization, or community (e.g. creating a stable funding stream to support a nonprofit organization in an on-going basis).

34. I can provide evidence (through a ppt., video, letters from others, or ePortfolio page) of how I have worked with others to identify and address a problem, need, or challenge within a group, organization, or community.

Engage in ethical decision-making and actions

35. I recognize the need to reflect on how my decisions and actions affect others (i.e. asking myself, "Do my decisions contribute to the overall care, well-being, or positive functioning of individuals, groups, organizations and communities that are a part of my life?").

36. I can identify specific moments or experiences where I have developed or practiced ethical principles (e.g. the principles of equity, justice, fairness, compassion, care, etc..) in my decision-making and actions.

37. I can provide evidence of decisions and actions where I have either developed, or expressed, one or more ethical principles (e.g. equity, justice, fairness, compassion, care, etc..) in the context of working with individuals, groups, organizations or communities that are a part of my life.

Need for cognition

38. I would prefer complex to simple problems
39. I like to have the responsibility of handling a situation that requires a lot of thinking
40. Thinking is not my idea of fun
41. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities
42. I try to anticipate and avoid situations where there is likely chance I will have to think in depth about something
43. I find satisfaction in deliberating hard and for long hours
44. I only think as hard as I have to
45. I prefer to think about small, daily projects to long-term ones
46. I like tasks that require little thought once I've learned them
47. The idea of relying on thought to make my way to the top appeals to me
48. I really enjoy a task that involves coming up with new solutions to problems
49. Learning new ways to think doesn't excite me very much
50. I prefer my life to be filled with puzzles that I must solve
51. The notion of thinking abstractly is appealing to me
52. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought
53. I feel relief rather than satisfaction after completing a task that required a lot of mental effort
54. It's enough for me that something gets the job done; I don't care how or why it works
55. I usually end up deliberating about issues even when they do not affect me personally

[SECTION A]
POST-GRADUATION PLANS
56. Please indicate your intended primary activity following graduation.

Employment, full-time paid
Employment, part-time paid
Graduate or professional school full-time
Graduate or professional school part-time
Additional undergraduate coursework
Internship
Fellowship
Fulbright
Military Service
Volunteer activity (e.g., Peace Corps, AmeriCorps*VISTA)
Starting or raising a family
Traveling
Completely Undecided
Other Activity, please specify: [Textbox]

57. Are you considering pursuing additional education beyond your bachelor's degree at any point in the future?

Definitely *(Section F)*
Probably *(Section F)*
Probably not *(Section F)*
Not at all

[SECTION B]
<u>CURRENT ACTIVITIES</u>

58. Which statement below best describes your primary employment situation?

Employed: I am presently employed full time or have accepted full-time employment. *(Section C)*
Employed: I am presently employed part time (less than 30 hours per week) as my first choice. *(Section C)*
Self employed: I started my own business *(Section C)*
Employed: I am presently employed part time and seeking full-time employment. *(Section C, Section D)*
Volunteering: I am involved with a volunteer project or program. *(Section C)*
Unemployed: I am presently unemployed and seeking full-time employment. *(Section D)*
Unemployed: I am presently unemployed and NOT immediately seeking full-time employment. *(Section D)*

59. Which statement below best describes your academic situation?

Continuing education: I am presently continuing my education and I plan to pursue my education further in the future. *(Section E, Section F)*
Continuing education: I am presently continuing my education and I have no plans to pursue my education further in the future. *(Section E)*
Future plans: I am not presently continuing my education but I plan to in the future. *(Section F)*
No plans: I am not presently continuing my education and I have no plans to in the future.

[SECTION C]
60. Please provide the name of your current employer and your professional title. *This information is for research purposes only. You and your employer will NOT be contacted.*

Name of organization:
Position Title/Description:
City:
State/Country (if not US):

61. The following statement best describes the career potential of your current position:

Job or volunteer assignment has clear career potential for me.
Job or volunteer assignment has possible career potential for me.
Job or volunteer assignment has no career potential for me and I would prefer a job with career potential.
Job or volunteer assignment has no career potential for me but that is not an issue.

[SECTION D]
62. What is the primary reason you are not currently employed full time?

I am currently enrolled in school
Unable to find a job in my desired field
Have received offers, but they have not been acceptable
Quit my previous position to find another job
Offer was rescinded or start date delayed
Laid off or my job was eliminated
Moved and haven't found new job yet
Taking time off
Traveling
Family responsibilities
Health
Other personal reasons
Other

[SECTION E]

63. If you are currently in school, please provide the following information:

Name of institution: [Textbox]
Degree program (e.g., Bachelor's, Master's, Ph.D., J.D., M.D., etc.): [Textbox]
Field of Study: [Textbox]

64. What choice was this institution?

First choice
Second choice
Third choice
Fourth choice
Fifth choice
Less than fifth choice

65. I would describe myself as a:

Full-time student
Part-time student

[SECTION F]

66. Please indicate the degree(s) you plan to pursue in the future. (Select all that apply)

Bachelor's, please indicate field of study: [Textbox]
Master's, please indicate field of study: [Textbox]
Ph.D., Ed.D. or other doctoral level, please indicate field of study: [Textbox]
Professional (e.g. M.D., D.O., J.D., etc), please indicate field of study: [Textbox]
Not a degree-seeking program, please describe: [Textbox]
Other (please specify): [Textbox]

67. When do you plan to continue your education?

Within a year
Next Year (2013-14)
Two years from now (2014-15)
Three years from now (2015-16)
More than three years from now
Undecided

[SECTION G]

68. Please indicate the program(s)/course(s) in which you are created your portfolio:

69. To what extent did your MPortfolio experience influence the following aspects of your professional and/or academic development? *(Scale: 5 = To a great extent; 4 = To a moderate extent; 3 = Somewhat; 2 = Slightly; 1 = Not at all; Not applicable)*

Clarity about professional aspirations
Clarity about academic goals
Ability to speak about yourself in an interview
Ability to write an admissions essay

70. When did you last update your MPortfolio?

I continually update my MPortfolio
Within the past month
Within the past 6 months
Within the past year
Not in the past year, but since the conclusion of the course in which I created the MPortfolio
I have not looked at my MPortfolio since the conclusion of the course in which I created it

71. Please describe how you have used or plan to use what you learned through the MPortfolio process.
[Textbox]

72. Reflecting back on your experience creating an MPortfolio, how would you improve the process so that it would be more useful to you today?
[Textbox]

[SECTION H]
73. Prior to taking the ResStaff course (UC 421), how prepared were you to interact with residents from different social identities?

Very well prepared
Well prepared
Somewhat prepared
Mostly unprepared
Not at all prepared

74. After taking the ResStaff course (UC 421), how prepared were you to interact with residents from different social identities?

Very well prepared
Well prepared
Somewhat prepared
Mostly unprepared
Not at all prepared

75. To what extent did the ResStaff course prepare you to do the following:
(Scale: 5 = To a great extent; 4 = To a moderate extent; 3 = Somewhat; 2 = Slightly; 1 = Not at all; Not applicable)

Get to know every resident very well
Assist residents in getting to know each other
Assess the needs of the community
Develop activities to address the needs that have been identified
Assist residents in taking ownership of their community

76. To what extent you do engage your residents in the type of reflective practice that you learned in the ResStaff course and through the creation of your MPortfolio?

To a great extent
To a moderate extent
Somewhat
Slightly
Not at all

77. How has your philosophy about creating inclusive communities changed as a result of the ResStaff course?
[Textbox]

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