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Institutional Effectiveness in an Open System: A Case Study of Graduation Rates in the Montana University System

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INSTITUTIONAL EFFECTIVENESS IN AN OPEN SYSTEM:

A CROSS-CASE STUDY OF GRADUATION RATES IN THE MONTANA UNIVERSITY SYSTEM

By

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Abstract

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Institutional Effectiveness in an Open System: A Cross-Case Study of Graduation Rates in the Montana University System

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This is a mixed-methods, non-experimental, cross-case study designed to examine the environmental conditions that influence institutional effectiveness within one state-governed university system. The purpose of the study was to examine nationally defined graduation rates as a performance indicator of institutional effectiveness. Eleven delimited campuses in the Montana University System constituted the sample population. The quantitative analysis compared federally mandated graduation rates with graduation rates resulting from a modified graduation rate methodology. The qualitative analysis evaluated environmental conditions at each of the institutions. The cross-case analysis synthesized the quantitative and qualitative data using an open-systems framework to identify emergent patterns. Three questions guided the research: (a) How can open-system theory inform practice in evaluating effectiveness of postsecondary institutions?, (b) How do graduation rates for all students vary within one state-governed postsecondary education system, and (c) How do environmental conditions of a specific institution explain graduation rates within one state-governed postsecondary system? This study is significant because it expands the definition of who gets included in graduation rate calculations, it utilizes state-level student-unit-records data to measure disaggregated at-risk student group performance, it evaluates how graduation rates are influenced by unique environmental conditions at individual institutions, and it contributes to a national discussion regarding postsecondary productivity. Findings of the study include: (a) graduation rates were variable among institutions, (b) institutions with higher percentages of at-risk students had lower graduation rates, (c) no single identified at-risk student group consistently performed better or worse than other student groups, (d) no two institutions had the same characteristics, and (e) graduation rates by themselves did not account for differences between institutions. In conclusion, policymakers are reminded that evaluation of institutional effectiveness requires disciplined examination of interrelations and patterns within a larger open system. Graduation rates do not account for variable environmental conditions and they do not provide an adequate measure of institutional productivity, performance, or effectiveness.

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Dedication

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Chapter One – Introduction

"Not everything that can be counted counts, and not everything that counts can be counted." (Cameron, 1963, p. 13)

In his book on learning organizations, Peter Senge (2006) stated that "systems thinking is a conceptual framework, a body of knowledge and tools that has been developed over the past fifty years, to make the full [organizational] patterns clearer, and to help us see how to change them effectively" (p.7). This study utilized systems thinking as a conceptual framework to examine environmental conditions in postsecondary institutions within the Montana University System, to understand patterns of productivity, and to help policymakers assess student success and improve institutional effectiveness. Policymakers use graduation rates to assess institutional effectiveness and productivity (Kelly, 2009). This study utilized Katz and Kahn's (1978) open-system characteristics as a research framework to examine environmental conditions that affect graduation rates. The current emphasis on graduation rates is related to a national political agenda to increase postsecondary degree productivity (Lumina Foundation for Education, 2009b; Lumina Foundation, 2013; National Governor's Association, 2010; Obama, 2009a; Obama, 2009b).

Barack Obama was the first African American to be elected President of the United States of America in 2008. It was an historic event and he ran on a platform of hope and change. One of the first goals that President Obama proposed was to change the country's international ranking of educational attainment, for the United States of America to once again become a world leader in the percentage of college-educated citizens (Obama, 2009a). In his first State of the Union Address, President Obama

(2009a) stated that the United States had lost its status as one of the world's best educated nations at the same time that global competition for skilled labor had increased and he challenged America to once again produce the highest percentage of college graduates by the year 2020. The Lumina Foundation for Education (2009b), likewise, established its ambitious *Big Goal* that 60% of American adults would obtain a postsecondary degree or certificate by the year 2020. Lumina (2013) revised its Big Goal to increase the proportion of Americans with high-quality degrees, certificates, and other credentials to 60% by the year 2025 (Goal 2025). To reach Goal 2025, the United States must produce 61.5 million new credentialed adults between the ages of 25 and 65, which is 23 million more credentialed adults than is projected at current rates of degree production (Lumina Foundation, 2013).

These are not the first national calls to improve education in America. The United States' primary and secondary educational system received intense public scrutiny during the last quarter of the twentieth century, leading to federal demands for more productivity and accountability during the twenty-first century (U.S. Congress, 2002; U.S. Department of Education, 2006; Zis, Boeke, & Ewell, 2010). Beginning with *A Nation at Risk: The Imperative for Educational Reform* (National Commission on Excellence in Education, 1983), the public became more aware of the United States' loss in international preeminence in commerce, industry, science, and technological innovation. *A Nation at Risk* criticized the nation's primary and secondary schools for overly generalized curricula, low academic expectations, poor use of school time, and poor teacher preparation. Thirty years have passed since *A Nation at Risk* was published, yet the U.S. Department of Education and the Organisation for Economic Co-operation

and Development (OECD) (Aud, Wilkinson-Flicker, Kristapovich, Rathbun & Wang, 2013; Organisation for Economic Co-operation and Development, 2010; U.S. Department of Education. 2006) indicated much remains the same in the first quarter of the twenty-first century. The OECD (2010) noted that the United States is struggling to maintain international parity, much less preeminence. The No Child Left Behind Act (2001) continued the demand for greater accountability of primary and secondary schools, while the Spellings Commission (U.S. Department of Education, 2006) demanded greater accountability of postsecondary institutions. Federal and state governments have asked twenty-first century postsecondary institutions to be more productive, accountable, and cost effective (National Governor's Association, 2010; U.S. Department of Education, 2006). The public's demands for greater productivity, accountability, and cost effectiveness further challenge postsecondary institutions already stretched by a myriad of issues inherent in serving an increasingly diverse student population.

Pascarella and Terenzini (2005) characterized the majority of postsecondary enrollments throughout the twentieth century as biased by a White majority of 18- to 22-year old, undergraduate males, enrolled full-time in four-year institutions with no outside job or family obligations. Twenty-first century researchers (Bash, 2003; Bearer-Friend, 2009; Braxton, Hirshey, & McClendon, 2004; Hess, Schneider, Carey, & Kelly, 2009; Tinto, 2013) recognized this demographic was no longer the majority in America's public postsecondary systems. Numerous researchers have characterized the twenty-first century postsecondary student body as having a female majority; growing cultural, racial and ethnic diversity; more part-time enrollment; more two-year college

enrollment; more full-time employment; and more family obligations (Bash, 2003; Bearer-Friend, 2009; Braxton et al., 2004; Hess et al., 2009; Tinto, 2013). Today's student body is more socioeconomically disadvantaged, has higher need for financial aid, assumes more debt to complete a degree, and requires more support services to be successful (Bash, 2003; Bearer-Friend, 2009; Braxton et al., 2004; Hess et al., 2009; Tinto, 2013).

The number of traditional-age students is in decline and beginning, full-time students represent a growing minority of public postsecondary students (Aud et al., 2010; Aud et al., 2013; Coucil for Adult and Experiential Education, 2000). Drummond (2001) reported that nineteenth-century, public postsecondary institutions in America served traditional-age students and offered baccalaureate degrees. Greater access to postsecondary education began with the establishment of the first public two-year college in 1901 (Drummond, 2001). Two-year colleges were established to provide lower-level academic and vocational coursework (Drummond, 2001). Numbers of two-year colleges grew throughout the twentieth century and in 2008, 689,000 more undergraduates were enrolled in public two-year schools than in public four-year schools (Aud et al., 2010). Nearly two thirds (59%) of two-year enrollments in 2008 (public and private) were part-time students (Aud et al., 2010).

Data reported by the U.S. Department of Education (Aud et al., 2010, 2013) indicated the twenty-first century postsecondary student population largely comprises part-time, adult learners, yet the primary national performance indicator of postsecondary institutional success—graduation rate, as defined by the Student-Right-to-Know (SRK) and Campus Security Act (1990)—is limited to first-time, full-time

students (Cook & Pullaro, 2010). Since passage of the SRK Act, institutions eligible to receive federal financial aid under Title IV of the Higher Education Act are required to disclose SRK graduation rates to all students and prospective students. Title IV institutions are further required to submit annual reports to the Secretary of Education to be included in the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS) (Aud et al., 2010). The SRK graduation rates reported to IPEDS do not measure success rates for students who transfer from another institution or students who initially enroll in postsecondary education part time. Legislators and policymakers evaluate graduation rates to judge the effectiveness of postsecondary institutions; however, a number of researchers (Adelman, 2007; Brookfield & Holst, 2010; Cook & Pullaro, 2010; Ewell, 2009) have cautioned that SRK graduation rates are limited to a select student population and they are not representative of the entire twenty-first century student population. These researchers have further argued that SRK graduation rates should not be generalized as an appropriate measure of a twenty-first century postsecondary institution's success.

The American educational landscape changed between the twentieth and twenty-first centuries (Aud, et al., 2013; Drummond, 2001; Pascarella & Terenzini, 2005). Twenty-first century postsecondary institutions share neither a common mission nor a homogeneous student body—they face a host of external challenges and internal complexities that demand new ways of thinking and new strategies for moving forward (Pascarella & Terenzini, 2005; Tinto, 2013). Conditions in postsecondary education have changed (Bash, 2003; Bearer-Friend, 2009; Braxton et al., 2004; Hess et al., 2009; Tinto, 2013). Expectations of postsecondary education have changed (Lumina

Foundation, 2014; National Governor's Association, 2010; Obama, 2009a; U.S. Department of Education, 2006). Adelman (2007) and Tinto (2013) have advocated that modes of operation and methods of analysis must also change.

Problem Statement

The responsibility for satisfying the public's demand for more productivity and accountability, achieving the President's goal of increased college-degree completion, and fulfilling the Lumina Foundation's Goal 2025 rests largely with public postsecondary institutions in the United States. The public has a stake in establishing and expecting adherence to performance standards, yet each institution is situated in a unique milieu and is subject to a variety of inputs. To be successful in meeting expected outcomes, public postsecondary policymakers must understand the open nature of postsecondary institutions and be able to manage the relationships between external and internal environments (Katz & Kahn, 1978).

Richardson and Martinez (2009) utilized a systems approach to evaluate higher education policy in five states. Their research emphasized no two postsecondary systems have equal inputs, throughputs, and outputs. Their research also emphasized that postsecondary institutional and system performance is multifaceted (involving governance, leadership, data management, access and achievement, fiscal policies, and research and development) and influenced by numerous competing and interrelated state and federal policies. Richardson's and Martinez's research framework opposed use of a single measure of institutional productivity; however, SRK graduation rates, which are mandated by Title IV, remain the primary national productivity metric.

There were 6,742 Title IV postsecondary institutions in the United States in 2011 (U.S. Department of Education, 2011, Table 5). Public institutions comprised less than one-third (1,989) of the total, while private institutions comprised slightly more than two-thirds (4,753). Nearly two-thirds (2,944) of the private institutions were classified as for-profit. Roughly two-thirds (4,495) of all Title IV institutions offered degrees—1,721 were two-year colleges and 2,774 were four-year colleges. These data highlight the variety of Title IV institutions: public versus private, profit versus non-profit, degree granting versus workforce training, and two-year versus four-year programs. Implicit differences between these institutions include governance, mission, student body profile, tuition costs, and funding models. Other than the ability to provide federal financial aid for postsecondary education and training, few qualities are shared by all Title IV institutions.

The primary productivity measure of Title IV institutions, SRK graduation rates as reported in the NCES's IPEDS Graduation Rate Survey (GRS), measures success for a narrowly defined group of students (first time, fulltime freshmen) enrolled among highly variable institutions (public, private, profit, not-for-profit, etc.). SRK graduation rates do not include all postsecondary students and they do not account for differences among institutions. One size does not fit all in the case of postsecondary productivity. Not all institutions are similarly governed and institutions that serve larger numbers of at-risk students are at greater risk of lower productivity. Richardson and Martinez (2009) demonstrated there is a need to evaluate institutional productivity and performance in a way that accounts for variable external inputs, focuses on the quality of local inputs, and differentiates unique throughputs. Their research also demonstrated a

need to evaluate postsecondary institutional effectiveness in a framework that minimizes external governance factors and acknowledges the open-system dynamics occurring at individual institutions. An open-systems approach minimizes reliance on a single measure of productivity and considers effectiveness as the result of a variety of environmental conditions that are unique to each institution.

William Cameron (1963), a sociologist, once stated, “not everything that can be counted counts, and not everything that counts can be counted” (p. 13). Peter Ewell (1984), a postsecondary researcher, cautioned institutions to choose carefully the correct units of measurement for assessment and productivity, warning that improperly chosen measures could be misused. Cameron’s and Ewell’s warnings predated twenty-first century concerns about institutional effectiveness, yet they portended the salient issue in the debate over appropriate postsecondary productivity metrics (Cook & Pullaro, 2010; Garcia & L’Orange, 2010). As states raise performance standards to increase productivity and simultaneously utilize fund allocation models to reduce overall support and reward productivity, it is important to heed Cameron’s and Ewell’s council, to know what to count and to choose carefully the correct unit of measurement. Failure to define and measure what counts in postsecondary educational institutions runs a high risk of resulting in poor public perceptions of quality and performance leading to falsely negative academic reputations and financial penalties. A major factor in this problem is that SRK graduation rates are a narrowly defined productivity metric—they do not account for institutional differences and they should not be generalized as an appropriate measure of institutional effectiveness (Adelman, 2007; Ewell, 2009).

Purpose of the Study

This mixed-method, non-experimental, cross-case study is concerned with assessing institutional effectiveness in one unified state-governed postsecondary system, the Montana University System. The purpose of this study will be to examine nationally defined graduation rates as one of several indicators of institutional effectiveness in twenty-first century, public, postsecondary institutions in Montana. This study differentiates between institutional performance, productivity, and efficiency in an attempt to better understand and define appropriate measures of postsecondary institutional effectiveness. The selection of a single unified postsecondary system is important because it illustrates how one governance body is positioned to allocate state funds based on a single productivity metric rather than multiple performance, productivity, and effectiveness metrics representative of institutional effectiveness.

Research Questions

The General Research Question posed by this study was: How can open-systems theory inform practice in evaluating effectiveness of postsecondary institutions? A mixed-methods design was utilized to address two overarching questions—the Quantitative Research Question framed the quantitative portion of the study and the Central Research Question framed the qualitative portion of the study. The Quantitative Research Question was: How do graduation rates for all students (fulltime, part-time, beginning, and transfers) vary within one state-governed postsecondary education system? The Central Research Question was: How do environmental conditions of a specific institution explain graduation rates?

Definition of Terms

For the purpose of this study, the following terms are defined.

Adult student. Student older than 24 years (≥25 years) (Bash, 2003; CAEL 2008; Knowles, 1984).

Adelman's method. Clifford Adelman's (Adelman, 2007) proposal to change the Student-Right-to-Know (SRK) graduation rate reported to Integrated Postsecondary Education Data System Graduation Rate Survey (IPEDS GRS) by redefining a beginning postsecondary cohort, breaking down cohort groups by age and enrollment status, and extending the expected percent-period-to-graduation.

At-risk students. Berkner, He, and Cataldi (2003), Engle and Tinto (2008), Horn (1996), and Horn and Premo (1995) identified a number of factors that hinder student success and place students at risk for not completing a postsecondary degree—gender, minority status, disability, delay of entry to postsecondary education after high school, attending part-time, working fulltime while enrolled, residing off-campus, having financial independence from parents, having dependent children, and having a general equivalency diploma (GED). For the purposes of this study, at-risk students are delimited based on age (>24), gender, and minority status.

Beginning student. Any student that entered an institution at any time during an academic year and enrolled in six or more credits during their first-term of enrollment (Adelman, 2007).

Council for Adult and Experiential Learning (CAEL). A non-profit organization established to enhance learning opportunities for adults (CAEL, 2014).

Board of Regents (BoR). A seven-member board authorized in Section 9 of the 1972 Montana State Constitution to govern and control public higher education (State of Montana, 2011).

Environmental conditions. Kinds of internal and external relationships existing between an organization and its world (Katz & Kahn, 1978, p. 124).

Equifinality. An open-systems principle that a system can reach the same final state from differing initial conditions and by a number of paths (Von Bertalanffy, 1956).

Fulltime enrollment. Total credit load equal to at least 75% of the normal fulltime course load (Aud, et al., 2010).

GR150. Graduation rate for students in a cohort who complete within 150% of normal time (three years for a 2-year associate degree, six years for a 4-year baccalaureate degree) (National Center for Education Statistics, 2013).

GR200. Graduation rate for student in a cohort who complete within 200% of normal time. In 2009, Title IV institutions were required to begin reporting the number of students in a cohort who completed within 200% of normal time (four years for a 2-year associate degree, eight years for a 4-year baccalaureate degree) (National Center for Education Statistics, 2009).

Hispanic. A person of Cuban, Mexican, Puerto Rican, South or Central American or other Spanish culture or origin, regardless of race (Aud, et al., 2010; National Center for Education Statistics, 2013).

Integrated Postsecondary Data System–Graduation Rate Survey (IPEDS GRS). Postsecondary graduation rates reported to the National Center for Education Statistics (NCES) as mandated and defined by the Student-Right-to-Know Act. The IPEDS was developed in 1986 and it included annual institution-level data collections. All postsecondary institutions that have a Program Participation Agreement (PPA) with the Office of Postsecondary Education (OPE), U.S. Department of Education (throughout IPEDS referred to as "Title IV") are required to report data using a web-based data collection system. IPEDS currently consists of the following components: Institutional Characteristics (IC); 12-month Enrollment (E12); Completions (C); Human Resources (HR) composed of Employees by Assigned Position (EAP), Fall Staff (S), and Salaries (SA); Fall Enrollment (EF); Graduation Rates (GRS); Finance (F); and Student Financial Aid (SFA) (National Center for Education Statistics, 2013)

Montana University System (MUS). The MUS was created in 1994 when the BoR restructured the state's public postsecondary education campuses into a two branch campus model based on the recommendations of Interim Commissioner Jeffrey Baker (Baker, 1993).

MUS Data Warehouse. The Montana University System's digital repository of student unit records.

Part-time enrollment. Total credit load is less than 75% of the normal full-time credit load (Aud, et al., 2010).

Percent-period-to-graduation. The expected time for completion of an undergraduate degree. The expected time for degree completion following the IPEDS-GRS method is 150% and 200% (National Center for Education Statistics, 2009).

Postsecondary degree. Any undergraduate certificate or degree (associate or baccalaureate) that is designed primarily for students who are beyond the compulsory age for high school (Aud et al. 2010).

Productivity. Measure of an institution's performance especially as it relates to the allocation of financial resources (Kelly, 2009).

Student-Right-to-Know (SRK) graduation rates. Number of students entering the institution as first-time, fulltime degree/certificate-seeking undergraduate students during a particular fall term (cohort) and completing their program within 150% of the normal time to degree completion (e.g., three years for a two-year program, six years for a four-year program).

Student unit record (SUR). Comprehensive record of a student's information and progress in postsecondary education. SUR data is collected at the institutional level and typically reported to a comprehensive state-level database (Garcia & L'Orange, 2010).

Title IV institution. An institution that has a written Program Participation Agreement (PPA) with the Secretary of Education that allows the institution to participate in any of the Title IV federal student financial assistance programs (Aud et al., 2010; National Center for Education Statistics, 2013).

Traditional student. First-time, fulltime postsecondary student from 18- to 24-years of age (CAEL, 2008).

TRiO. A group of federal outreach and student service programs designed to identify and provide services for individuals from disadvantaged backgrounds. TRiO includes eight programs targeted to serve and assist low-income individuals, first-generation college students, and individuals with disabilities. The goal of all TRiO programs is to increase postsecondary success and degree attainment of disadvantaged students (U.S. Department of Education, 2014).

Twenty-first century student body. Represents the complexity of modern postsecondary institutions and includes higher percentages of part-time, ethnic, racial, and at-risk students (Aud et al., 2013; Cook & Pullaro, 2010; Engle & Tinto, 2008)

White. A person having origins in any of the original peoples of Europe, North Africa or the Middle East (Aud et al., 2010; National Center for Education Statistics, 2013).

Delimitations

This study examined SUR data from one cohort year of students enrolled in one state-governed postsecondary educational system, the Montana University System (MUS) during the 2001-2002 academic year. The MUS included all public, two- and four-year institutions in Montana; it did not include tribal colleges. Montana's seven tribal colleges are independently chartered and governed by sovereign American Indian tribes. Currently the MUS includes 16 campuses; however, this study was delimited to 11 campuses. Two of the currently recognized campuses (Bitterroot and Gallatin) did not exist in 2001 and Montana's three legislatively authorized community colleges (Dawson, Flathead Valley, and Miles) were not required to report full SUR data sets to the MUS Data Warehouse in 2001. IPEDS-GRS data were available for the three

community colleges, but the MUS Data Warehouse did not include the data elements necessary for inclusion in this study. Therefore, Dawson, Flathead Valley, and Miles Community Colleges were not included.

This study was delimited to examination of one cohort year of beginning postsecondary students enrolled in 11 MUS campuses. The 11 campus cohort was further delimited to all beginning students enrolled in six or more credits during the 2001-2002 academic year. The 2001-2002 cohort was selected because it was the first cohort in the MUS Data Warehouse that included reliable and comparable longitudinal data from a majority of MUS institutions (T. Trevor, personal communication, April, 27, 2011). The 2001-2002 cohort was also selected because it allowed for a longer percent-period-to-graduation to track student success.

For the purpose of this study at-risk students were delimited by age, gender, and minority status.

Limitations

This is a mixed-method, cross-case study of one state-governed postsecondary system. There are many factors that influence postsecondary student success and the limited number of MUS campuses to be studied precluded a statistical analysis of influencing variables. The MUS Data Warehouse did not include information on additional risk factors such as income, disabilities, employment status, having dependent children, or having a general equivalency diploma. OCHE did not require graduation rates for part-time students to be tracked in the MUS Data Warehouse. Katz and Kahn's (1978) open-systems characteristics were utilized as a research framework and guided

the quantitative and qualitative data collection efforts. Research frameworks that analyze different characteristics might yield different results.

Significance of Study

The significance of this research is tied to national discussions that propose to modify state-funding models to reward performance outcomes (primarily graduation rates of a narrowly defined population) rather than system inputs (e.g., enrollment and student credit hour production) (Bearer-Friend, 2009; Kelly P. J., 2009; U.S. Department of Education, 2006). The Spellings Commission advocated that twenty-first century, postsecondary institutions must learn to compete on the basis of performance not reputation (U.S. Department of Education, 2006). Additionally, the National Governor's Association (2010) advocated for, and numerous states have pursued, funding models that provide financial reward for meeting predetermined educational outcomes (Georgia, Minnesota, Tennessee, & Washington). Future state funding may not be wholly tied to how many students enroll or how many credit hours are generated for fall term; future state funding may be tied to how many students graduate within a specific period of time. If the timeframe for graduation is not realistic for a majority of the student population, a fundamental performance indicator of institutional effectiveness will not be appropriately defined. Additionally, the current low graduation rates imply failure of public postsecondary institutions to achieve a basic public good—not purely to educate, but to award degrees of accomplishment and completion. Financial penalty could be the consequence of lower than expected performance (Bearer-Friend, 2009; Kelly & Jones, 2005; Kelly, 2009; U.S. Department of Education, 2006).

This research followed the recommendations from a growing body of research performed on national postsecondary databases that concludes that more, state-level analyses of student unit records (SURs) are warranted to understand institutional effectiveness (Adelman, 2007; Bearer-Friend, 2009; Bowen, Chingos, & McPherson, 2009; Cook & Pullaro, 2010; Garcia & L'Orange, 2010; Kelly P. J., 2009; National Governor's Association, 2010; U.S. Department of Education, 2006). These researchers recognized that no two state-level SUR systems were developed under the same political conditions nor do they share similar data definitions. Cook and Pullaro (2010) pointed out that no single national database can be used to measure the overall effectiveness of postsecondary institutions and that state-to-state correlation of SUR data is not possible. Cook and Pullaro further pointed out that it is difficult to link state-level data, because there is no way to aggregate data from multiple state databases into one national database, and although national databases are useful for their intended purposes they should be used with care.

As an example, Cook and Pullaro (2010) pointed out that the federally mandated IPEDS GRS excludes nearly 50% of students enrolled in postsecondary institutions in the United States, because it excludes part-time and transfer students. The IPEDS GRS also does not include student income data. The National Student Clearinghouse (Clearinghouse) includes 93% of postsecondary institutions, but the Clearinghouse is a non-federal, independent, nonprofit organization, its membership is voluntary, its data are not public, and members must subscribe to more than one of its services to calculate graduation rates (Cook & Pullaro, 2010). Cook and Pullaro emphasized the national-level databases were designed for different purposes and none fully addresses

institutional mission, state governance structures, student demographics, or institutional policies.

The selection of Montana's state-governed postsecondary system is of interest for its instrumental value. As an instrumental case, it contributes to an emerging body of research (Cook & Pullaro, 2010; Garcia & L'Orange, 2010) related to the national completion agenda and the use of state-level data to evaluate postsecondary performance, productivity, and efficiency.

This research is significant because it expands on the definition of who gets included in graduation rate calculations and how graduation rates are influenced by unique environmental conditions at individual campuses. The results might contribute to a more nuanced understanding of institutional effectiveness and to recognition of institutional strengths. The research findings could result in changing funding formulas to reward institutional effectiveness.

Summary

This study aims to evaluate graduation rates from multiple institutions in one SUR system and to consider the environmental conditions that influence institutional effectiveness. Reasons for conducting the research are related to state and federal pressures to increase degree production (Lumina Foundation, 2013; Obama 2009a), to require greater institutional accountability (National Governor's Association, 2010; U.S. Department of Education, 2006), and to utilize SRK graduation rates as the primary performance and productivity metric (Cook & Pullaro, 2010; Ewell, 2009; National Governor's Association, 2010). The problem is that SRK graduation rates are a narrowly defined metric—they do not account for institutional differences, and they

should not be generalized as an appropriate measure of postsecondary institutional effectiveness (Adelman, 2007; Ewell, 2009).

The purpose of this study was to examine nationally defined graduation rates as one of several indicators of institutional effectiveness in twenty-first century, public postsecondary institutions in Montana. By conducting an in-depth analysis of individual campuses and a cross-case analysis of multiple institutions in one postsecondary system, postsecondary institutions, policymakers, and citizens will gain insight on the value of SRK graduation rates as a limited measure of productivity—not as a generalizable measure of institutional effectiveness. This research is significant because the findings might influence policymakers to financially reward institutional efficiency.

Chapter Two –Review of Related Literature

This research is concerned with examining the environmental characteristics of postsecondary institutions to evaluate the utility of using graduation rates to assess institutional effectiveness. Numerous researchers (Dugan & Hernon, 2006; Katz & Kahn, 1978; Ewell, 2009; National Governor's Association, 2010; Richardson & Martinez, 2009) have recognized that postsecondary institutions operate in open-systems environments that are subject to global, national, and state influences. Postsecondary policymakers are expected to be knowledgeable of and responsive to these environmental conditions (National Governor's Association, 2010; Richardson & Martinez, 2009). This literature review establishes the foundation for understanding open-system theory and systems thinking; understanding the environmental conditions influencing postsecondary education at global, national, and state levels; understanding subtleties of the national degree productivity and institutional performance agendas; while considering the leadership implications for twenty-first century postsecondary policymakers.

Open-System Theory and Systems Thinking

In 1950, Ludwig von Bertalanffy, a biologist, introduced general systems theory in his *Science* article, "The Theory of Open Systems in Physics and Biology". Von Bertalanffy (1950, 1956) applied his general systems theory to biological and physical systems. Katz and Kahn (1978), both social psychologists, subsequently recognized social organizations as open systems and cited von Bertalanffy's general systems theory as a forerunner to their open system theory. Katz and Kahn's (1978) open-system theory evolved from general system theory (von Bertalanffy, 1956), classic organizational

theory (Taylor, 1923; Weber, 1947), and sociopolitical group theory (Mayo, 1933). Taylor and Weber first described organizations as closed systems, which could be methodically managed and controlled to obtain optimal output without influence from outside the organization. Mayo recognized the transactional influences working within an organization—the power that small groups of organized workers could wield to manage and control output. Parsons (1960) and Allport (1954, 1967, 1962) expanded on the closed-system theories by focusing on the subsystems of an organization and the patterns of organizational behavior resulting from cyclical events. The closed-system theorists did not concern themselves with external transactions.

Katz and Kahn (1978) and other organizational theorists (Schein, 2004; Senge, 2006) viewed social structures using a systems approach and criticized closed-system theories for failing to recognize an organization's dependence on inputs from its external environment. The open-system theorists characterized organizational systems by their interconnected parts that are constantly influenced by internal and external forces. Katz and Kahn's open-system theory emphasized the close relationship between a social structure or organization and its supporting environment. Their open-system theory also recognized that systems are in a constant state of flux as a result of variable transactional inputs, throughputs, and outputs. Katz and Kahn emphasized it is critical when studying an organizational system to understand the nature of its environment and that much of organizational behavior becomes unexplainable if inputs are treated as constants.

Katz and Kahn (1978, pp. 23-30) identified ten common characteristics of open systems. These common characteristics include:

1. Importation of energy or primary inputs to the system – there are different qualities of inputs in different systems.
2. The throughput – transforms inputs via some process.
3. The output – the end product of transformed inputs.
4. Systems as cycles of events – patterns of recurring energy exchange.
5. Negative entropy – the accumulation of reserves to safeguard a system from running down.
6. Information input, negative feedback, and the coding process – how a system processes incoming information to make corrections.
7. The steady state and dynamic homeostasis – preservation of the character or qualitative aspects of a system.
8. Differentiation – the growing complexity and specialized functions of a system.
9. Integration and coordination – orderly and systematic articulation of functions achieved through priority setting, policy development, scheduling, etc.
10. Equifinality – equal end state from multiple starting points and internal pathways.

Katz and Kahn's (1978) common characteristics are useful for defining an open system and for categorizing its influencing environmental conditions. The common characteristics are also useful for understanding the unique environmental conditions

that shape organizational culture and leadership. Katz and Kahn connected environmental conditions to leadership by stating:

> . . . if leadership is a boundary function, the relationship between a leader and his followers will depend to a major extent on the leader's capacity to manage the relationships between the external and internal environments in a way that will allow his followers to perform their primary task. (pp. 532-533)

Other open system theorists have connected leadership to management of external and internal environmental conditions using slightly different terminology. Schein (2004) viewed environment in the context of culture. Kotter and Rathgeber (2005) viewed environment in the context of climate. Schein connected organizational culture to the pattern of shared basic assumptions that was learned by a group as it solved its problems of external adaptation and internal integration. The following paragraph is a Schein (2004) quote with Katz and Kahn's and Kotter's and Rathgeber's terms interchangeably listed in brackets.

> The only thing of real importance that leaders do is to create and manage culture [climate, environmental conditions]; that the unique talent of leaders is their ability to understand and work with culture [climate, environmental conditions]; and that it is an ultimate act of leadership to destroy culture [climate, environmental conditions] when it is viewed as dysfunctional. . . If one wishes to distinguish leadership from management or administration, one can argue that leadership creates and changes cultures [climate, environmental conditions], while management and administration act within a culture [climate, environmental conditions]. (Organizational culture and leadership, p. 11)

Open system theory evolved from considering organizations as easily manipulated simple systems (Taylor, 1923) to considering them as highly structured social systems with unique cultures resulting from complex and dynamic internal and external conditions (Schein, 2004). It is the intertwined concepts of open system theory, organizational culture, and leadership that culminated in Senge's (2006) fifth discipline—the discipline of systems thinking. Senge described systems thinking as a discipline for seeing wholes by examining interrelationships and patterns rather than things, and for developing a sensibility for subtle interconnections that give systems unique character. Senge further described systems thinking as a discipline for leaders to identify structural elements that underlie complex situations, thereby providing them with new tools to rethink problems and find new solutions. Consistent with Schein's view of open systems as highly structured social systems, the following section examines some of the complex and dynamic internal and external conditions effecting postsecondary educational systems.

Environmental Conditions

Katz and Kahn (1978) pointed out that postsecondary educational systems are subject to a myriad of environmental conditions that influence how they operate. This section addresses some of the unique global, national, and state conditions that influence American postsecondary educational systems. Consideration of the interrelationship between these environments facilitates a systems-thinking approach (Senge, 2006).

Global. The Organisation for Economic Co-operation and Development (OCED) was established in 1961 to promote policies that improve the economic and social well-being of people around the world. The OECD tracks data to understand

global trends and help governments seek solutions to common problems. Since 1998, the OECD has summarized education statistics for OECD member counties and other leading G20 countries in its annual report, *Education at a Glance* (Organisation for Economic Co-operation and Development, 2013). Adult attainment of tertiary education in the United States for the years 1999, 2002, 2005, 2008 and 2011 are summarized in Table 1. These longitudinal data indicate an increase in the percentage of Americans who complete some form of postsecondary education; however, they also indicate a decrease in global ranking for the percentage of Americans who complete some form of postsecondary education.

Table 1.

Percent of Adult Tertiary Educational Attainment in the United States and Global Ranking

	Total Adult Population		25-34 Year Olds		55-64 Year Olds	
Year	%	Rank	%	Rank	%	Rank
1999	35	3	38	3[a]	28	2[b]
2002	38	3	40	4[c]	33	2
2005	39	5	39	10[d]	37	3
2008	41	5	42	12	40	3
2011	42	5	43	10[e]	41	4

Note. [a]Tied with two countries. [b]Tied with one country. [c]Tied with two countries. [d]Tied with one country. [e]Tied with two other countries for 10th place. (Organisation for Economic Co-operation and Development, 2001, 2004, 2007, 2010, 2013)

In 1999, the United States ranked 3rd among OECD countries for the proportion of its total adult population that had attained a tertiary degree (35%) (Organisation for Economic Co-operation and Development, 2001). In 2011, the United States ranked 5th

among OECD countries for the proportion of its total adult population that had attained a tertiary degree even though the percentage had increased to 42 (Organisation for Economic Co-operation and Development, 2013). Closer examination of disaggregated attainment data for 25-34 year olds and 55-64 year olds revealed the same trends—an increase in the percentage of American adults completing tertiary degrees and a decrease in global ranking. Korea, Japan, Canada, and the Russian Federation were ranked the highest in 2011. President Obama (2009a) expressed concern that the United States had lost its status as one of the world's best educated nations at the same time that global competition had continued to increase for skilled labor. The President's concerns were reinforced by the OECD's (2013) arguments that nations need a skilled and educated workforce to be globally competitive.

The loss in global rank has resulted in a national environment that demands greater productivity from American postsecondary institutions (Lumina Foundation, 2013; Obama, 2009a; U.S. Department of Education, 2006). The following section addresses the national environmental conditions affecting public postsecondary institutions.

National. In his first address to a joint session of congress, President Barack Obama (2009a) stated, "In a global economy where the most valuable skill you can sell is your knowledge, a good education is no longer just a pathway to opportunity—it is a prerequisite." President Obama acknowledged that America had one of the highest high school dropout rates of any industrialized nation. *The Obama Education Plan* (Educational Projects in Education, 2009) raised the issue that "only 70% of U.S. high school students graduate with a diploma" (p. 100). The U.S. Department of Education

reported that 8% of 16-24 year olds in 2008 had dropped out of high school (Aud et al., 2010), The Lumina Foundation for Education (2009a) found fewer than half of students who begin college ever finish. In spite of these facts, President Obama articulated a goal that America will once again have the highest proportion of college graduates in the world by the year 2020. To do so, Bowen et al. (2009) projected the United States must radically increase degree production among racial and ethnic minorities. Bowen et al. emphasized the challenge of achieving a higher percentage of college graduates is mired in the social, political, and economic disparities of race and ethnicity.

Between 1988 and 2008, the percentage of White public-school children decreased from 68 to 55 and the percentage of Hispanic public-school children increased from 11 to 22 (Aud et al., 2010). Whereas the total U.S. population is projected to increase by 56% from 2010 to 2050 (U.S. Census Bureau, 2008), the White population increase (42%) is much less than the minority population increase. The Hispanic population is projected to increase 273% from 2010 to 2050 (U.S. Census Bureau, 2008). Bowen et al. (2009) projected racial minorities will outnumber non-Hispanic whites by the year 2042. High school completion and college enrollment rates for Blacks, Hispanics, and Whites have increased since 1985; however, the percentage of high school graduates who immediately enroll in college is highest for White students (72% in 2008). The percentage of Black and Hispanic high school completers enrolling in college in 2008 was 56 and 64, respectively (Aud et al., 2010). Enrollment rates translate to completion rates and completion rates translate to jobs and higher salaries. In 2008, 36% of White women and 30% of White men who entered a bachelor's program completed the degree by age 26 (Bowen et al., 2009). Twenty-two percent of

Black women and 13% of Hispanic women completed the degree by age 26; only 11% to 12% of Black and Hispanic men completed the degree by age 26 (Bowen et al., 2009, p. 8). The National Governor's Association (2010) projected 74% of jobs in 2014 will require a postsecondary certificate or degree. The average income for someone employed full-time with a bachelor's degree is 65% higher than someone employed full-time with a high school diploma (Bureau of Labor Statistics, 2008).

In 1990, minority students accounted for 23% of college enrollment (U.S. Department of Education, 2010). Postsecondary enrollment of minority students in 2008 was 37% (Aud et al., 2010, p. 116). Forty-five percent of Whites ages 25 to 29 in 2009 had earned an associate's degree or higher, compared to 25% of African-Americans and 18% of Hispanics (Lumina Foundation, 2013, p. 4) . Minority student enrollments are increasing and are projected to represent the majority of postsecondary enrollments by 2042 (Bowen et al., 2009, pp. 8-9), but minority student achievement remains low (Radford, Berkner, Wheeless, & Shepherd, 2010, p. 8; Bowen et al., 2009, pp. 29-31). High school graduates (Class of 1992) from high-income and educated families completed college at a higher rate than students from low-income and poorly educated families—64% versus 9%, respectively (Bowen et al., 2009).

President Obama (2009a, 2009b) has repeatedly articulated the goal of America achieving the highest proportion of college graduates in the world by the year 2020. In 2011, the United States ranked fifth with 42% tertiary educational attainment for adults between 25 and 64 years as compared to the Russian Federation that ranked number one with 53% tertiary educational attainment for adults between 25 and 64 years (Organisation for Economic Co-operation and Development, 2013). The Lumina

Foundation for Education (2013) announced its goal of increasing the percentage of Americans with high-quality degrees and credentials to 60% by the year 2025 (60/25 goal). Although similar to the President's goal, Lumina's 60/25 goal is more quantifiable. Lumina's goal equates to 64 million degrees over 16 years—16 million more than the 48 million projected in 2008. Degree granting institutions awarded 2.4 million associate and bachelor degrees in 2008 (Aud et al., 2010). Lumina has projected annual postsecondary degree production in the United States needs to nearly double from 2008 productivity levels to 4 million per year to meet the 60/25 goal (Lumina, 2013). To achieve the shared goal of increased postsecondary degree attainment, Lumina, the U.S. Department of Education, and others (CAEL, 2000; Kelly, 2009; Zis et al., 2010), have prioritized funding on educational access, availability, and student success. As a result, more students are pursuing a postsecondary education and the national postsecondary educational environment is more complex. The following subsections expand on these complexities by addressing access, availability and student success; postsecondary goals; the changing twenty-first century student body profile; and the national accountability agenda.

Access, availability and student success. The United States government has done much to increase access to postsecondary education. In 1944, President Franklin D. Roosevelt signed the Serviceman's Readjustment Act, entitling World War II veterans to grants for school and college tuition, low-interest mortgage and small-business loans, job training, hiring privileges, and unemployment payments—it was the nation's first GI Bill. In 1984, the Montgomery Bill extended educational benefits to soldiers honorably discharged during peace times. Subsequent legislation resulting in

broader access to postsecondary education included the Civil Rights Act of 1964 (anti race, religion, and gender discrimination), the Higher Education Authorization Act of 1965 (authorizing federal financial aid and educational opportunities programs such as TRiO), and the Americans with Disabilities (ADA) and Individuals with Disabilities Education Acts (IDEA) of 1990 (ADA and IDEA mandate antidiscrimination of persons with disabilities and right to access services). The Development, Relief and Education of Alien Minors (DREAM) Act, first introduced in the Senate in 2001 and never ratified, further promised to increase postsecondary enrollments by providing citizenship to undocumented youth who completed a postsecondary degree or served for two-years in the U.S. military. The Serviceman Readjustment Act, Montgomery Bill, Civil Rights Act, Higher Education Authorization Act, Americans with Disabilities Act, Individuals with Disabilities Act and the DREAM Act exemplify federal efforts to promote postsecondary enrollment of veterans, racial and ethnic minorities, and persons with disabilities.

In 2008, the CAEL and the National Center for Higher Education Management Systems, published a report on adult learners in the United States. The CAEL and the National Center for Higher Education Management Systems recognized that twenty-first century students enjoyed increased access to postsecondary education; however, affordability and course and program availability remained barriers for many adult students. It was not always possible for students to attend face-to-face classes either because a postsecondary institution was not close enough to attend or because classes were not offered at convenient times. Emerging technologies have improved course and program availability. Students now attend classes anywhere and anytime via web-based,

distance technologies (e.g., massive open online courses (MOOCs) and web-based learning management systems). It is now possible for students to complete online degree programs without ever having to attend a face-to-face course (Durrance, Maggio, & Martin, 2010).

More students are enrolled in postsecondary education than ever before, but fewer than half who start will finish with a degree (Hanford, 2011). Increased access and availability do not correlate with achievement (Pascarella & Terenzini, 2005; Zhang, 2008). Student success remains a challenge for postsecondary institutions. In his seminal book on student retention, Tinto (1993) found retention was especially challenging for public, two-year institutions where first-year attrition of beginning full-time students may reach as high as 50%. Tinto (2013) reported similar attrition rates for four-year students and found that 67% of students who leave postsecondary education do so within the first two years. Kuh, Kinzie, Schuh, and Whitt (2005) advocated that student success and institutional productivity improve as postsecondary institutions address student needs and create conditions that matter for student engagement. In other words, Kuh et al. (2005), recognized that student success is related to the environmental conditions that exist at institutions. How an institution supports the conditions that matter has direct bearing on the success of its students (Braxton et al., 2004; Kuh et al., 2005; Seidman, 2005).

Postsecondary goals. As discussed in Chapter One, the national degree completion agenda (Lumina Foundation, 2013; National Governor's Association, 2010; Obama, 2009a) demands greater productivity from all postsecondary institutions but the primary national productivity standard (SRK graduation rate) measures success of a

narrowly defined student population (first time, fulltime freshmen) among highly variable institutions (public, private, profit, not-for-profit, etc.). Productivity metrics are standardized, but the institutions and the individuals that they serve are not (Aud et al., 2013).

Many researchers have argued that education is about self-realization—to develop "an ideal self" (Csikszentmihalyi, 1993), to become self-actualized (Maslow, 1943), to live a more authentic and creative life (Brookfield & Holst, 2010). Brookfield and Holst (2010) argued that the practical goals in postmodern America are more complicated than an individual's self-improvement; they argued that education should create a more just world. Brookfield and Holst further argued the reality of who gets educated, why, how, and at what cost is based on local, state, and national politics, which have been driven by the economic and social considerations of dominant White culture. Engle and Tinto (2008) promoted higher earning potential, better health, and longevity as benefits of a higher education and cautioned increased poverty, sickness, and premature death as consequences of being under-educated.

Brookfield and Holst (2010) argued that education in America is designed to advance a political, capitalistic democracy not an economic, socialist democracy. Politicians and education advocacy groups promote postsecondary education as the fuel of the American economy—essential to producing trained and highly skilled workers. Remember President Obama's (2009a) comment quoted in Chapter One, "In a global economy where the most valuable skill you can sell is your knowledge, a good education is no longer just a pathway to opportunity—it is a prerequisite." Additionally, the Lumina Foundation for Education (2004) and the Bill and Melinda Gates Foundation,

two of the nation's largest private funders of education, argued that investment in student success yields economic growth. Lumina (2004) further cited a 5 to 15% increase in economic growth resulting from increasing countries average level of education by one year; a three to one return on taxpayer dollars invested in community colleges (tax dollar yield); and a 60% increase in employment opportunities for persons with some postsecondary education/training. All of these are economic arguments and they are underscored by a twentieth century industrial view of education. Brookfield and Host (2010) argued that postsecondary education is the country's economic engine—it is organized and resourced to privilege established political, capitalistic interests. To dismantle these privileged interests, Brookfield and Holst advocated that education must recognize economic and social inequalities, confront racism, and place diversity at its core.

The DREAM Act, which has yet to be ratified by the U.S. Congress, would come close by providing citizenship to undocumented youth if they completed a postsecondary degree or served for two-years in the military. To qualify, DREAM applicants would have to document entry into the country before age 16, pass a background check, graduate from high school, and have no criminal record. Naylor (2010), a reporter for National Public Radio, argued that these individuals would make ideal citizens and quoted Frank Sharry, director of America's Voice, as saying, "All they want to do is to live the American dream, so that they can contribute to a nation that they call home." Naylor further reported that the DREAM Act faced strong opposition in the U.S. Senate from those calling it an amnesty bill. The opponents argued that the net effect of such legislation would take jobs away from citizens. DREAM Act opposition is based on

preserving an economic, social privilege of citizenship not on promoting a democracy where economic and social opportunity is distributed for the common good (Brookfield & Holst, 2010).

Charged with increasing degree production, developing a skilled workforce, and creating opportunity for all, public postsecondary institutions are in the cross-hairs of competing political, economic, social, and educational goals (Bowen et al., 2009; Brookfield & Holst, 2010; Lumina Foundation, 2013; Naylor, 2010). The resulting environment contributes to mixed messages on who is served, who is tracked, what are appropriate goals, what constitutes success, and how public postsecondary institutional productivity should be evaluated and rewarded.

Twenty-first century student. The demographics of postsecondary institutions in the United States changed radically during the last quarter of the twentieth century. Students are more racially, ethnically and gender diverse; older; less affluent; and more socioeconomically at-risk (Aud et al., 2010, 2013; CAEL & National Center for Higher Education Management Systems, 2008; Bash, 2003; Levin, Montero-Hernandez, & Cerven, 2010; Engle & Tinto, 2008). A discussion of shifting race, gender, age, socioeconomic status, risk factors, and needs follows.

Race/ethnicity. Between 1988 and 2008, the number of White public-school children decreased from 68% to 55% and the number of Hispanic public-school children increased from 11% to 22% (Aud et al., 2010). Similarly, population projections from 2008 to 2050 showed a 42% increase in Whites and a 273% increase in Hispanics (U.S. Census, 2008). The rapidly changing student profile is evident in Table 2, which shows a declining White majority and increasing Black and Hispanic minorities in all

postsecondary sectors from 2008 to 2010. Racial minorities are projected to outnumber non-Hispanic whites by the year 2042 (Bowen et al., 2009). This shift in demographics has and will continue to affect the national postsecondary student profile (Aud et al., 2010; Bowen et al., 2009; U.S. Census, 2008).

Table 2.

Percent Distribution of National Fall 2008 and Fall 2010 Enrollment In Degree-Granting Institutions by Race/Ethnicity

Race/Ethnicity	Public 2-Year		Public 4-Year		Public and Private	
	2008	2010	2008	2010	2008	2010
White	59	57	67	64	63	60
Black	14	15	11	12	14	15
Hispanic	17	18	10	12	12	14
Asian/Pacific Islander	7	6	7	6	7	6
Native American	1	1	1	1	1	1

(Aud et al., 2010, pp. 116-117; Aud et al., 2012, p. 250)

Gender. Female enrollment in postsecondary education grew faster than male enrollment from 1988 to 2008 (Aud et al., 2010). The number of females enrolled in undergraduate postsecondary education surpassed the number of males in 1978 and continues to increase. Females accounted for 57% of undergraduate enrollments between 2008 (Aud, et al., 2010) and 2011 (Aud et al., 2013).

Age and enrollment status. A traditional postsecondary student in the twentieth century was 18- to 20-years old, financially dependent on parents, enrolled in college fulltime, and living on campus (Pascarella & Terenzini, 2005; Stokes, 2006). Fewer

than 16% of twenty-first century postsecondary students in the United States fit that description (Stokes, 2006). At the turn of the twenty-first century, Bash (2003) found that 51% of postsecondary enrollments were older than 25 years. Bash further attributed a declining number if fulltime students to a growing number of older students. Bash (2003) and Bearer-Friend (2009) found that full-time enrollment decreases as age increases. Bearer-Friend further found that the number of part-time students is higher in two-year colleges. Nearly 60% of students attending two-year colleges are enrolled part time and 21% of students attending four-year colleges are enrolled part time (Bearer-Friend, 2009).

Table 3 shows the percent distribution of undergraduate enrollments by age and enrollment status in two- and four-year institutions for fall 2011 (Aud, et al., 2013). The highest percentage of fulltime, undergraduate students enrolled in two–year institutions were of traditional age (77%); the highest percentage of fulltime, undergraduate students enrolled in four-year public institutions were of traditional age (88%). Only 12% of fulltime students who enrolled in public, four-year institutions were 25 or older; 20% of fulltime students in public, two-year institutions were 25 or older. Older students comprise a larger percentage of part-time students enrolling in public institutions. Forty-eight percent of part-time, undergraduate students enrolled in public two-year institutions in fall 2011 were 25 years or older. Fifty percent of part-time, undergraduate students who enrolled in public four-year institutions in fall 2011 were 25 years or older.

Table 3.

Percent Distribution of Fall 2011 Adult Enrollment Status in Undergraduate Degree-Granting Institutions by Age

Age	Enrollment Status	2-Year			4-Year		
		Public	Private		Public	Private	
			Non-Profit	For-Profit		Non-Profit	For-Profit
< 25	Fulltime	71	59	47	88	86	29
	Part-time	52	40	39	50	32	21
25 to 34	Fulltime	18	25	31	9	8	39
	Part-time	25	32	35	29	30	39
≥ 35	Fulltime	11	16	21	3	5	32
	Part-time	23	27	26	21	36	39

(Aud, Wilkinson-Flicker, Kristapovich, Rathbun, & Wang, 2013, pp. 146-147)

The enrollment data reported by Aud et al. (2013), Bash (2003) and Bearer-Friend (2009) indicated twenty-first century students are not predominantly of traditional age and enrolled fulltime. The student body is age-stratified and a large percentage is enrolled part-time (Aud et al., 2013). The data in Table 3 illustrate why the IPEDS SRK graduation methodology is outdated. SRK graduation rates do not include part-time students, they are biased against students older than 25, and they do not account for enrollment differences among institutions (Adelman, 2007; Cook & Pullaro, 2010). There remains a critical absence of solid data on part-time students and adult students—generating these data is an absolutely critical activity (Stokes, 2006).

Socioeconomic status. As previously noted, traditional twentieth century, postsecondary students were more financially dependent on their parents and enrolled in

college fulltime (Stokes, 2006). The United States government has done much to increase access to postsecondary education (e.g., the Serviceman Readjustment Act, Montgomery Bill, Civil Rights Act, Higher Education Authorization Act, Americans with Disabilities Act, and Individuals with Disabilities Act), but, despite having greater access, socioeconomic conditions continue to limit student success among populations that have previously been underrepresented in postsecondary education (Engle & Tinto, 2008)—namely low-income and first-generation students. Nearly one-quarter of undergraduate students in 2008 were both low-income and first generation (Engle & Tinto, 2008). Engle and Tinto (2008) characterized low-income first-generation students as more likely to be older, female, have a disability, represent a minority, be non-native English speaking, have dependent children, be a single parent, have earned a high school equivalency diploma, and be financially independent from their parents. Engle and Tinto found low-income, first-generation students are also more likely to delay entry into postsecondary education after college, attend college closer to home, live off-campus, attend part-time, and work full-time while enrolled (Engle & Tinto, 2008). Each of these characteristics place students at greater risk for non-completion. Low-income, first-generation students attending public and private four-year institutions graduate at approximately half the rate of their most advantaged peers, 46% versus 83% (Engle & Tinto, 2008).

Risk factors. The previous discussion presented some of the differences between twentieth and twenty-first century postsecondary students—increasing percentages of ethnic/racial minorities, a majority of females, older adults, more part-time enrollment, lower income, and more first-generation college students. These differences have

resulted in a postsecondary population that is at increased risk for not completing certificates and degrees (Bash, 2003; Coucil for Adult and Experiential Education, 2000; Engle & Tinto, 2008; Hanford, 2011; Stokes, 2006; Tinto, 1993). The compounding factors of age, gender, race, socioeconomic status and enrollment conspire against academic success and degree completion (Bash, 2003; Coucil for Adult and Experiential Education, 2000; Engle & Tinto, 2008; Hanford, 2011; Stokes, 2006; Tinto, 1993).

Studies published by the National Center for Education Statistics (Berkner, He, & Cataldi, 2003; Horn & Premo, 1995; Horn, 1996) indicated six factors put students at-risk for leaving postsecondary education before earning their degree. These risk factors included delaying entry to into postsecondary education after high school, attending part-time, working full-time while enrolled, being financially independent from parents, having dependent children, and having a GED. The National Center for Educational Statistics' studies predict those students who delayed entry into postsecondary education have lower socioeconomic status, and those students who attended part-time are at greatest risk for not completing.

In 2008, 21% of all undergraduate students enrolled in four-year postsecondary institutions attended part time (Aud et al., 2010). Seventy-nine (79%) percent of traditional age (≤24 years) undergraduates enrolled part-time were employed; only 45% of fulltime undergraduates (≤24 years) were employed (Aud, et al., 2010). The percentage of fulltime undergraduates (≤24 years) who were employed increased from 34% in 1970 to 52% in 2004 (Aud, et al., 2010). More female (49%) undergraduates were employed in 2008 than male (42%) undergraduates (Aud et al., 2010). Thirty-one percent of employed students worked more than 20-hours per week—22% worked

between 20- and 30-hours per week, 9% worked more than 30 hours per week (Aud et al., 2010). A majority (80%) of community college students was employed in 2008; and 41% worked fulltime (Levin et al., 2010).

Engle and Tinto (2008) found the compounding factors of age, gender, race, socioeconomic status and enrollment status conspire against at-risk students in other ways. At-risk students were more likely to enroll in two-year colleges than four-year colleges (Engle & Tinto, 2008). Even though starting at a four-year institution offers the best and most direct route to the baccalaureate degree for all students, socioeconomically disadvantaged students tend to start their postsecondary education with lower aspirations (Engle & Tinto, 2008). The result it is that socioeconomically disadvantaged students are more than seven times as likely to complete a baccalaureate degree if they begin college at a four-year institution, but less than 25% do begin in four-year institutions (Engle & Tinto, 2008).

Needs. Numerous researchers have reported the twenty-first century student body is different than the twentieth century student body—it is older, more female, more racially/ethnically mixed, more financially unstable, more part-time, and more at risk for not achieving academic success (Bash, 2003; CAEL, 2000; Engle & Tinto, 2008; Hanford, 2011; Stokes, 2006; Tinto, 1993). Postsecondary educational institutions are challenged to serve a diverse student body with unique needs (Kuh et al., 2005). To serve all students effectively and ensure greater academic success, the CAEL and Kuh et al. suggested educational institutions must identify and create conditions that matter. These conditions range from redefining mission to modifying program offerings—focusing on student learning styles—expanding support services—creating a broader

sense of community—changing schedules—changing academic polices, etc. (CAEL, 2000; Engle & Tinto, 2008; Kuh et.al, 2005).

Malcolm Knowles (1980, 1984) was one of the first educators to recognize that adult learning styles differed from traditional students and he promoted an adult learning theory call andragogy. Andragogy promotes six learning principles. Adult learners (a) are internally motivated and self-directed, (b) have foundational life experiences to draw on, (c) have greater self-confidence (d) need relevancy, (e) are problem centered rather than content oriented, and (f) need to be respected. Like CAEL (2000) and Kuh et al. (2005), Knowles (1984) was an early advocate for creating conditions that matter for adult students.

The CAEL (2000) also characterized adult students as different from traditional students—they are more mature, have different, learning styles, more life experiences, and more risk factors. Typical institutional performance and outcome measures (retention, GPA, six-year graduation rates) are designed to measure the success of traditional students, yet over 40% (and growing) of students attending four-year baccalaureate institutions are not traditional students. Cook and Pullaro (2010) reported that 48% of students who entered postsecondary education in 2008 were not included in the IPEDS GRS. The literature is clear that institutions need better metrics for measuring success of adult, non-traditional, and at-risk students (Bash, 2003; CAEL, 2000; Cook & Pullaro, 2010; Engle & Tinto, 2008).

Sixty percent of low-income, first-generation students who leave postsecondary education without attaining a degree do so after the first year (Engle & Tinto, 2008). Pascarella and Terenzini (2005) suggested implementing student service strategies such

as bridge courses and programs during the summer between high school and college, orientation sessions, and courses during the freshman year. The National Adult Learners Satisfaction-Priorities Report (CAEL, 2008 & 2009) ranked student services and assessment at the bottom of eight adult student priorities for both two- and four-year colleges; alternative scheduling (outreach), career planning, teaching-learning process, and financing ranked at the top of adult student priorities. Kuh et al. (2005) and Tinto (2013) made convincing arguments for implementing intentional institutional actions to support success of all students. These actions included highly structured programs to support academic, financial, and social needs; promote student engagement with faculty and peers; and provide timely feedback on academic progress and performance.

Community college students average twice as many risk factors as four-year college students (Levin et al., 2010). Low-income, first-generation students greatly increase their chances of earning a bachelor's degree if they start at a four-year institution; but they still need a great deal of help at both the institutional and departmental level to ensure that they have the same chances to succeed as their peers in this sector (Engle & Tinto, 2008).

Lumina (2013) cautioned that the U.S. will not be able to achieve Lumina's 60/25 goal by focusing success strategies on a declining traditional student population. Lumina (2013) recognized that in order to produce more graduates, educators and policymakers must acknowledge and address the changing characteristics and unique needs of twenty-first century students.

This section, Twenty-first Century Students, outlined the many changing characteristics of the twenty-first century student body (race/ethnicity, gender, age,

enrollment status, socioeconomic status) and it addressed some of its unique needs (alternative scheduling, career counseling, financial aid, academic supports, etc.). In brief, the twenty-first century student body is far more diverse and far more at-risk than the twentieth century student body (Aud et. al., 2010; Aud et al., 2013; Bash, 2003; Bowen et al., 2009; CAEL, 2000; Engle & Tinto, 2008; Hanford, 2011; Stokes, 2006; Tinto, 1993). Kuh et al. (2005), CAEL (2000), Engle and Tinto (2008), and Tinto (2013) have challenged postsecondary institutions to examine their student body, determine its needs, and design programs and services that create conditions resulting in student success. Whereas these researchers challenge institutions to design programs and services that improve student success, educational policymakers challenge institutions to be accountable for student success through reporting.

Accountability agenda and performance metrics. In 1984, Peter Ewell, one of the foremost authors on assessment and currently Vice President at the National Center for Education Management Systems, wrote a widely cited book entitled *The Self-Regarding Institution: Information for Excellence.* In *The Self-Regarding Institution* (1984), Ewell acknowledged the growing public demand for postsecondary education to be more accountable and to demonstrate its educational effectiveness. He also pointed out that as students have become more diverse so have institutions, and external accountability may require institutions to make alternative choices regarding their mission and priorities. Ewell was one of the first to suggest the benefits of institutional assessment and increased accountability in postsecondary education; however, he also suggested that it was important to choose the correct unit of analysis, warning that

improperly chosen processes and measures could be dangerous if misused outside of the academic community.

Ewell's warning—written before the development of national-level postsecondary education databases and the establishment of national assessment metrics—foreshadowed an impending debate about how to measure institutional performance. The debate centers on which students get counted and whether or not their success demonstrates institutional effectiveness. The debate is also concerned with conflating assessment for improvement with assessment for accountability (Ewell, 2009). Table 4 contrasts Ewell's two assessment paradigms—institutional assessment versus mandated accountability.

Table 4.

Ewell's Two Assessment Paradigms

	Assessment Paradigms	
	Institutional Improvement	Mandated Accountability
Strategic Dimension		
Intent	Formative (Improvement)	Summative (Judgment)
Stance	Internal	External
Predominant Ethos	Engagement	Compliance
Application Choices		
Instrumentation	Multiple/Triangulation	Standardized
Nature of Evidence	Quantitative and Qualitative	Quantitative
Reference Points	Over Time, Comparative, Established Goal	Comparative or Fixed Standard
Communication Results	Multiple Internal Channels and Media	Public Communication
Uses of Results	Multiple Feedback Loops	Reporting

(modified after Ewell, 2009)

Ewell (2009) argued that both paradigms are necessary, and advocated for more work to plan accountability measures and to build institutional infrastructures which result in evidence-based performance reporting. Ewell also argued evidence-based performance reporting needs to include disaggregated quantitative metrics for specific student populations.

In 2006, the Spellings Commission offered six recommendations to improve access to postsecondary education and make it more affordable. Among those

recommendations was an acknowledgement that current federal databases were inadequate for meeting the challenges of the twenty-first century. The Spellings Commission (U.S. Department of Education, 2006) recommended, "The creation of a consumer-friendly information database on postsecondary education with useful, reliable information on institutions, coupled with a search engine to enable students, parents, policymakers and others to weigh and rank comparative institutional performance" (p. 21). Although few of the Spellings Commission's recommendations have been enacted (Ewell, 2009), one widely available federal-level accountability metric of student learning outcomes is graduation rates.

Since 2008, students, parents, and policymakers have had access to graduation-rate data via a consumer-friendly, government-sponsored website, College Navigator (http://nces.ed.gov/collegenavigator/). College Navigator was developed to provide postsecondary education consumers with information about institutions in order to make informed decisions on where to attend. The reality is that the majority of students make postsecondary education decisions based on location and cost, not published performance metrics (Ewell, 2009).

In the wake of the Spellings Commission, the primary consumers of accountability data are state policymakers (Zis et al., 2010) and the primary accountability metric is the IPEDS GRS (Cook & Pullaro, 2010). All of these researchers caution that unless policymakers understand what the IPEDS GRS measures, the IPEDS-GRS data have potential to be misused outside of the academic community.

The IPED GRS. The National Center for Education Statistics (NCES), established in 1974, is the primary federal entity responsible for collecting and analyzing

educational data in the United States (Fuller, 2011). Postsecondary institutions submit annual reports to the NCES's Integrated Postsecondary Education Data System (IPEDS), which was established in 1985 (Fuller, 2011). The IPEDS is a large database that includes annual input from 6,742 Title IV institutions (U.S. Department of Education, 2011). Institutions receiving Title IV aid report on institutional characteristics, student enrollment, completions, transfer rates, financial aid awards, and cost of enrollment as mandated by the federal government.

Cook and Pullaro (2010) provided historical background on the origin of the Student-Right-to-Know (SRK) graduation rates reported to the IPED GRS. The Student Right-to-Know and Campus Security Act of 1990 (P.L. 101-542) mandated postsecondary institutions to report SRK graduation rates to the federal government. The SRK graduation rates were originally designed for the purpose of providing consumer choice information to student athletes. Federal intervention resulted from growing concerns that graduation rates for male athletes in NCAA schools were lower than those for the non-athlete student population and that schools were profiting from student athletes rather than educating them. Cook and Pullaro reported the emphasis on student athlete graduation rates was removed from the SRK Act in 2007. The IPEDS is the most frequently used database to evaluate institutional graduation rates and it is the only database that includes data from all institutions receiving federal funds (Cook & Pullaro, 2010). Cook and Pullaro recognized the IPED GRS is "the only reporting of graduation rates that is required by law" (p. 8) and "it is increasingly being used as a measure of institutional quality" (p. 9); they also concluded " it is imperfect for

informing policy decisions related to national graduation rates and institutional effectiveness" (p. 9).

The IPEDS GRS was developed in 1997 following enactment of the Student Right-to-Know and Campus Security Act of 1990 (P.L. 101-542). The IPEDS-GRS data can be analyzed by policymakers at the state and federal level for benchmarking, peer analysis, and policy development (Cook & Pullaro, 2010). IPEDS-GRS data are also made available to students and parents through the College Navigator website, http://collegenavigator.ed.gov, for the purpose of comparing institutions. IPEDS-GRS data are a product of the twentieth century and they represent a limited view of today's postsecondary students—the IPEDS GRS only includes information on first time, full-time students. More specifically the IPEDS GRS, as originally conceived, focuses on degree completion of scholarship athletes (Cook & Pullaro, 2010). IPEDS-GRS data are not and never were designed to be inclusive of a holistic student body (e.g. transfer students, returning students and part-time students) (Cook & Pullaro, 2010). Although the IPEDS GRS provides useful preliminary metrics for first-time, fulltime students to compare institutions, it has limited utility in measuring institutional success in the twenty-first century, because the methodology excludes nearly 50% of students who enter postsecondary education (Bowen et al., 2009; Cook & Pullaro, 2010; Engle & Tinto, 2008; Bearer-Friend, 2009).

A revised graduation rate. Clifford Adelman (2007), a former research analyst with the U.S. Department of Education, proposed a revision in the process and formula that the department uses to determine graduation rates. Adelman's method (2007) results in more inclusive, differentiated, and precise institutional graduation rates.

Adelman's methodology includes: (a) defining an academic year from July 1 through the following June 30, (b) defining a tracking cohort as all who enter a postsecondary school as first-time students at any point during the academic year and enroll for six or more semester-equivalent credits in their first term; (c) dividing the first-time students into two groups—18- to24-year olds and ≥25 year olds; (d) separating formal transfer students out in each age group; and (e) reporting graduation rates for these four groups at two intervals for associate and bachelor degree institutions. Adelman proposed that associate degree institutions report at four- and six-years; baccalaureate granting institutions report at six and nine years. The differences between the current IPEDS-GRS methodology and Adelman's methodology are summarized in Table 5.

Table 5.

Differences between IPEDS-GRS and Adelman Methods

Definitions	Method: IPEDS-GRS	Method: Adelman	Adelman Advantages
Academic Year	Fall term	July 1 to June 30	Includes all students who begin within an academic year. Not limited to fall term enrollment.
Cohort Group:			
Age	No breakdown	18 to 24 years and 25 years and older	Differentiation by age, enrollment, and transfer status allows for better tracking of traditional versus adult student successes. Allows institutions to better understand which students need targeted support services.
Enrollment	Beginning and fulltime (≥12 credits)	Beginning (≥6 credits) and transfer (≥6 credits)	
Graduation Rate Reporting Intervals in Years:			
Associate	2 and 3	4 and 6	Extending the time to graduation rate interval allows for tracking of full- and part-time student successes.
Baccalaureate	4 and 6	6 and 9	
Number of Resulting Graduation Rates for One Cohort Group:			
Associate	2	8	Greater differentiation of graduation rates for different students produces more holistic metrics for institutional analysis.
Baccalaureate	2	8	

Adelman (2007) listed four advantages to using a different method to calculate SRK graduation rates. First, by including all beginning students enrolled in six or more credits during their first term of an expanded academic year, the majority of degree-seeking students is included in the cohort group. Exclusion of students enrolled in fewer than six credits during their first term of an expanded academic year, generally eliminates inclusion of non-degree seeking students enrolled in personal enrichment or professional development courses. Second, differentiation of students by age and transfer status, allows for better tracking of traditional-age versus adult students. Results of differentiated cohort groups may be useful for targeting (designing intervention strategies and/or interim measures) student support services. Third, extending the time-to-degree for reporting graduation rates recognizes the growing percentage of part-time students enrolled in associate and baccalaureate institutions, thus recognizing and honoring institutions whose mission includes serving higher at-risk populations. Fourth, greater differentiation of graduation rates for different students produces more holistic metrics for institutional analysis.

National environment summary. This section focuses on the national-level environmental conditions that affect public postsecondary educational institutions. National-level concerns include: (a) providing greater postsecondary access for an increasingly diverse and disadvantaged population, (b) achieving postsecondary success for a growing number of at-risk students, (c) shifting postsecondary goals from individual self-actualization to national economic imperative, and (d) growing demands to measure the results of public postsecondary investments. State-level environmental conditions affecting public postsecondary institutions are addressed in the next section.

State. The previous sections presented a macro view of global and national conditions affecting the postsecondary education environment in the United States; however, this research is concerned with measuring institutional success in a specific state, Montana. Richardson and Martinez (2009) documented that national policy affects institutional decision making, but state-level environmental conditions have a more direct impact on institutional governance, policy making, and student success. This section summarizes some of the unique state-level environmental conditions in postsecondary education and seeks to clarify why the Montana University System was selected for this case-study research.

Funding and performance. Postsecondary education budgets constitute the largest percentage of discretionary funds in many states (Kelly & Jones, 2005). In 2001, Montana Governor Martz's 2003 Biennium Budget (Martz, 2001) included approximately $200 million per annum for higher education, which accounted for roughly 12% of the state budget. Only Montana's K-12 education system and public health and human services received higher allocations of the state's discretionary budget, 44% and 23%, respectively. Given the size of states' investments in postsecondary education, Jones and Wellman (2010) justified pressure from state taxpayers and policymakers for higher levels of accountability.

Jones and Wellman (2010) found that public demand for evidence of educational productivity is growing, especially in response to the recent financial crisis. During the Great Recession of 2009, some states cut education budgets between 10% and 25%—e.g. California, Florida, New York, Pennsylvania and Virginia (Jones & Wellman, 2010). Montana's governor, Brian Schweitzer, increased the state's 2009 biennium

allocation by $50 million (Schweitzer, 2006a), but froze tuition-rate increases and relied on federal-stimulus dollars to make up 10% of the higher-education budget from 2009 to 2011 (Kelderman, 2011; Schweitzer, 2008). Jones and Wellman (2010) pointed out that postsecondary institutions have the ability to address budget shortfalls by increasing tuition revenue (e.g. during the recession, California, Oregon, Washington, New York, Wisconsin and Florida allowed tuition increases ranging between 10% and 33%). Jones and Wellman also noted that raising tuition is self-limiting and has the effect of limiting student access. If students cannot afford college during difficult economic times, they do not simply delay entrance to college; they forego it (Jones & Wellman, 2010). Montana Governor Schweitzer (2006a) demonstrated his commitment to college affordability and student access by proposing a state tuition freeze. In a press release on his 2008-2009 Executive Budget, Schweitzer stated, “This would be the first time since 1991 that tuition did not increase” (Schweitzer, 2006b, “Zero Tuition Increase”).

In an issue brief prepared by the National Governor’s Association (National Governor's Association, 2010), states were encouraged to experiment with tying a substantial percentage of state funding to institutional performance (8% to 10%). The brief further stated that small financial incentives (less than 8%) have not influenced institutional behavior to improve performance. Ewell (2009) noted that results-based performance funding is more effective when state budgets are tight. The national financial crisis has resulted in many states withholding a portion of postsecondary budgets to award as performance incentives. The State of Tennessee has a long-established (since the mid-80s) performance funding scheme that rewards institutions for their performance in meeting several learning outcomes (Ewell, 1984, 2009). Most

performance funding schemes, however, rely on IPEDS graduation rates (Ewell, 2009). The challenge for states is to devise incentives that are fair and reflective of the unique attributes of institutions. As noted by Offenstein and Shulock (2010), "Once reporting systems are in place and institutions gear up to provide a set of metrics to system offices, governors, or state legislators, it will be difficult to refine the approaches" (p. 1). Database systems must support the needs of complex reporting demands, but most existing database systems fall short of this goal (Garcia & L'Orange, 2010; Offenstein & Shulock, 2010). The following section addresses some of the inconsistencies in federal and state-managed database systems.

Student unit records (SUR). As previously mentioned in the National Accountability Agenda and Performance Metrics section, the Spellings Commission (U.S. Department of Education, 2006) recommended the development of a new federal-level, consumer-oriented, postsecondary education database. The Spellings Commission further recommended that all postsecondary education institutions provide student-level (SUR) data to the privacy-protected system. This is in stark contrast to the current practice of Title IV institutions reporting aggregated data to the IPEDS. Reporting of SUR data occurs in most states, but not with any degree of consistency (Garcia & L'Orange, 2010).

Cook and Pullaro (2010) conducted a survey of state SUR systems. Their findings emphasized the identification, collection, storage, and use of state data is complex. State SUR systems are subject to the demands of many stakeholders (legislature, business, private foundations, federal government, etc.), thus their data elements are more inclusive than federal databases but the data do not easily correlate

from one state to another. Additionally, issues of state policy and institutional governance affect data collection and institutional performance (Richardson & Martinez, 2009).

The State Higher Education Executive Officers (SHEEO) published a report (Garcia & L'Orange, 2010) detailing data elements of 59 state–level SUR systems located in 44 states and the District of Columbia (45 total). The report summarized the following:

- Nineteen states include data from public two- and four-year, independent non-profit, and for-profit institutions;
- Forty-five states have at least one SUR; and
- Five states have no state postsecondary SUR systems (Delaware, Idaho, Michigan, Nebraska & New Hampshire).

These findings illustrate the variability of SUR systems across the country. Some states have one comprehensive system, some states have more than one system, and other states have no system at all. Garcia and L'Orange (2010) found that demographic, enrollment, and completion data were the most common data elements included in the 59 SUR systems. SHEEO surveyed 36 postsecondary data elements. Seventeen elements were associated with academic history, and only four western states contained complete academic history elements in their SUR systems (Montana, Utah, Colorado, and Hawaii). Among these states, Garcia and L'Orange found that Colorado and Montana had the most comprehensive and available, single-source SUR systems in which to evaluate state-level graduation rates versus federally mandated graduation rates. Utah and Hawaii did not make student unit record data available to non-affiliated

researchers (Garcia & L'Orange, 2010). Colorado's and Montana's state SUR systems were not governed by the same political or accrediting bodies, Colorado postsecondary institutions are governed by the Colorado Commission on Higher Education and accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools (19 state membership). Montana postsecondary institutions are governed by the Montana Board of Regents (BoR) and accredited by the Northwest Commission of Colleges and Universities (5 state membership). The following section addresses how postsecondary system governance varies among states.

Governance. There is no unified governance of public postsecondary systems in the United States (Richardson & Martinez, 2009)—no consolidated governing board that oversees all public postsecondary institutions and interfaces between state legislatures and postsecondary institutions. Richardson and Martinez (2009) conducted case studies in seven large states and concluded that virtually no comparative governance system exists—some states have local trustees to govern individual campuses (Michigan, New Mexico), some have centralized governing boards that oversee two-year, community college campuses (California, Washington), some have centralized governing boards that oversee four-year campuses. Some states (California) have multiple four-year campus systems—the California State and University of California systems.

It is no accident that the MUS represents a unique system of postsecondary education. In 1993, Interim Commissioner Dr. Jeffrey Baker (1993) proposed a restructure plan to unify the 14 separate campuses into an integrated system of postsecondary education. Baker reported that the state's share of postsecondary education funding had been reduced from 77.9% in 1983 to 63.4% in 1993.

Commissioner Baker sought cost savings, cost containment, and alternative revenue sources while simultaneously providing better service. His answer was to build a unified system of campuses, centralize administrative functions, improve student access, and differentiate tuition to incentivize enrollments. The restructured MUS comprised a mix of public two- and four-year campuses divided into two primary university-level units (University of Montana and Montana State University) and three community college units (Figure 1). Each primary university unit included a doctoral granting institution, several baccalaureate and masters granting institutions and several associate and certificate granting colleges of technology. The University of Montana included one flagship campus and five affiliate campuses. Montana State University included one flagship campus and four affiliate campuses. For simplicity of discussion and case analysis, the campuses listed in Table 6 are grouped not by their affiliate status, but by their degree granting mission—associate (two-year) versus baccalaureate (four-year). Two campuses, Montana State University – Northern and The University of Montana – Western, have dual associate and baccalaureate missions.

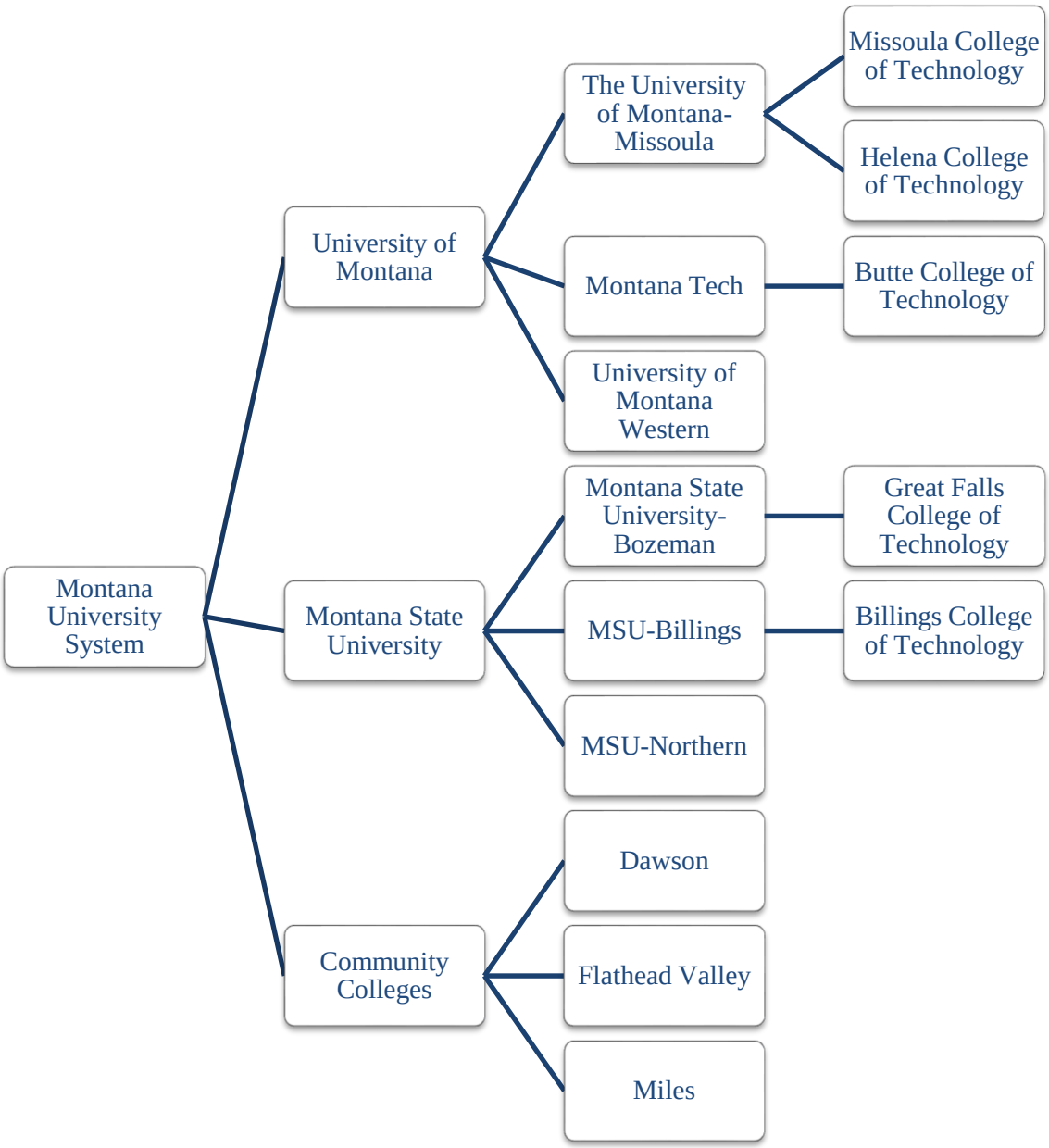


Figure 1. Montana University System Organization from 1994 to 2010. The Montana University System included six University of Montana affiliate campuses, five Montana State university affiliate campuses, and three community college campuses.

Table 6.

Degree Authority and Governance of Montana University System Campuses

Campus Name	Associate (2 Yr)	Baccalaureate (4 Yr)	Graduate	Governance
Billings College of Technology	X			MUS
Butte College of Technology	X			MUS
Dawson Community College[a]	X			CC/MUS[c]
Flathead Valley Community College[a]	X			CC/MUS
Great Falls College of Technology	X			MUS
Helena College of Technology	X			MUS
Miles Community College[a]	X			CC/MUS
Missoula College of Technology	X			MUS
MSU[d] – Billings		X	X	MUS
MSU – Bozeman		X	X	MUS
MSU – Northern[b]	X	X	X	MUS
Montana Tech of the UM[e]		X	X	MUS
The UM – Missoula		X	X	MUS
UM – Western[b]	X	X		MUS

Note. [a] SUR not included in the MUS Data Warehouse for fall 2001 cohort. [b]Denotes combined two- and four-year mission. [c]CC indicates community college. [d]Montana State University (MSU). [e]University of Montana (UM).

Mission statement versus degree granting mission. In 1998, the Montana Board of Regents (BoR) approved Policy 219, which required board approval of all campus mission statements. The policy further required mission statements to be reviewed by the regents every three years and all revisions be submitted for approval. The campus mission statements and their associated vision and aspiration statements vary from the BoR authorized degree granting mission in that they establish the character, breadth and depth of academic programming; define regional, state, national and international presence, and state service function. In addition to approving mission statement and degree granting missions, the BoR is authorized to establish system initiatives. Several such initiatives are addressed in the next section.

Twenty-first century MUS initiatives. During the last decade of the twentieth century, the MUS was restructured in response to decreased state funding and a need to become more efficient (Baker, 1993). Baker's restructure focused MUS initiatives on campus unification, streamlining student services, eliminating weak programs, and creating new relationships with all stakeholders. Commissioner Baker also emphasized two-year versus four-year education and laid the framework for increased transferability within the MUS.

During the first decade of the twenty-first century, with the restructure complete, the MUS focused MUS initiatives on student access, affordability, transfer, student success, and economic development (Board of Regents, 2001; 2010; 2013). One major Lumina Foundation funded initiative, College!Now (Montana University System, 2013), resulted in development of a comprehensive two-year mission (BOR ITEM #151-103-R0511), renaming of the former colleges of technology (BOR ITEM #155-106-R0512),

and addition of two new sites to access two-year, postsecondary programming (Bitterroot College and Gallatin College). The comprehensive two-year mission expanded the former technical emphasis of programming at the colleges of technology to promote (a) transfer education through the associate's degree, (b) workforce development though certificate and applied associate degrees, (c) developmental and adult basic education, (d) lifelong learning, and (e) community development (http://mus.edu/2yr/2yr_Mission_and_Vision.asp). Figure 2 illustrates the MUS organization after addition of the Bitterroot and Gallatin colleges, expansion of the two-year mission, and renaming the former colleges of technology.

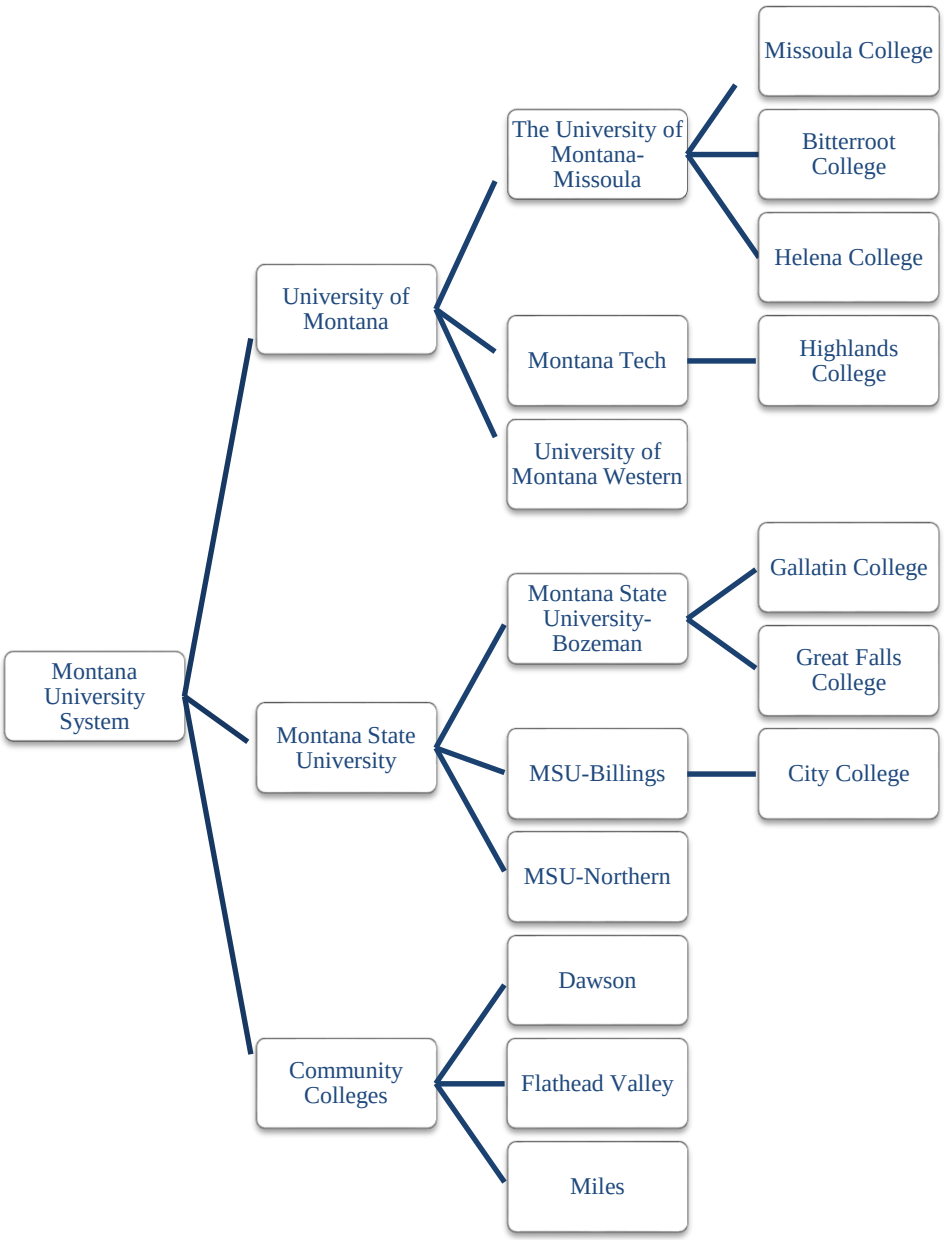


Figure 2. Montana University System Organization after 2012. The former colleges of technology were renamed. Bitterroot College was added as a University of Montana affiliate. Gallatin College was added as a Montana State University affiliate.

Other twenty-first century MUS initiatives resulted in uniform course numbering schemes, more seamless student transfer between MUS campuses, and refined data reporting protocols to build a reliable SUR, the MUS Data Warehouse. The MUS Data Warehouse is the most comprehensive source of postsecondary SUR data in Montana and it allows longitudinal tracking of a variety of dashboard indicators (http://mus.edu/data/DashboardIndicators.asp). The dashboard indicators published on the MUS web site are specifically designed to meet the strategic goals of the MUS (BOR, 2010; 2013) and allow for comparison of institutional performance metrics such as student retention, financial aid, affordability, enrollment, cost per completion, and operating budget ratios. These metrics have been developed since 2010.

The 2013 Montana Legislature passed the Senate Joint Resolution SJ0013 requesting the MUS to study and adopt measures directed at increasing college completion rates and to propose performance measures to be studied. The measures to be studied included outcome and progress metrics in degree production, graduation rates, transfer rates, time-to-completion, enrollment in remedial education, success in remedial education, credit accumulation, retention rates, and course completion rates. SJ0013 required the MUS to develop a state action plan for increasing completion rates by July 1, 2014. The 2013 Montana Legislature further allocated $7.5 million in HB 0002 to implement a five percent performance funding incentive in fiscal year 2015. Montana's allocation of five percent for performance funding falls short of the National Governors Association's (2010) recommendation of between eight and ten percent, but it establishes new conditions for institutional performance and accountability that are consistent with other states.

State environment summary. This section focused on the unique state-level environmental conditions that affect public postsecondary educational institutions and it clarified why the MUS was selected for this study. State-level concerns include legislative funding, system governance, institutional mission, student record system management, and institutional performance and accountability.

Productivity, Performance, and Efficiency

The previous section, Environmental Conditions, addressed some of the unique global, national, and state conditions that influence postsecondary performance. This section addresses how productivity differs from performance and efficiency in a postsecondary environment and why it is increasingly important for policymakers to differentiate between the terms.

The Merriam-Webster online dictionary (Merriam-Wester, 2013) defined *productivity* as the rate at which goods are produced, *performance* as an activity or execution of an action, and *efficiency* is effective operation as measured by a comparison of production with cost (i.e., energy, time, and money). All three words are nouns, but they are not synonyms. Performance is pure action, productivity is a rate of action, and efficiency is action without waste. As evidenced by the growing number of citizens accessing postsecondary education, institutions have demonstrated positive performance and productivity by expanding programs and services throughout the twentieth century (Aud et al., 2013; Drummond, 2001). As evidenced by low retention, persistence, and graduation rates, postsecondary institutions have not been highly efficient (Bearer-Friend, 2009; Bowen et al., 2009; Ewell, 2009; Kelly, 2009).

The Worldwatch Institute (2008) defined economic productivity as a measure of efficiency that is calculated as the ratio of what is produced to what is required to produce it. The Worldwatch Institute described economic productivity in the twentieth century was about producing goods and services in abundance, yielding profits, and paying little attention to the resulting waste stream. The Worldwide Institute suggested that economic productivity in the twenty-first century is about sustainability—producing goods and services in moderation, reducing production costs, yielding profits, and reducing manufacturing wastes. Dugan and Hernon (2006) argued that educational productivity changed between the twentieth and twenty-first centuries—it is no longer possible to rely on an abundance of raw material (students), to profit from easy access to raw materials (high school graduates), and to ignore wastes (college dropouts).

In his first State of the Union Address, President Obama (2009a) acknowledged that America had one of the highest high school dropout rates of any industrialized nation, that just over half of U.S. citizens did not have an education beyond high school, and that half of the students who started college never graduated. In other words, like Dugan and Hernon (2006), President Obama recognized the waste stream was too great—the United States was wasting too much human capital. To produce more graduates without consuming more raw materials, postsecondary institutions are challenged to achieve greater productivity through increased efficiency (Richardson & Martinez, 2009).

Levins (2008) proposed a holistic framework for achieving sustainability in the twenty-first century. His framework, called Natural Capitalism, was based on three principles: (a) use all resources far more productively, (b) redesign how products are

made and services are delivered, and (c) manage all institutions to be restorative of human and natural capital. Although Levins' Natural Capitalism is an economic framework, its principals have implications for thinking about productivity and performance metrics in postsecondary education.

Levins' Natural Capitalism framework challenges all institutions to use resources more efficiently and to redesign how products are made and services delivered. Postsecondary institutions are no different in application of Levins' first two principles; however, they differ from other institutions in the management of restorative human capital. It is the primary responsibility of public postsecondary institutions is to create an educated populace. Unlike private postsecondary institutions, publics have more lenient admission requirements. *A Nation at Risk* reported that one-fifth of all four-year public postsecondary institutions were required to admit every high school graduate from within the respective state regardless of the student's preparation (National Commission on Excellence in Education, 1983). Open admissions policies allow for a more diverse and at-risk student body, resulting in more potential for waste of human capital. Open admission policies alternatively allow the most potential for restoration of human capital.

The national productivity agenda is about production of more postsecondary graduates (Lumina, 2013; U.S. Department of Education, 2006). It employs arguments, strategies, and tactics that were developed for business. The agenda speaks to the loss of human capital affecting economic prosperity, but, in addressing productivity, the agenda rarely acknowledges the challenges that institutions with high percentages of at-risk students must overcome. Dr. Dennis Jones, president of the National Center for Higher

Education Management Systems, reported on where Montana stands relative to other states in the Delta Cost Project database (Jones, 2009). Jones made several recommendations to the Montana BoR to increase system efficiency—reduce demands that each student places on the system, eliminate remediation (admit only fully prepared students), accelerate learning, improve rates of course completion, reduce credit hours to degree, award credit for prior experience, and encourage use of assessment and test-out options. He also recommended elimination of programs, reengineering of courses, and changing the composition of human assets.

The national productivity agenda demands a greater number and percentage of college graduates by 2020 (Lumina, 2013; National Governor's Association, 2010; Obama, 2009a). State performance agendas must be more nuanced (Cook and Pullaro, 2010; Ewell, 1984). Postsecondary education budgets constitute the largest percentage of discretionary funds in many states (Kelly & Jones, 2005). States budgets shoulder the burden of higher production costs; therefore, state productivity agendas are ultimately about institutional efficiency and effectiveness (Richardson & Martinez, 2009). State-level productivity agendas demand greater output (graduates) with fewer resource inputs (state funds), and less waste (dropouts) (Cook & Pullaro, 2010; National Governor's Association, 2010; Richardson & Martinez, 2009).

Leadership Implications

Much of the preceding literature review focused on describing the environmental conditions affecting postsecondary institutions. These conditions include global, national, and state environments and they represent complex relationships that are similar to Katz and Kahn's (1978) supersystems, systems, and subsystems. Each environment is simultaneously open to and subject to internal and external forces. Katz and Kahn (1978) argued that it is the responsibility of leadership to manage the relationships between systems and between internal and external environments, thus allowing followers to perform their primary task. None of the aforementioned environments is static though, worker's tasks are less routine, and modern scholars do not advocate authoritarian, hierarchical leadership styles (Chaleff, 2009; Fullan, 2001, 2009; Kotter, 2012; Kotter & Rathgeber, 2005; Schein, 2004; Senge, 2006; Weick, 1995, 2001). These scholars recognized that the relationships between systems and their internal and external environments are dynamic and complex.

In his book *Leading in a Culture of Change* (2001), Michael Fullan acknowledged leading at the convergence of complex changing environments is particularly challenging—it requires sophistication—leaders with abilities to manage complex interconnected problems, special interest groups, and policies. Fullan further argued that leadership is not about solving problems where solutions already exist. He challenged leaders to motivate people in organizations to recognize and confront problems that have yet to be successfully addressed. Kotter's and Rathgeber's (2005) eight-step process for successful change also advocated for empowerment of others to recognize and take action to solve problems.

In his book *Organizational Culture and Change*, Edgar Schein (2004) argued that the only thing of real importance that leaders do is to create and manage culture and that the ultimate act of leadership is to change or destroy a dysfunctional culture. Cook and Pullaro (2010) indicated reliance on SRK graduation rates as a measure of institutional quality and effectiveness is an example of a dysfunctional culture—policymakers are focused on what can easily be counted rather than confronting the problem of how to measure institutional effectiveness.

Cook and Pullaro (2010) provided historical background on the origin of SRK graduation rates. SRK graduation rates were designed in 1988 to provide consumer choice information to student athletes. The impetus was related to growing concerns that graduation rates for male athletes in NCAA schools were lower than those for the non-athlete student population. The emphasis on student athlete graduation rates was removed from the SRK Act in 2007, but the IPED GRS methodology established in the 1992 reauthorization of the Higher Education Act still measured completions for only slightly more than half of students in postsecondary education—the largely White and more affluent half. Cook and Pullaro recognized the IPED GRS is "the only reporting of graduation rates that is required by law" (p. 8) and "it is increasingly being used as a measure of institutional quality" (p. 9); they also concluded " it is imperfect for informing policy decisions related to national graduation rates and institutional effectiveness" (p. 9).

Cook and Pullaro (2010) pointed out that SRK graduation rates were designed to address the problem of poor academic performance among male athletes in NCAA schools. The existing IPED-GRS methodology—used as a measure of institutional

productivity—is an example of solving problems where solutions already exist. It is important to improve SRK graduation rates, but it is more important for leadership to mobilize institutions to recognize and confront the problems that limit success and postsecondary completion for a growing population of older, part-time, and minority students.

Solving the problems of twenty-first century postsecondary institutions requires leadership that is adept at managing change and motivating others to engage in action (Fullan, 2001; Kotter & Rathgeber, 2005). The challenge for policymakers and postsecondary leaders is to rapidly build new systems and transform existing operations in response to an ever-faster-changing environments (Kotter, 2012). Numerous researchers have recognized the rapid rate of change often out-paces the skills of institutional leaders, and have concluded it is increasingly important to build and promote adaptive organizations where everyone is tasked to understand the forces and realities that effect the organization, where everyone shares responsibility for stewardship of the mission, and where everyone is empowered to provide insight and personal leadership (Chaleff, 2009; Fullan, 2001, 2009; Kotter, 2012; Kotter & Rathgeber, 2005; Schein, 2004; Senge, 2006; Weick, 1995, 2001). Senge (2006) proposed the term systems thinking as the fifth discipline of an adaptive learning organization. Senge's systems thinking is the discipline that integrates the other disciplines—personal mastery, mental models, shared vision, and team learning—by fusing them into a coherent body of theory and practice.

Expectations for postsecondary institutions have changed and transformational change is called for (Bowen et al, 2009; National Governor's Association, 2010; U.S.

Department of Education, 2006). Institutions are being held accountable for measurable outcomes and state allocations are being tied to performance metrics (Kelly & Jones, 2005). In order to respond effectively to ever-growing demands, twenty-first century postsecondary leaders must destroy dysfunctional organizational structures (Schein, 2004), they must shift from privileged and staid academic hierarchies to dynamic and adaptive learning organizations (Senge, 2006). Effective leadership will promote system thinking, where all workers are responsible for mastering the elements of a learning organization (Senge, 2006) and for creating conditions that matter for student success (Kuh et al., 2005).

Summary of Chapter Two

The literature review presented in Chapter Two established the background for this research. It described pertinent findings in open-system research (Von Bertalanffy, 1950; Katz & Kahn, 1978; Senge, 2006); global, national, and state environmental conditions affecting public postsecondary institutions (Adelman, 2007; Aud, et al., 2010, 2013; CAEL, 2000; Cook & Pullaro, 2010; Bowen et al., 2009; Engle & Tinto, 2008; Ewell, 1984; Lumina Foundation, 2013, National Governor's Association, 2010; Obama 2009a; Richardson & Martinez, 2009) and leadership implications for policymakers (Cook & Pullaro, 2010; Ewell, 1984; Fullan, 2001; Senge, 2006). The following summarizes the relevant findings of the literature review.

The U.S. Department of Education's (Aud et al., 2010, 2013) data indicated more Americans are seeking postsecondary education than at any other time during our country's history; however, the OECD (2001, 2004, 2007, 2010, 2013) has documented that the percentage of Americans with postsecondary degrees is declining and no longer

is the highest in the world. President Obama (2009a) and the Lumina Foundation (2013) have indicated that annual degree production needs to nearly double for the United States to reclaim the number one OECD ranking. Aud et al. (2010, 2013) and the U.S. Census Bureau (2008) have found the highest rates of degree completion are among White Americans and the percentage of White Americans, both in postsecondary education and in the general population, is in decline. The percentage of Hispanic and Black Americans seeking postsecondary degrees is increasing (U.S. Census Bureau, 2008), but these groups have had lower rates of academic success (Bowen et al., 2009; Engle & Tinto, 2008). Numerous researchers have indicated the challenge to produce a more credentialed citizenry is complicated by the United States' changing demographics (Aud et al., 2010, 2013; CAEL, 2000; U.S. Census Bureau, 2008), by the availability of state resources (CAEL & National Center for Higher Education Management Systems, 2008; Jones & Wellman, 2010; National Governor's Association, 2010; Richardson & Martinez, 2009) and by what is an appropriate measure of institutional success (Cook & Pullaro, 2010; Ewell, 1984; Jones, 2009; Richardson & Martinez, 2009).

Researchers recognized twenty-first century students differ from twentieth century students (Bash, 2003; Drummond, 2001; CAEL, 2000; Dugan & Hernon, 2006)—they have greater access to postsecondary educational opportunities, but they are at greater risk of not completing a certificate or degree (Engle & Tinto, 2008). They are more diverse with greater numbers of women and minorities; they are older, have family obligations, work part-time, and are more dependent on financial assistance. Ewell (2007) and Cook and Pullaro (2010) reported the most widely used metric to measure institutional productivity, SRK graduation rates reported to the IPEDS-GRS, does not

include older, part-time students. Furthermore, Cook & Pullaro noted that the IPEDS-GRS methodology excludes nearly 50% of students who enter postsecondary education based on age and enrollment status. Bash (2001), Bearer-Friend (2009) and CAEL (2000) found older, part-time students at greater risk for not completing a certificate or degree; older, part-time students also represented the largest loss of human capital in postsecondary institutions, yet there is no standard metric for measuring their success (Adelman, 2007; Cook & Pullaro, 2010). Ewell cautioned the IPEDS-GRS productivity metric is not universally understood by policymakers and misuse of the metric could penalize institutions that effectively serve large numbers of non-traditional students but report low graduation rates to the IPEDS GRS. Cook and Pullaro emphasized the SRK graduation rate is a useful metric for measuring degree completion among a select population of students—traditional age, first-time, fulltime students. Adelman recognized the SRK metric as a poor metric for inferring institutional effectiveness in serving a holistic student population and he proposed a new methodology to calculate graduation rates. Adelman's method includes all students who begin within an academic year. His method includes part-time and transfer students.

The research findings presented in Chapter Two underscore the challenge to better define metrics for postsecondary productivity, student success, and institutional effectiveness. Cook and Pullaro (2010) and Richardson and Martinez (2009) recommended that this effort needs to be conducted at the state level to simplify issues of postsecondary system governance and management of SUR systems. These researchers also recognized that states have the highest investment in postsecondary systems and state-level postsecondary agendas need to be more nuanced. State-level

postsecondary agendas must adapt to a new paradigm and shift from measuring degree productivity for a narrowly defined postsecondary population to measuring institutional effectiveness serving the needs of all postsecondary students. Senge's (2006) work offers postsecondary institutions leadership tools to make the shift and create adaptive learning organizations.

Chapter Three – Methodology

This is a mixed-methods, non-experimental, cross-case study designed to examine the environmental conditions that influence institutional effectiveness within one state-governed university system. The mixed-methodology includes a quantitative analysis of graduation metrics and a qualitative analysis of environmental conditions. The quantitative analysis summarizes descriptive demographic and graduation-rate statistics derived from 11 postsecondary institutions. The qualitative analysis evaluates of environmental conditions (e.g., institutional mission, degrees, financial resources, policies, etc.) at each of the 11 institutions. The cross-case analysis synthesizes the quantitative and qualitative data to identify emergent patterns.

This research utilized Katz and Kahn's (1978) common characteristics of an open system as a framework for collecting the quantitative and qualitative data. Katz and Kahn's open-system characteristics were introduced in Chapter Two. These characteristics are reproduced in Tables 7 and 8 with brief explanations and postsecondary education analogies. Table 7 summarizes the quantitative characteristics for this study. Table 8 summarizes the qualitative characteristics for this study.

Table 7.

Katz and Kahn's Quantitative Characteristics and Postsecondary Analogies

Open System Characteristics[a]	Explanation	Postsecondary Education Analogy
Importation of energy	Primary inputs to the system.	New students. Student inputs may vary in terms of gender, age, and minority status.
Output	End product of transformed inputs.	Most widely recognized and quantifiable end product of a postsecondary system is student graduates. IPEDs methodology is the national standard for higher education graduation rates.

[a]Katz & Kahn, 1978

Table 8.

Katz and Kahn's Qualitative Characteristics and Postsecondary Analogies

Open System Characteristics[a]	Explanation	Postsecondary Education Analogy
Importation of Energy	Primary inputs to the system.	New students and financial resources (student tuition and state revenue). Student inputs may vary in terms of age, gender, and minority status.
Throughput	Transforms inputs via some process.	Transformation of inputs via some process such as enrollment in degree programs, development of academic policies, availability of campus services, and involvement in student life programs.
Cycles of events	Patterns of recurring energy exchange	Repetitive, asynchronous cycles: ongoing acceptance of new students; scheduling course rotations for one-, two- and four-year degree programs; graduating students fall, spring and summer semesters; annual reporting of IPED GRS completion rates (GR150 and GR200); and managing annual or biannual appropriations.

Negative entropy	Accumulation of reserves to safeguard a system from running down.	Leadership, administrative processes, trends analysis, contingency planning, academic programs, and institutional stability.
Feedback	How a system processes incoming information to make corrections.	Functions of administrative structures, shared governance, and data-driven decision making.
Differentiation	Growing complexity and specialized functions of a system.	Academic and student support programs as well as unique institutional mission, role, and scope.
Integration and coordination	Orderly and systematic articulation of functions achieved through priority setting, policy development, scheduling, etc.	Achieved through internal and external regulatory processes.
Steady state and dynamic homeostasis	Preservation of the character or qualitative aspects of a system.	A regulatory process of managing inputs and outputs to maintain the essential character or qualities of the institution.

[a]Katz & Kahn, 1978

Research Questions

Three questions guided this research – a general research question, a quantitative research question, and a qualitative central question. The General Research Question follows. The Quantitative Research Question and the Central Research Question will be presented respectively within the Quantitative Research Design and Qualitative Research Design sections.

General Research Question. How can open-system theory inform practice in evaluating effectiveness of postsecondary institutions?

Creswell (2003) stated "a theory is an interrelated set of constructs (or variables) formed into propositions, or hypotheses, that specify the relationship among variables" (p. 120). Creswell further noted a theory "helps explain (or predict) phenomena that occur in the world" (p. 120). The General Research Question was designed to assist the cross-case analysis relative to open-systems theory. The General Research Question required synthesis of the relationships among all of Katz and Kahn's (1978) open-system characteristics in order to explain effectiveness of postsecondary institutions. Katz and Kahn's open system characteristics incorporate quantitative and qualitative data elements; as such, this research employed quantitative and qualitative research methodologies to answer the General Research Question.

Quantitative Research Design

The quantitative research focused on the examination of demographic, postsecondary enrollment, and graduation rate data. The main criticism of federal IPEDS-GRS data is that the sample population—first-time fulltime students from Title IV institutions—is too narrowly defined and institutional graduation rates resulting from

the IPEDS-GRS methodology should not be generalized to the entire postsecondary population (Adelman, 2007; Cook & Pullaro, 2010). This study broadened the cohort definition and restricted the number of postsecondary institutions to be examined. The quantitative research employed a non-experimental design to examine demographic, postsecondary enrollment, and graduation data to answer the Quantitative Research Question.

Quantitative Research Question. How do graduation rates for all students (fulltime, part time, beginning, and transfers) vary within one state-governed postsecondary education system?

Hypotheses. The quantitative portion of this research posited four alternative hypotheses. Descriptive statistics were used to inform these hypotheses.

Research Hypothesis One.

H_1: Institutions with higher percentages of at-risk students will have lower graduation rates.

Research Hypothesis Two.

H_1: At-risk student groups identified by age will have lower graduation rates than other student groups within the same institution.

Research Hypothesis Three.

H_1: At-risk student groups identified by gender will have lower graduation rates than other student groups within the same institution.

Research Hypothesis Four.

H_1: At-risk student groups identified by minority status will have lower graduation rates than other student groups within the same institution.

Quantitative data collection. Because this research is concerned with examining the environmental conditions that influence graduation rates within one state-governed university system, it was important to select a state with a comprehensive SUR system. Garcia and L'Orange (2009) reported that Montana had one of the most comprehensive, single source, state-governed SUR systems among the western states. All of the quantitative data used in this study were obtained from the U.S. Census Bureau, the NCES and OCHE. SUR data from the MUS Data Warehouse was provided in the form of a flat-file spreadsheet with associated pivot tables. No student identifiers were provided with the OCHE data. Table 9 summarizes the quantitative data and sources for this study as related to Katz and Kahn's (1978) open-systems characteristics.

Table 9.

Quantitative Data and Sources

Open System Characteristics[a]	Environmental Conditions Data	Data Sources
Importation of energy	Student body profile – age, gender, and minority status Regional demographics Campus demographics	MUS Data Warehouse U.S. Census Data BoR Reports
Output	Graduates (GR150 & GR200)	NCES IPEDS MUS Data Warehouse

[a]Katz & Kahn, 1978

Two categories of data were collected for quantitative analysis—demographic and graduation rates. All of the collected data were assumed to be accurate because they were gathered from reliable primary sources. County demographic data included median family and household incomes, and percentages of male, female and minority adults for each of the Montana counties with a MUS campus. Because the official United States census is conducted every ten years, the 2000 Census were used to obtain county demographic data. Campus demographic data included enrollment, gender, minorities for all students for the 2002 academic year (summer, fall, and spring terms). Table 10 shows a data collection template for the type and categories of demographic data collected for each MUS campus.

Table 10.

Quantitative Data Collection Template for Demographic Data

Campus Name			
Source	Type	Reference Date	Categories
U.S. Census	Adult population in county	2000	Median income Male Female Minority
Campus & OCHE	Student body profile	Summer 2001 Fall 2001 Spring 2002	Enrollment Female Male Minority

Graduation rate data were also collected for this study. Table 11 shows a template for the type and categories of IPEDS graduation rate data collected for each MUS campus. IPEDS graduation rates for each category were collected for each of the reference years shown. The reference years were tied to the cohort start date (fall 2001) and the 150- and 200-percent period-to-graduation for two- and four-year campuses.

Table 11.

Quantitative Data Collection Template for IPEDS Graduation Rates

Campus Name				
Method	Type	Reference Date 2-Year	Reference Date 4-Year	Categories
IPEDS	SRK freshman	Fall 2001	Fall 2001	Headcount Female Male Minority
	Beginning/fulltime student graduation rates	2004[a] 2005[b]	2008[a] 2010[b]	Headcount Female Male Minority

Note. [a]150% graduation rate (GR150). [b]200% graduation rate (GR200). The IPEDS GRS did not require reporting of GR200 until 2009.

Population. Montana was well suited for this study because all of the public colleges and universities representing the MUS are administered by one central body, the OCHE. The OCHE establishes the requirements for a uniform SUR system and is governed by the BoR. The MUS was selected for this research because it represents (a) a public, postsecondary system comprised of associate, baccalaureate, and post-baccalaureate degree granting institutions; (b) it is governed by one legislatively authorized body; and (c) it maintains a centralized SUR database.

In 2012, the BoR governed 16 public postsecondary institutions (Montana University System, 2012). The population for this study included 11 MUS campuses with reliable student unit records (SUR) stored in the MUS Data Warehouse for summer 2001, fall 2001, and spring 2002. Enrollment and graduation data from the 11 MUS campuses were analyzed to answer the Quantitative Research Question. Two of the currently recognized campuses (Bitterroot and Gallatin) did not exist in 2001 and Montana's three legislatively authorized community colleges (Dawson, Flathead Valley,

and Miles) were not required to report full SUR data sets to the MUS Data Warehouse in 2001. IPEDS-GRS data are available for the three community colleges, but the MUS Data Warehouse does not include the data elements necessary for inclusion in this study. Therefore, Dawson, Flathead Valley, and Miles Community Colleges were not included.

The defined population is not limited to first-time, full-time students enrolled in fall 2001. The population includes all first-time students, transfer students, and part-time students who initially enrolled in six or more postsecondary credits at any time during the 2001-2002 academic year (summer, fall, and spring terms).

Reliability and validity. The BoR and OCHE mandate what and how MUS data are collected, coded, and reported. The advantage to utilizing data from the MUS Data Warehouse is that the data have been vetted by campus registrars and OCHE staff members for accepted reliability and validity. The MUS data are reliable because they have been collected using consistent definitions and reporting formats. The MUS data are valid because they include raw student unit data that have undergone internal review (campus registrars) and external audit (OCHE). The MUS data have not been subject to secondary experimental analysis and interpretation.

Tyler Trevor (personal communication, April 27, 2011), OCHE Deputy Commissioner for Planning and Analysis, stated that the MUS Data Warehouse includes SURs dating back to a 1998 cohort; however, the 2001-2002 cohort is the first system-wide cohort that he has confidence in the reliability. Prior to 2001, the data definitions and reporting formats were neither standardized nor dependable.

Quantitative data analysis. The quantitative portion of this study demonstrated how graduation rates for all students vary within one state-governed postsecondary system. The unit of analysis is at the level of the institution not individual students. The population includes 11 MUS campuses. Inferential statistics were not used because the entire population was utilized; therefore, no inferences were necessary. To answer the quantitative research question, demographic data and IPEDS-GRS data were analyzed using descriptive statistics. However, the IPEDS-GRS data have been found to be too narrowly defined (Adelman, 2007; Cook & Pullaro, 2010). Because IPEDS data do not include all students, this study followed Adelman's (2007) recommendations with some modifications.

Modified Adelman method. Adelman's (2007) methodology was described in Chapter Two, but it is not fully compatible with the MUS definition of an academic year and the reporting intervals are not comparable with the IPEDS-GRS. Because of the inability of the MUS Data Warehouse to adjust to Adelman's academic year and the need to compare Adelman's graduation rate intervals with the IPEDS-GRS percent-period-to-graduation, this study modified Adelman's methodology (see Appendix B for permission). The differences between Adelman's method and this study are summarized in Table 12. A narrative describing the differences follows Table 12.

Table 12.

Differences between Adelman and This Study

	Method		
Definitions	Adelman	This Study	Difference
Academic Year:	July 1 to June 30	Summer, Fall and Spring Terms	The MUS tracks academic year enrollments from summer to the following spring. Adelman's method straddles the MUS summer term.
Cohort Group:			
	All students		
Age	18 to 24 years		No Change
	25 years and older		
Enrollment	Beginning students (≥6 credits)		No Change
	Transfer students (≥6 credits)		
Graduation Rate Reporting Intervals in Years:			
Associate	4 and 6	3 and 4	
Baccalaureate	6 and 9	6 and 8	Acknowledges current IPEDS methodology for GR150 and GR200.
Transfers	4 and 6	3 and 4	

Academic year. Adelman defined an academic year from July 1 of one year to June 30 of the following year. The MUS similarly defines an academic year and fiscal year from July 1 to June 30, but the MUS Data Warehouse tracks SURs by academic terms (summer, fall, and spring). Summer term in the MUS begins in May and ends in August—the MUS summer term straddles Adelman's academic year, which begins in July. Therefore, Adelman's definition of academic year was modified to begin summer term in one year, continue through the fall term, and finish at the end of the following spring term.

Cohort group. Adelman's method included all beginning students who enrolled in six or more credits at any time during the academic year. Adelman's beginning cohort group definition was more inclusive than the IPEDS-GRS method and it allowed for further breakdown by age, gender, minority status, and enrollment status. No modification of Adelman's cohort group definition was made for this study.

Graduation reporting intervals. Two years after Adelman proposed a longer percent-period-to-graduation, the U.S. Department of Education mandated Title IV institutions to report GR150 and GR200 to the NCES IPEDS, effectively adopting Adelman's proposal for a longer tracking period. Adelman's proposed graduation periods were slightly longer than the GR200; therefore, for the purposes of this study, Adelman's graduation reporting intervals were modified to be consistent with current IPED-GRS requirements.

Table 13 summarizes the graduation rate data resulting from the modified Adelman methodology. This is a more expansive data set than shown in Table 11 and it allows differentiation among student groups. The differentiated student groups were

evaluated based on risk factors (age, gender, and minority status). The reference years listed in Table 13 are tied to the cohort year (2011-2012) and the 150% and 200% graduation rates for two- and four-year campuses.

Table 13.

Quantitative Data Collection Template for Graduation Rates

Campus Name:				
Method	Type of Data	Reference Years		Categories
		2-Year	4-Year	
Modified Adelman	Beginning Student Cohort	AY 2001-2002		Headcount Female Male Minority
	Beginning student (≥6 credits) graduation rates	2005[a] 2006[b]	2008[a] 2010[b]	Graduates Female Male Minority
	Beginning 18- to 24-year olds (≥6 credits) graduation rates	2005[a] 2006[b]	2008[a] 2010[b]	Graduates Female Male Minority
	Beginning 25-year olds and above (≥ 6 credits) graduation rates	2005[a] 2006[b]	2008[a] 2010[b]	Graduates Female Male Minority
	All transfer students (≥ 6 credits) graduation rates	2005[a] 2006[b]	2008[a] 2010[b]	Graduates Female Male Minority

[a]150% graduation rate (GR150).
[b]200% graduation rate (GR200). IPEDS-GRS required reporting of GR200 in 2009.

Summary of quantitative analysis. Once all of the quantitative data were collected for each campus, they were analyzed with descriptive statistics to compare graduation rates resulting from the modified Adelman methodology employed for this study with graduation rates reported to the IPEDS GRS. The modified Adelman graduation rates were further analyzed to determine differences among campuses related to at-risk indicators delimited by age (>24), gender, and minority status. All of MUS graduation rate data were analyzed to answer the Quantitative Research Question, "How do graduation rates for all students vary within one state-governed postsecondary system?" The demographic data, and graduation rate data were incorporated in the qualitative cross-case analysis of environmental conditions to enrich the case study narrative.

Qualitative Research Design

In his book entitled *Multiple Case Study Analysis*, Robert Stake (2006) wrote, "the qualitative understanding of cases requires experiencing the activity of the case as it occurs in its contexts and in its particular situation" (p. 2). Stake argued that a case has both an inside and an outside, with some components falling within the case boundaries and some components falling outside the case boundaries. The outside components help to define the context, while the inside features help to define particular situations. To help researchers visualize and plan case research, Stake developed a worksheet (Figure 3) that graphically represents the relevant internal and external components and allows researchers to view the case relative to the main issues and questions to be answered. Stake's worksheet depicts the case as a full, heavily-bordered circle. Smaller, light-bordered circles overlapping the case boundary depict external components. The internal case components, which represent research activities and methodology, are depicted as pie sections within the case boundary. Issues and questions, foundational to the case study, are summarized in boxes beneath the full circle.

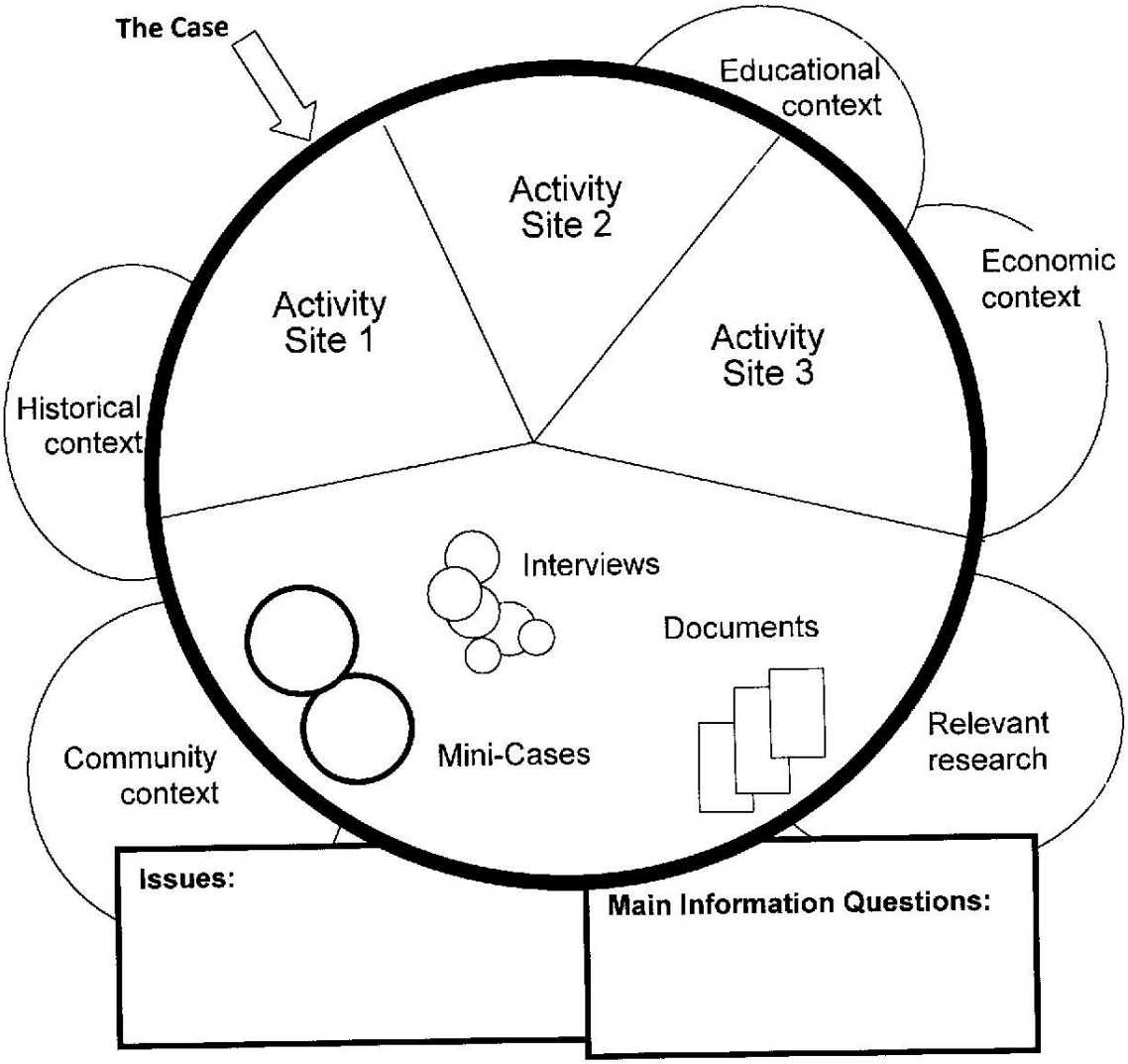


Figure 3. Stake's Graphic Design of a Case Study. From Multiple Case Study Analysis (p. 5), by R.E. Stake, 2006, New York: The Guilford Press. Copyright 2006 by The Guilford Press. Reprinted with permission.

The qualitative research design employed Stake's worksheet for viewing the external and internal components of the Montana University System as well as the main issues and questions relative to the case (Figure 4). The full, heavy-bordered circle represents the Montana University System. The smaller, light-bordered circles overlapping the case boundary represent external components that influence the case—MUS history, community characteristics, public postsecondary system policies and characteristics, relevant research, economic conditions, and performance funding. The pie sections within the case boundary depict internal components—graduation rates, campus characteristics and services, study-body characteristics, and research population and data sources. The identified postsecondary environmental conditions and qualitative questions are summarized in boxes. This study entailed a cross-case analysis of 11 postsecondary institutions viewed in the context of the national accountability agenda and in the situation of each campus' unique environmental conditions.

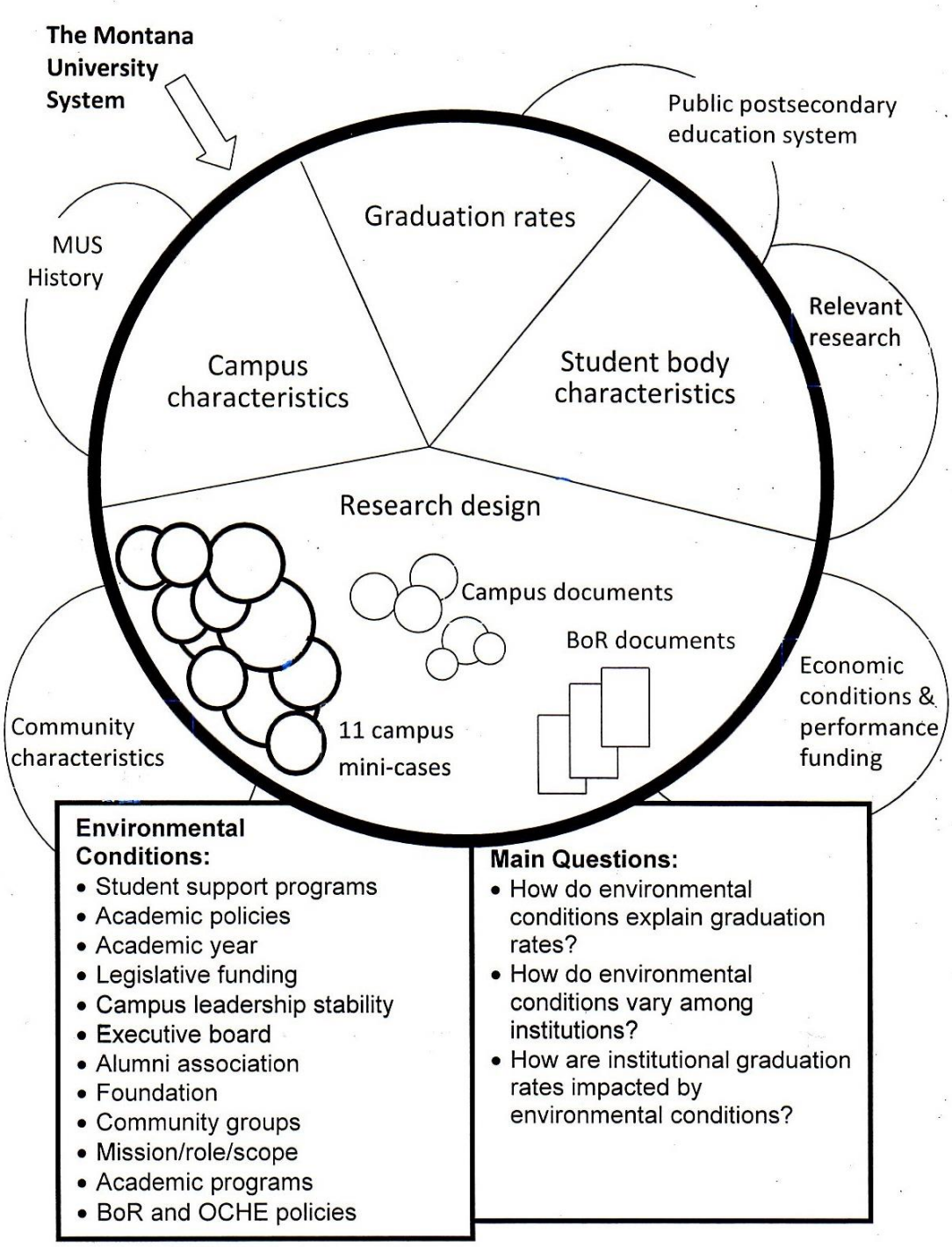


Figure 4. Montana University System Case Study. From *Multiple Case Study Analysis* (p. 5), by R.E. Stake, 2006, New York: The Guilford Press. Copyright 2006 by The Guilford Press. Adapted with permission.

Central Research Question. How do environmental conditions of a specific institution explain graduation rates within one state-governed postsecondary education system?

The qualitative analysis identifies and describes environmental conditions relating graduation rates in the MUS. In order to answer the central question, several subquestions were asked.

1. How do environmental conditions vary among institutions? (e.g., mission, role, scope and vision statements, incoming student profile [age, gender, and minority status], program offerings, regional demographics, funding, etc.)
2. How are institutional graduation rates impacted by environmental conditions?

Participants. This cross-case study examines 11 MUS campuses. Using Stake's (2006) case study terminology, each campus was a unique mini-case. The selection of mini-cases was limited to public postsecondary institutions with complete SURs in the MUS Data Warehouse for summer 2001, fall 2001, and spring 2002. The selection of the 2001-2002 academic-year cohort for the cross-case-study time boundary was determined based on a need to (a) use valid and reliable quantitative data, as verified by the OCHE, and (b) calculate 200% period-to-graduation rates (GR200) for four-year degree-seeking students (8 years after initial enrollment). Spring 2010 was the GR200 for baccalaureate students enrolled anytime during the 2001-2002 academic year.

Procedures. Each of the MUS campuses was treated as a unique mini-case. For each mini-case, BoR and campus documents were evaluated in the context Katz and Kahn's (1978) qualitative characteristics of an open system. Table 14 provides a

template for the data elements and the sources that were researched relative to open-system characteristics and environmental conditions. All of the collected data will be assumed to be accurate because they were gathered from primary sources.

Table 14.

Qualitative Data and Sources

Open System Characteristics[a]	Environmental Conditions[b]	Sources
Importation of Energy	Enrollment data & mean standardized test scores Financial allocation County demographics	MUS Data Warehouse BoR documents 2000 Census
Throughput	Student support programs Academic policies	College catalogs BoR documents
Output	Graduation rates[c]	This study
Cycles of events	Academic year Legislative funding	College catalogs MUS reports/budgets
Negative entropy	Stability of campus leadership Enrollment trends Financial trends	College catalogs/ websites BoR documents
Feedback	Alumni/Foundation Executive Board	College catalogs BoR reports
Steady state and dynamic homeostasis	Enrollment trends Financial trends	MUS Data Warehouse BoR documents
Differentiation	Mission/Role/Scope Academic programs	College catalogs BoR documents
Integration and coordination	IPEDs methodology BoR and OCHE	IPEDS BoR policy

Note. [a]Katz & Kahn, 1978. [b]A four-year record or fall-enrollment and fiscal-year data were tracked for two-year schools. An eight year record of fall enrollment and fiscal year data were tracked for four-year schools. [c]Graduation rates from the quantitative portion of this study were incorporated into the qualitative analysis.

In order to establish enrollment and financial trends that coincide with the IPEDS-GRS percent-period-to-graduation (GR150 and GR200), four years of fall enrollment (2001 to 2004) and fiscal-year (2002 to 2006) data were collected for two-year institutions. Eight years of fall-enrollment (2001-2009) and fiscal-year (2002 to 2010) data were tracked for four-year institutions.

Trustworthiness. Consistent with Lincoln and Guba (1985), Merriam (2009, pp. 209-228) suggested that qualitative research should be concerned with credibility rather than internal validity, consistency rather than reliability, and transferability rather than generalizability or external validity. Credibility, consistency, and transferability are the terms used to address the quality of this qualitative research. Creswell (2013, pp. 250-253) recommended qualitative researchers use at least two verification procedures to establish trustworthiness of a study. This study employed six verification procedures—(a) member checks, (b) triangulation, (c) rich, thick descriptions, (d) clarifying researcher bias, (e) peer review, and (f) external audit. Individually these procedures addressed data credibility, consistency and transferability; collectively they ensured trustworthiness.

Member checks. Even though the qualitative data were collected from primary source documents and assumed to be accurate, the research design allows for clarification and validation through member checks with MUS personnel.

Triangulation. The research design employed multiple methods of inquiry (e.g., quantitative and qualitative, IPED-GRS methodology, and the modified Adelman methodology), multiple primary sources of system and campus data (BoR documents,

census data, campus catalogs, websites, etc.), and multiple institutions (11 MUS campuses).

Rich, thick descriptions. The research design ensures transferability because each mini-case included detailed narratives of the Katz and Kahn's (1978) common characteristics at each MUS campus. The shared characteristics were easily identified via the descriptive narrative.

Clarifying researcher's bias. Yin (2009) stated case-study researchers need to demonstrate their prior experience and knowledge of a case-study topic. The data collection and analysis activities were conducted by the researcher who is a veteran MUS administrator. This researcher has been a MUS administrator since 1994 (program director from 1994-1998, academic dean from 1999 to 2013, interim assistant provost since 2013). Although responsible for generating enrollment and promoting student success, this researcher has no responsibility for collecting SUR information or for reporting institutional data to the NCES or MUS.

This researcher is well versed in the system-level discussions that have occurred around establishment of performance metrics and is familiar with the types of system-level data and policies that pertain to performance metrics. At the time of this research, the researcher served the MUS as a member of several state-level leadership committees—College!Now Implementation Team, Two-Year Council, eLearning Committee, Adult Basic Education Workgroup, and Developmental Education Workgroup.

Although a native of Montana and a graduate student at the University of Montana Missoula, the researcher's own formative educational experiences occurred in Africa, New Mexico, and California. It is these experiences, along with experience as a TRiO program director, which have cumulated her recognition of educational disparities among socioeconomic groups. As dean of lifelong learning programs, the researcher is additionally aware that traditional national student success indicators do not adequately measure adult student success.

Peer review. The research design included a peer reviewer. Creswell (2003) stated a peer reviewer's roll is to provide an external check of the research process, ask questions, and serve as a devil's advocate. The peer review was provided by the researcher's advisor and dissertation chair, Dr. Bill McCaw.

External audit. The research design included an external audit in the form of dissertation committee members. Lincoln and Guba (1985) and Merriam (1988) described the function of an external auditor as examining both the process and product of the research and assessing its accuracy. The external auditors' roles were examine the findings, interpretations, and conclusions—they had no direct connection to the study. The external auditors included Drs. Frances O'Reilly, John Matt, Roberta Evans, and Arlene Walker-Andrews.

Qualitative data analysis. Katz and Kahn's (1978) first nine characteristics of open systems (Table 8, p. 77) provided the conceptual framework to initially organize the qualitative data. Environmental conditions related to each of the characteristics were summarized in case narratives for each MUS campus mini-case. Potential sources to collect data on environmental conditions are summarized in Table 8. These sources

included primary MUS documents, BoR documents, IPEDS-GRS data, MUS Data Warehouse data, campus catalogs, U.S. Census data, and websites.

Once the environmental conditions data for each mini-case were collected and summarized, the data were coded to aid the cross-case analysis. Initial codes were assigned based on degree-granting mission. Secondary coding was necessary to further elicit patterns from the environmental conditions data and to identify general themes (Saldana, 2009). All of the primary data were entered into a flat-file spreadsheet and then processed into summary tables using pivot table tools in Microsoft Excel™. The summary tables assisted with the cross-case analysis. The cross-case analysis was conducted to identify emergent patterns between environmental conditions and graduation rates and to answer the Central Research Question and associated subquestions.

Summary of Chapter Three

The purpose of this study was to examine nationally defined graduation rates as a performance indicator of institutional effectiveness in twenty-first century, public, postsecondary institutions in Montana. The General Research Question guiding this research was: How can open-system theory inform practice in evaluating effectiveness of postsecondary institutions. The research design mixes quantitative and qualitative methods in a cross-case study of a unified, state-governed postsecondary system. The Quantitative Research Question was: How do graduation rates for all students (fulltime, part-time, beginning and transfer) vary within one state-governed postsecondary education system? The Central Research Question was: How do environmental

conditions of a specific institution explain graduation rates within one state-governed postsecondary education system?

The population for this study consisted of 11 campuses of the Montana University Systems. Data stored in the MUS Data Warehouse was used to calculate graduation rates using a modified Adelman methodology. The methodology allowed for inclusion of transfer students, returning students, and part-time students—these student groups are excluded from the IPEDS GRS. Graduation rates resulting from the modified Adelman methodology were compared with graduation rates reported to the IPEDS GRS. Both graduation metrics were included in a cross-case analysis of environmental conditions at each of the eleven campuses. The MUS and individual campuses, provided primary source materials for the environmental conditions data. Katz and Kahn's (1978) open-system characteristics provided the framework for coding the environmental conditions and conducting the qualitative analysis. The qualitative cross-case analysis of 11 delimited campuses followed Senge's systems thinking approach to examine interrelationships and patterns of environmental conditions in order to understand how structural conditions affect institutional effectiveness. The research design answered the General Research Question by employing elements of open-system theory to evaluate effectiveness of postsecondary institutions in Montana.

Chapter Four – Results and Analysis

The purpose of this study was to examine graduation rates as one of several indicators of institutional effectiveness in twenty-first century, public, postsecondary institutions in Montana. Three research questions guided the study—a general question, a quantitative question, and a central question. The methodology used to collect data was presented in Chapter Three. The data and analysis related to each of the research questions follow in this chapter. Data resulting from the quantitative and qualitative analyses are reported first. The cross-case analysis emerges from patterns identified in the quantitative and qualitative data for each of the 11 campuses. Although this study is delimited to 11 campuses, the campus data reported to and provided by the OCHE allowed for analysis of 13 mini-cases. The University of Montana Western and Montana State University-Northern have dual two-year and four-year missions, which made up the additional mini-cases. Mini-case acronyms are used to simplify presentation of the data. The acronyms were established by Tyler Trevor in the OCHE and are summarized in Table 15. Supporting summary data tables are included in Appendix A. Findings and conclusions are addressed in Chapter Five.

Table 15.

Montana University System Campus Names, Mini-Case Acronyms, and Degree-Granting Mission

Campus Name	Mini-case Acronym	Mission[a]
Montana State University Campuses:		
Montana State University – Bozeman	MSU	4
Montana State University – Billings	MSUB	4
Montana State University - Billings College of Technology	MSUB COT	2
MSU Great Falls College of Technology	MSU GF COT	2
Montana State University – Northern	MSUN	4
Montana State University – Northern	MSUN (2 Yr)	2
University of Montana Campuses:		
University of Montana	UM	4
University of Montana College of Technology	UM COT	2
Montana Tech	TECH	4
Montana Tech College of Technology	TECH COT	2
University of Montana Helena College of Technology	UM HLN COT	2
University of Montana Western	UMW	4
University of Montana Western	UMW (2 Yr)	2

Note. [a]Mission is based on two- or four-year degree granting status.

Quantitative Data and Analysis

The quantitative data describe internal and external characteristics and environmental conditions relevant to each mini-case. Viewed in the context of Katz and Kahn's (1978) open-systems characteristics, the demographic and enrollment information describe qualities of energy inputs, the graduation-rate data describe qualities of system output. This section presents the results of the quantitative data collection efforts and identifies emergent patterns among the delimited campuses. The

quantitative data comprise demographic information, enrollment information, and graduation rates for each MUS campus and mini-case.

Demographic data. Two types of demographic data were collected—county census data and campus demographic data. The county census data established an indirect measure of the quality of external environmental conditions. The campus demographic data described the student-body profile and established a direct measure of internal environmental conditions. Each type of demographic data is presented as follow.

County census data. The 11 MUS campuses included in this study are located in eight counties. Table 16 lists the eight counties and summarizes county, state, and national data from the 2000 Census Profile (U.S. Census, 2000). The demographic data categories include population statistics; percentages of males, females, and minorities; and median household and family incomes.

Table 16.

County, State, and National Demographic Data

County	Population		Gender (%)		Minority	Median Income ($)	
	No.	%	Male	Female	%	Household	Family
Beaverhead	9,202	1.0	51.2	48.8	4.1	28,962	39,971
Cascade	80,357	8.9	49.5	50.5	9.3	32,971	39,949
Gallatin	67,831	7.5	52.0	48.0	3.8	38,120	46,639
Hill	16,673	1.8	49.8	50.2	20.5	30,781	38,179
Lewis & Clark	55,716	6.2	49.1	50.9	4.8	37,360	46,766
Missoula	95,802	10.6	50.0	50.0	6.0	34,454	44,865
Silver Bow	34,606	3.8	49.4	50.6	4.6	30,402	40,018
Yellowstone	129,352	14.3	48.8	51.2	7.2	36,727	45,277
Montana	902,195	100	49.8	50.2	9.4	33,024	40,487
United States	281,421,906	100	49.1	50.9	24.9	41,994	50,046

Note. Population percentages reported for counties are based on the Montana population. All other percentages are based on county populations. (U.S. Census Bureau, 2000)

The eight counties comprised 54% of the Montana population and less than 0.2% of the United States population in 2000. Similar to the state and the nation, the ratio of males to females was roughly 49:51 or 50:50. Beaverhead and Gallatin counties had a slightly higher percentage of males (51.2% and 52%, respectively). Yellowstone County had a slightly lower percentage of males (48.8%). Minorities comprised nearly

25% of the nation's population in 2000—minorities comprised less than 10% of Montana's population in 2000. Montana's minority population was largely Native American (69%) and Hispanic (21%). Hill County (20.5% minority) was the only Montana county with a MUS campus that approached the national percentage (24.5%) for minorities. All other Montana counties with MUS campuses had minority populations below the state minority population of 9.4%. Cascade and Yellowstone counties were the closest to the state percentage with minority populations of 7.2% and 9.3%, respectively. Gallatin County had the lowest percentage of minorities (3.8%). None of the eight counties had median household or family incomes above the national averages ($41,994 and $50,046, respectively). Four counties—Gallatin ($38,120 and $46,639), Lewis and Clark ($37,360 and $46,766), Missoula ($34,454 and $44,865), and Yellowstone ($36,727 and $45,277)—had median household and family incomes greater than the Montana averages ($33,024 and $40,487, respectively). The lowest median household income for the eight counties was reported for Beaverhead County ($28,962). The lowest median family income for the eight counties was reported for Hill County ($38,179). The U.S. Census Bureau (2000) defines household income as the sum income of all people greater than 15 years living in a house. Family income is defined as the sum income of all family members older than 15 years. Family members must be related by birth, marriage, or adoption. Table 17 shows each county's rankings relative to the demographic categories.

Table 17.

County Rankings based on Demographic Categories

County	Population	Gender		Minority	Median Income	
		Male	Female		Household	Family
Beaverhead	8	2	7	7	8	6
Cascade	3	5	4	2	5	7
Gallatin	4	1	8	8	1	2
Hill	7	4	5	1	6	8
Lewis & Clark	5	7	2	5	2	1
Missoula	2	3	6	4	4	4
Silver Bow	6	6	3	6	7	5
Yellowstone	1	8	1	3	3	3

Note. All ordinal rankings are listed from highest value (1) to lowest value (8).

Campus demographic data. The 11 MUS campuses included in this study are located in eight counties. Table 18 lists the eight counties, identifies which campuses are located in each county, and summarizes 2001 beginning student demographic data supplied by the OCHE. Some county demographic data are duplicated from Table 16 for comparison with the campus demographic data. The campus demographic data categories include population statistics; percentages of males, females, and minorities; and average standardized ACT and SAT scores for incoming fulltime freshmen for fall 2001.

Table 18.

Campus Demographic Data for 2001 Beginning Student Cohort

County & Mini-cases	Population		Gender		Minority	Standardized Test Scores[c]	
			Male	Female			
	#[a]	%[b]	%	%	%	ACT	SAT
Beaverhead	9,202		51.2	48.8	4.1		
UMW	277	3.0	52	48	9	19.9	931
UMW (2 Yr)	9	0.1	11	89	11	--	--
Cascade	80,357		49.5	50.5	9.3		
MSU GF COT	628	0.8	40	60	13	20.3	946.9
Gallatin	67,831		52	48	3.8		
MSU	2,820	4.2	56	44	4	23.2	1105.3
Hill	16,673		49.8	50.2	20.5		
MSUN	350	2.1	51	49	24	19.8	966.6
MSUN (2 Yr)	33	0.2	48	52	18	--	--
Lewis and Clark	55,716		49.1	50.9	4.8		
UM HLN COT	377	0.7	59	41	8	--	--
Missoula	95,802		50	50	6.0		
UM	2,822	2.9	49	51	8	22.6	1085.6
UM COT	495	0.5	44	56	9	19.5	955.9
Silver Bow	34,606		49.4	50.6	4.6		
TECH	397	1.1	62	38	6	23.1	1093.7
UM TECH COT	175	0.5	40	60	5	18.5	926.3
Yellowstone	129,352		48.8	51.2	7.2		
MSUB	1,107	0.9	36	64	13	21.0	989.1
MSUB COT	254	0.3	52	48	7	18.5	1003

Note. -- Data not available. [a] Mini-case numbers based on Beginning Student Cohort (AY 2001-2002). [b]Percent calculated relative to county population. [c]Average ACT and SAT scores based on IPEDS cohort (Fall 2001). (MUS Data Warehouse, 2014; U.S. Census Bureau, 2000)

During the 2001-2002 academic year, 9,854 beginning students (18 years and older, taking six or more credits) were admitted to the 11 campuses in this study. The beginning student cohort (AY2001-2002) represented 1% of the state's population and 2% of the eight combined county populations in this study. Seventy-eight percent of the beginning student cohort enrolled in four-year campuses; 21% in two-year campuses. Higher percentages of males enrolled in the four-year campuses; higher percentages of females enrolled in two-year campuses. Male enrollment exceeded female enrollment at five campuses (MSU, MSUN, UM HLN COT, TECH, and MSUB COT). Female enrollment exceeded male enrollment at eight campuses (UMW, UMW (2 Yr), MSU GF COT, MSUN (2 Yr), UM, UM COT, UM TECH COT, and MSUB). Unlike the national student demographics described in Chapter Two (p. 36), females did not constitute a majority of MUS students during the 2001-2002 academic year. Females constituted 48% of the IPEDS cohort and 50% of the beginning student cohort. The percentage of minority student enrollments was generally higher at all MUS campuses than the percentage of minorities living in the surrounding county. Although Native American students comprised 1% of national higher education enrollments (Table 2, p. 36), they comprised 3.8% of MUS enrollments. Forty-nine percent of minority enrollments in the MUS were Native American students. Hispanic (1.5%), Asian (1.3%), and Black (0.5%) students comprised 42.5% of minority enrollments in the MUS. The average percentage of combined minority enrollments in two- and four-year campuses was nearly equal (10.1 and 10.6, respectively); however, a slightly higher average percentage (0.5) of minority students enrolled in four-year campuses. Mean Average ACT and SAT scores for the beginning student cohort were higher at four-year campuses (21.6 and 1029, respectively) than at two-year campuses (19.2 and 958, respectively). Table 19

shows mini-case rankings relative to data values for each demographic category. Mini-case names in Table 19 are ordered based on descending ACT test score rankings rather than county affiliation. The reordering based on rank facilitated data analysis and identification of patterns.

Table 19.

Rankings of Mini-case Demographic Data

Mini-cases	Population	Male	Female	Minority	Standardized Test Scores[a]	
					ACT	SAT
MSU	2	3	10	13	1	1
TECH	6	1	12	11	2	2
UM	1	6	7	8	3	3
MSUB	3	12	2	3	4	5
MSU GF COT	4	9	3	3	5	8
UMW	10	4	9	6	6	9
MSUN	9	5	8	1	7	6
UM COT	5	8	5	6	8	7
MSUB COT	8	11	13	10	9	4
UM TECH COT	11	9	3	12	9	10
UMW (2 Yr)	13	13	1	5	--	--
MSUN (2 Yr)	12	7	6	2	--	--
UM HLN COT	7	2	11	8	--	--

Note. -- Data not available. All ordinal rankings are listed from highest value (1) to lowest value (13). Rankings based on demographics of Beginning Student Cohort (AY 2001-2002). [a]Average ACT and SAT scores based on IPEDS cohort (Fall 2001). (MUS Data Warehouse, 2014)

Tables 18 and 19 show the six, four-year mini-cases generally enrolled students with higher standardized test scores than the two-year mini-cases. MSU GF COT was the only two-year exception, ranking 5th in ACT scores. Standardized test scores were

not available for UMW (2 Yr), MSUN (2 Yr), and UM HLN COT. MSU (23.2 and 1105.3), TECH (23.1 and 1093.7), and UM (22.6 and 1085.6) had the highest average ACT and SAT scores. MSU and TECH also enrolled higher percentages of males (56% and 62%, respectively) and lower percentages of minority students (4% and 6%, respectively). The highest percentages of females were enrolled at UMW (2 Yr) (89%), MSUB (64%), and UM TECH COT (56%). The highest percentages of minorities were enrolled at MSUN (24%), MSUN (2Yr) (18%), MSUB (13%), and MSU GF COT (13%).

Beginning student enrollment data. Table 20 shows beginning student enrollment data for each of the 13 mini-cases for the 2001 to 2002 academic year. The beginning student enrollment data were not delimited by age (≥18 years); therefore, the reported totals are higher than totals reported for the IPEDS's freshman fall cohort and this study's modified Adelman beginning student cohort.

The data in Table 20 document the total number of beginning student enrollments during academic year 2001-002, the total number of beginning students enrolled in six or more credits, and the total number of beginning students enrolled in 12 or more credits. The percentage data in Table 20 show that Adelman's credit delimitation (students enrolled in 6 or more credits) captured more than 90 percent of students in 12 of the 13 mini-cases. Only 77% of MSU GF COT students enrolled in six or more credits during the 2001-2002 academic year. The percentage data show that the IPEDS credit delimitation (students taking 12 or more credits) captures less than 90 percent of the total number of students enrolled in all of the mini-cases. These enrollment percentages indicate that MSUN, UMW (2 Yr), and MSU GF COT enrolled the highest

percentages of part-time students. UMW, UM and TECH enrolled the lowest percentages of part-time students.

Table 20.

Beginning Student Enrollment Data for Academic Year 2001-2002

Mini-cases	Academic Year 2001-2002 Enrollments					
	Total	6 or more credits		12 or more credits		
	#	#	%	#	% of Total	% of 6 or more credits
UMW	327	296	91	273	83	92
UM	2,940	2,869	98	2,627	89	92
TECH	411	403	98	366	89	91
MSU	2,916	2,825	97	2,500	86	88
UM COT	593	552	93	475	80	86
MSUN (2 Yr)	34	34	100	29	85	85
UM TECH COT	200	180	90	150	75	83
UM HLN COT	402	393	98	327	81	83
MSUB COT	300	277	92	230	77	83
MSUB	1,189	1,120	94	921	77	82
MSUN	428	401	94	287	67	72
UMW (2 Yr)	13	12	92	6	46	50
MSU GF COT	883	677	77	336	38	50
Total	10,636	10,039	94	8,527	80	85

Note. Enrollment totals do not match the beginning student cohort data reported in Table 18 because the number includes all students—those enrolled in less than six credits and those that are less than 18 years of age. (MUS Data Warehouse, 2014)

Graduation data. Two sets of graduation rate data are reported from this study. The first set is IPEDS-GRS data extracted from the MUS Data Warehouse and reported by the OCHE. The second set is calculated following the modified Adelman methodology described in Chapter Three. Graduation rates resulting from the IPEDS-GRS and modified Adelman methodologies are compiled in 15 tables included in Appendix A (Tables A1 through A15). Table A1 summarizes graduation rates for students included in all of the MUS two-year mini-cases. Table A2 summarizes graduation rates for students in all of the MUS four-year mini-cases. Tables A3 through A8 summarize campus-specific graduation rates for two-year mini-cases. Tables A9 through A15 summarize campus-specific data for four-year mini-cases. The data from these tables are analyzed below to answer the Quantitative Research Question and to contribute to the qualitative understanding of the MUS case.

IPEDS graduation rates. The IPEDS-GR150 data for the fall 2001 cohort are summarized in Table 21. Mini-cases in Table 21 are ordered based on descending cohort graduation rates. IPEDS-GR150 rates for the MUS (2 Yr) case and MUS (4 Yr) case are also listed in Table 21. Readers should note the reported IPEDS-GR150 value for the MUS (2 Yr) case includes graduate data from the four community colleges excluded from this study. It was not possible to extract the community college data from the reported IPEDS-GR150 value for the MUS (2 Yr) case.

Table 21.

IPEDS-GR150 Graduation Rates

Mini-Cases	IPEDS-GR150 Graduation Rates (%)							
	Cohort		Males		Females		Minority	
	%	(n)	%	(n)	%	(n)	%	(n)
UM HLN COT	59.9	(162)	62.2	(111)	54.9	(51)	60	(10)
MSU	47.7	(1,720)	52.8	(989)	43.9	(731)	40.7	(54)
TECH	41	(271)	47.8	(180)	27.5	(91)	23.1	(13)
UM	40.8	(1,846)	36.5	(891)	44.8	(955)	25	(112)
UM COT	40.4	(297)	34.8	(155)	46.5	(142)	32	(25)
UMW	34.7	(173)	29.2	(89)	40.5	(84)	42.9	(14)
MSUB COT	33.8	(133)	42.1	(76)	22.8	(57)	9.1	(11)
MSUB	28.8	(514)	20.9	(177)	32.9	(337)	30.3	(54)
UM TECH COT	24.2	(91)	11.4	(40)	36.2	(47)	28.6	(7)
MSUN	22.4	(165)	23.9	(92)	20.5	(73)	13.8	(29)
MSU GF COT	17.6	(136)	14.9	(47)	19.1	(89)	11.8	(17)
MSUN (2 Yr)	16.7	(12)	22.2	(9)	0	(3)	0	(2)
UMW (2 Yr)	0	(2)	0	(1)	0	(1)	0	(0)
MUS (2 Yr)[a] Case	36.6	(1,352)	36.6	(697)	36.6	(655)	28.7	(101)
MUS (4 Yr) Case	41	(4,689)	44	(2,418)	38.5	(2,271)	26.1	(276)

Note. Cohort based on Fall 2001, first-time, full-time freshmen enrollment. [a]The MUS (2 Yr) IPEDS-150 graduation rates include community college data. (MUS Data Warehouse, 2014)

Results of the IPEDS-GR150 graduation rates reported in Table 21 are similar to the ACT score rankings and demographic data reported in Table 19 (p. 109) with several exceptions: (a) the UM HLN COT moved to the top of the ranking and (b) three two-year mini-cases moved into the top seven rankings. The average IPEDS-GR150 graduation rate was higher for the MUS (4 Yr) case (41.0%) than for MUS (2 Yr) case (36.6%), but MSU (47.7%) and TECH (41.0%) were the only four-year mini-cases with higher IPEDS-GR150 graduation rates than the MUS (4 Yr) case rate of 41.0%. UM HLN COT (59.9%) and UM COT (40.4%) were the only two-year mini-cases with

higher IPEDS-GR150 rates than the MUS (2 Yr) case rate (36.6%). Two of the top three mini-cases with high graduation rates reported in Table 21—UM HLN COT (59.9%), MSU (47.7%), and TECH (41.0%)—correlate with the two mini-cases (MSU and TECH) with the highest standardized test scores reported in Table 19 (p. 109). Standardized test scores were not available from the MUS Data Warehouse or IPEDS for UM HLN COT; however, similar to MSU and TECH, Table 18 (p. 107) shows the UM HLN COT mini-case had a high percentage of male students (59%) and low percentage of minority students (8%). MSU and UMW ranked the highest among the four-year mini-cases in Table 21 for minority IPEDS-GR150 graduation rates (42.9% and 40.7%, respectively).

Table 22 shows ordinal rankings of IPEDS-GR150 graduation rates for each mini-case based on the cohort, male, female, and minority students. The UM HLN COT IPEDS-GR150 graduation rates ranked highest in all categories—cohort, male, female, and minority students. MSU and TECH IPEDS-GR150 graduation rates ranked the highest for males among the four-year mini-cases. Males graduated at higher rates than females at three of the six, four-year mini-cases—MSU, TECH, and MSUN. Males graduated at higher rates than females at three of the seven, two-year mini-cases—UM HLN COT, MSUB COT, and MSUN (2 Yr). Males comprised a higher percentage of the population at each of these two- and four-year mini-cases. UMW (2 YR) ranked last with zero IPEDS-GR150 graduates.

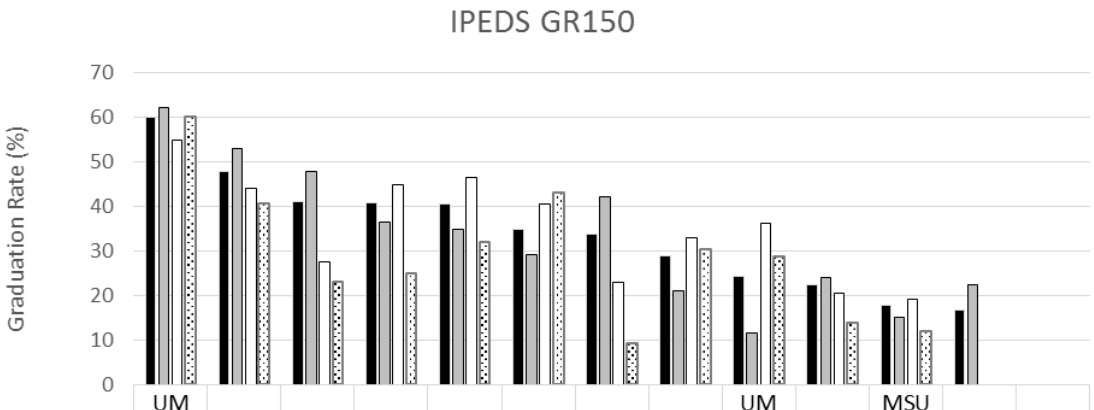
Table 22.

Mini-Case Rankings by Fall 2001 IPEDS-GR150 Rates

Mini-Cases	IPEDS-GR150 Rankings			
	Cohort	Males	Females	Minority
UM HLN COT	1	1	1	1
MSU	2	2	4	3
TECH	3	3	8	8
UM	4	5	3	7
UM COT	5	6	2	4
UMW	6	7	5	2
MSUB COT	7	4	9	11
MSUB	8	10	7	5
UM TECH COT	9	12	6	6
MSUN	10	8	10	9
MSU GF COT	11	11	11	10
MSUN (2 Yr)	12	9	12	12
UMW (2 Yr)	13	13	12	12

Note. All ordinal rankings are listed from highest value (1) to lowest value (13). Cohort based on Fall 2001, first-time, full-time freshmen enrollment. (MUS Data Warehouse, 2014)

Figure 5 illustrates the rank order of MUS mini-cases relative to IPEDS-GR150 cohort graduation rates. IPEDS-GR150 graduation rates for male, female, and minority students are also depicted. The general downward trends for cohort, male, female, and minority graduation rates are similar; however, Figure 5 shows striking proportional differences for male, female, and minority success among the mini-cases. These differences will be examined further in the cross-case analysis.



	UM HLN COT	MSU	TECH	UM	UM COT	UMW	MSUB COT	MSUB	UM TECH COT	MSUN	MSU GF COT	MSUN (2 Yr)	UMW (2 Yr)
Cohort	59.9	47.7	41	40.8	40.4	34.7	33.8	28.8	24.2	22.4	17.6	16.7	0
Males	62.2	52.8	47.8	36.5	34.8	29.2	42.1	20.9	11.4	23.9	14.9	22.2	0
Females	54.9	43.9	27.5	44.8	46.5	40.5	22.8	32.9	36.2	20.5	19.1	0	0
Minority	60	40.7	23.1	25	32	42.9	9.1	30.3	28.6	13.8	11.8	0	0

Figure 5. IPEDS-GR150 graduation rates for each MUS mini-case. Rank order of campuses on horizontal axis is based on descending cohort graduation rates.

Modified Adelman. This study utilized a modified Adelman (2007) methodology to calculate graduation rates. Adelman's method expanded the definition of the beginning student cohort to include all students, 18 years and older, taking six or more credits, who matriculated within an academic year. Adelman's methodology differentiated students based on age and transfer status, and extended the graduation reporting intervals to include GR150 and GR200. Minor modifications to Adelman's method were necessary for this study and were fully described in Chapter Three. This section presents graduation rate results for (a) the beginning student cohort, (b) 18- to 24-year old students, (c) ≥25-year old students, and (d) transfer students. A graduation rate prefix was used to differentiate between each student group. The prefixes included *BSC* for beginning student cohort, *1824* for 18- to 24-year old students, *≥25* for ≥25-year

old students, and *TRNS* for transfer students. Each group (BSC, 1824, ≥25 and TRNS) was disaggregated into male, female, and minority students.

Beginning student cohort (BSC). The BSC-GR150 and BSC-GR200 graduation rates are summarized in Tables 23 and 24. Table 23 summarizes the BSC-GR150 graduation data. Table 24 summarizes the BSC-GR200 graduation data. Mini-case listings in Tables 23 and 24 are ordered based on descending BSC-cohort graduation rates.

Table 23.

GR150 Graduation Rates for the Beginning Student Cohort

Mini-Cases	BSC-GR150 Graduation Rates (%)							
	Cohort		Males		Females		Minority	
	%	(n)	%	(n)	%	(n)	%	(n)
MSU	45.1	(2,820)	41.7	(1,587)	49.6	(1,233)	37.3	(123)
UM	41.6	(2,822)	38.6	(1,378)	44.4	(1,444)	28.6	(227)
TECH	41.1	(397)	47.2	(248)	30.8	(149)	31.8	(22)
MSUN (2 Yr)	36.4	(33)	25.1	(16)	47.1	(17)	16.7	(6)
UM HLN COT	36.0	(377)	39.0	(223)	31.8	(154)	34.5	(29)
UM COT	35.5	(495)	23.8	(218)	44.7	(277)	20.0	(45)
MSUB COT	33.5	(254)	33.1	(133)	33.9	(121)	15.4	(26)
UMW	30.7	(277)	26.6	(143)	35.1	(134)	28.0	(25)
MSUB	25.6	(1,107)	21.5	(399)	28.0	(705)	13.0	(146)
MSUN	22.3	(350)	25.4	(177)	19.2	(172)	15.6	(83)
UMW (2 Yr)	22.2	(9)	0.0	(1)	25.0	(8)	100	(1)
UM TECH COT	14.9	(175)	12.9	(70)	16.2	(105)	20.0	(8)
MSU GF COT	5.1	(628)	4.0	(249)	5.8	(379)	2.4	(82)
MUS (2 Yr)[a] Case	23.8	(1,971)	22.7	(910)	24.8	(1,061)	14.5	(199)
MUS (4 Yr) Case	39.3	(7,773)	37.7	(3,932)	41	(3,837)	24.7	(626)

Note. Cohort based on beginning student cohort for Academic Year 2001-2002. [a]MUS (2 Yr) graduation rates for this study do not include community college data. (MUS Data Warehouse. 2014)

Table 24.

GR200 Graduation Rates for the Beginning Student Cohort

Mini-Cases	BSC-GR200 Graduation Rates (%)							
	Cohort		Males		Females		Minority	
	%	(n)	%	(n)	%	(n)	%	(n)
MSU	48.4	(2,820)	45.4	(1,587)	52.4	(1,233)	37.3	(123)
UM	44.3	(2,822)	41.6	(1,378)	46.8	(1,444)	31.2	(227)
TECH	42.6	(397)	48.0	(248)	33.5	(149)	36.3	(22)
MSUN (2 Yr)	39.4	(33)	25.1	(16)	53.0	(17)	16.7	(6)
UM COT	39.1	(495)	26.1	(218)	49.4	(277)	24.4	(45)
UM HLN COT	38.1	(377)	39.4	(223)	36.3	(154)	34.5	(29)
MSUB COT	36.6	(254)	36.1	(133)	37.2	(121)	15.4	(26)
UMW	32.9	(277)	27.3	(143)	38.8	(134)	32.0	(25)
MSUB	27.6	(1,107)	22.3	(399)	30.6	(705)	15.1	(146)
MSUN	22.6	(350)	25.4	(177)	19.8	(172)	15.6	(83)
UMW (2 Yr)	22.2	(9)	0.0	(1)	25.0	(8)	100.0	(1)
UM TECH COT	15.5	(175)	12.9	(70)	17.2	(105)	20.0	(8)
MSU GF COT	7.2	(628)	6.0	(249)	7.9	(379)	6.1	(82)
MUS (2 Yr)[a] Case	26.3	(1,971)	24.3	(910)	28.0	(1,061)	17.0	(199)
MUS (4 Yr) Case	41.9	(7,773)	40.4	(3,932)	43.6	(3,837)	26.8	(626)

Note. Cohort based on beginning student cohort for Academic Year 2001-2002. [a]MUS (2 Yr) graduation rates for this study do not include community college data. (MUS Data Warehouse, 2014)

Adelman's (2007) more inclusive cohort definition—beginning students, 18 years and older, taking six or more credits at any time during the academic year—resulted in lower MUS (2 Yr) case and MUS (4 Yr) case graduation rates than reported for IPEDS-GR150 (Table 21). MSU (45.1%), UM (41.6%), and TECH (41.1%) had the highest BSC-GR150 graduation rates and were all above the MUS (4Yr) case rate of 39.3% for four-year mini-cases. MSUN (2 Yr) and UM HLN COT had the highest BSC-GR150 rates for two-year mini-cases (36.4% and 36.0%, respectively). Four of the two-year mini-cases had BSC-GR150 graduation rates above the MUS (2 Yr) case rate

of 23.8%—MSUN (2 Yr) (36.4%), UM HLN COT (36.0%), UM COT (35.5%), and MSUB COT (33.5%).

The BSC-GR150 graduation rates were generally lower than the IPEDS-GR150 graduation rates summarized in Table 21. Not all campus BSC-GR150 rates were lower—UM, TECH, MSUN (2 Yr) and UMW (2 Yr) had higher BSC-GR150 rates. The UM and TECH BSC-GR150 rates (41.6% and 41.1%, respectively) were only slightly higher than the UM and TECH IPEDS-GR150 rates (40.8% and 41.0%, respectively). The MSUN (2 Yr) and UMW (2 Yr) BSC-GR150 rates (36.4% and 22.2%, respectively) were approximately 20 percentage points higher than the MSUN (2 Yr) and UMW (2 Yr) IPEDS-GR150 rates (16.7% and 0.0%, respectively). UM HLN COT recorded the greatest difference between IPEDS- and BSC-GR150 graduation rates (59.9% and 36.0%, respectively)—a difference of 23.9 percentage points.

Mini-cases listed in Table 24 (p. 118) are ordered based on descending BSC-GR200 graduation rates. MSU (48.4%), UM (44.3%) and TECH (42.6%) had the highest BSC-GR200 graduation rates and were all above the MUS (4 Yr) case rate of 41.9%. MSUN (2 Yr) (39.4%), UM COT (39.1%), UM HLN COT (38.1%), and MSUB COT (36.6%) had BSC-GR200 graduation rates above the MUS (2 Yr) case rate of 26.3%.

The BSC-GR200 graduation rates (Table 24) were higher (by an average of 2 percentage points) than the BSC-GR150 graduation rates (Table 23, p. 117)), but not universally higher than the IPEDS-GR150 graduation rates (Table 21, p.113). Five mini-cases—UM HLN COT, MSUB COT, MSUB, UM TECH COT, and MSU GF COT—had lower BSC-GR200 rates than IPEDS-GR150 rates. The MUS (2 Yr) BSC-

GR200 rate (26.3%) was also lower than the MUS (2 Yr) IPEDS-GR150 rate (36.6%). The greatest differences between IPEDS-GR150 and BSC-GR200 rates were noted for UM HLN COT, UM TECH COT, and MSU GF COT. The BSC-GR200 rate for these mini-cases were lower than the IPEDS-GR150 rates by 21.8, 8.7, and 10.4 percentage points, respectively. None of the cohort BSC-GR200 rates improved over the cohort BSC-GR150 rates by more than 3.3 percentage points.

Table 25 shows ordinal rankings of the BSC-GR150 graduation rates for each campus based on the cohort, male, female and minority students. Table 26 shows ordinal rankings of the BSC-GR200 graduation rates for each campus based on the cohort, male, female, and minority students.

Table 25.

Ranking of Beginning Student GR150 Graduation Rates

Mini-cases	BSC-GR150 Rankings			
	Cohort	Males	Females	Minority
MSU	1	2	1	2
UM	2	4	4	5
TECH	3	1	8	4
MSUN (2 Yr)	4	8	2	9
UM HLN COT	5	3	7	3
UM COT	6	9	3	7
MSUB COT	7	5	6	11
UMW	8	6	5	6
MSUB	9	10	9	12
MSUN	10	7	11	10
UMW (2 Yr)	11	13	10	1
UM TECH COT	12	11	12	7
MSU GF COT	13	12	13	13

Note. All ordinal rankings are listed from highest value (1) to lowest value (13). Cohort based on beginning student cohort for academic year 2001-2002. (MUS Data Warehouse, 2014)

Table 26.

Ranking of Beginning Student GR200 Graduation Rates

Mini-cases	BSC-GR200 Rankings			
	Cohort	Males	Females	Minority
MSU	1	2	2	2
UM	2	3	4	6
TECH	3	1	8	3
MSUN (2 Yr)	4	9	1	9
UM COT	5	7	3	7
UM HLN COT	6	4	7	4
MSUB COT	7	5	6	11
UMW	8	6	5	5
MSUB	9	10	9	12
MSUN	10	8	11	10
UMW (2 Yr)	11	13	10	1
UM TECH COT	12	11	12	8
MSU GF COT	13	12	13	13

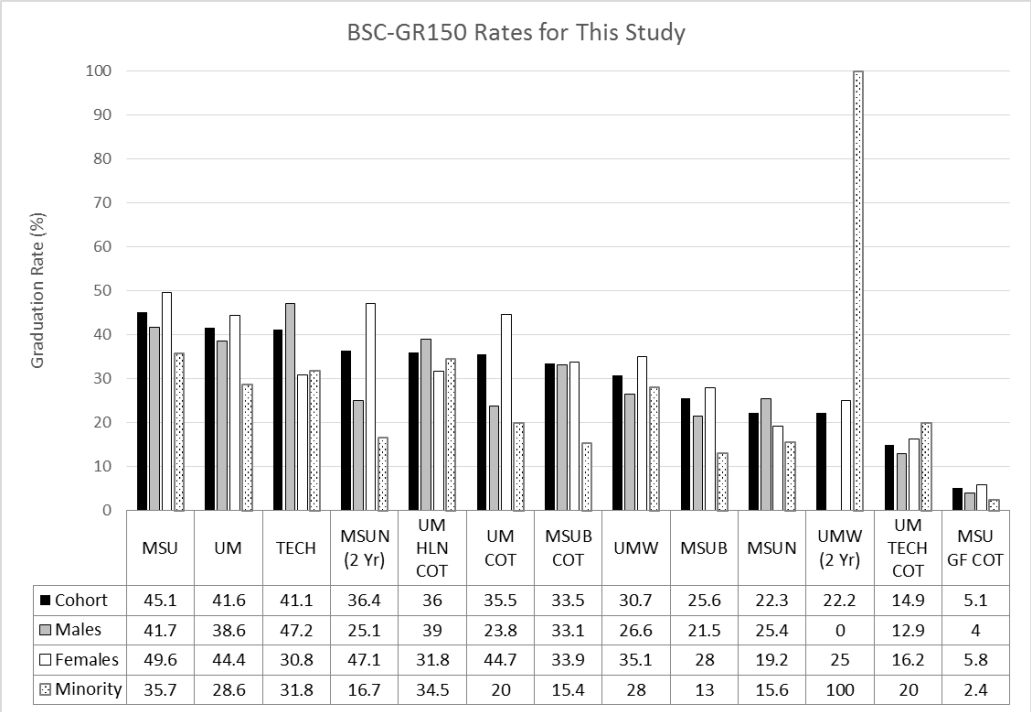
Note. All ordinal rankings are listed from highest value (1) to lowest value (13). Cohort based on beginning student cohort for academic year 2001-2002. (MUS Data Warehouse, 2014).

MSU, UM and TECH had the highest cohort BSC-GR150 and BSC-GR200 graduation rate rankings of the four-year mini-cases. MSU (2 Yr) and UM HLN COT had the highest cohort BSC-GR200 rate rankings of the two-year mini-cases. With one exception—the UM COT moved up one rank—mini-case cohort rankings remained the same for BSC-GR150 and BSC-GR200.

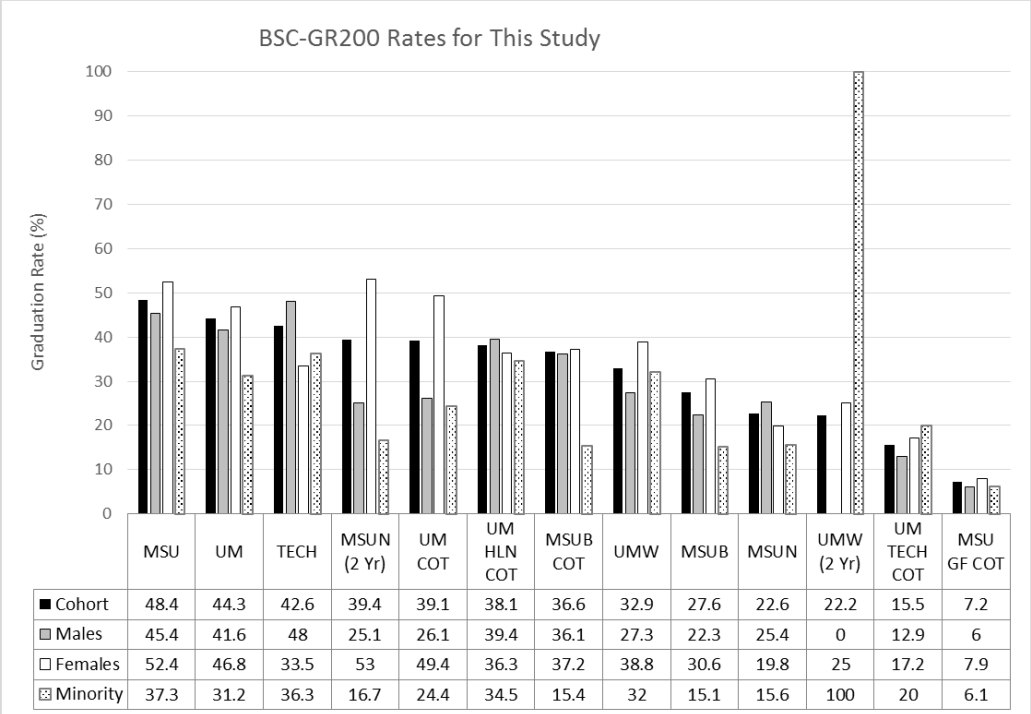
MSU and UMW (2 Yr) had the highest BSC-GR150 and BSC-GR200 graduation rate rankings for minorities among the four-year mini-cases. It should be noted that the UMW (2 Yr) BSC-150 and BSC-GR200 graduation rates of 100% measured the success

of one student. MSU GF COT had the lowest BSC-GR150 and BSC-GR200 graduation rate rankings for cohort, female, and minority student groups. UMW (2 Yr) had the lowest BSC-GR150 and BSC-GR200 graduation rate rankings for male students.

Figure 6 illustrates the rank order of the six four-year mini-cases and seven two-year mini-cases relative to BSC-GR150 and BSC-GR200 cohort graduation rates. BSC graduation rates are also depicted for male, female, and minority students. Single-digit increases were noted for nearly all BSC-GR150 to BSC-GR200 graduation rates. The increases resulted in minor changes in mini-case rankings for cohort, male, female, and minority student groups. Only one mini-case, UM COT, moved up in rank based on the BSC-cohort graduation rates.



	MSU	UM	TECH	MSUN (2 Yr)	UM HLN COT	UM COT	MSUB COT	UMW	MSUB	MSUN	UMW (2 Yr)	UM TECH COT	MSU GF COT
Cohort	45.1	41.6	41.1	36.4	36	35.5	33.5	30.7	25.6	22.3	22.2	14.9	5.1
Males	41.7	38.6	47.2	25.1	39	23.8	33.1	26.6	21.5	25.4	0	12.9	4
Females	49.6	44.4	30.8	47.1	31.8	44.7	33.9	35.1	28	19.2	25	16.2	5.8
Minority	35.7	28.6	31.8	16.7	34.5	20	15.4	28	13	15.6	100	20	2.4



	MSU	UM	TECH	MSUN (2 Yr)	UM COT	UM HLN COT	MSUB COT	UMW	MSUB	MSUN	UMW (2 Yr)	UM TECH COT	MSU GF COT
Cohort	48.4	44.3	42.6	39.4	39.1	38.1	36.6	32.9	27.6	22.6	22.2	15.5	7.2
Males	45.4	41.6	48	25.1	26.1	39.4	36.1	27.3	22.3	25.4	0	12.9	6
Females	52.4	46.8	33.5	53	49.4	36.3	37.2	38.8	30.6	19.8	25	17.2	7.9
Minority	37.3	31.2	36.3	16.7	24.4	34.5	15.4	32	15.1	15.6	100	20	6.1

Figure 6. Graphs of beginning student cohort graduation rates (BSC-GR150 and BSC-GR200)

18- to 24-year old students (1824). The 18- to 24-year old student group represents traditional-aged students. The 1824-GR150 and 1824-GR200 graduation rates for this group are presented in Tables 27 and 28, respectively. Mini-cases are listed according to descending 1824-cohort graduation rates.

Table 27.

GR150 Graduation Rates for 18- to 24-Year Old Students

Mini-Cases	1824-GR150 Graduation Rates (%)							
	Cohort		Males		Females		Minority	
	%	(n)	%	(n)	%	(n)	%	(n)
MSU	45.6	(2,571)	41.9	(1,466)	50.7	(1,105)	36.8	(106)
TECH	43.4	(336)	48.2	(220)	34.4	(116)	27.8	(18)
UM	42.6	(2,536)	39.5	(1,255)	45.7	(1,281)	28.8	(184)
MSUB COT	41.0	(138)	27.0	(80)	14.0	(58)	0.0	(10)
UM COT	35.1	(297)	24.4	(135)	43.8	(162)	4.5	(22)
UM HLN COT	34.9	(226)	36.2	(138)	32.9	(88)	31.6	(19)
UMW	32.6	(248)	29.9	(127)	35.5	(122)	31.8	(22)
MSUB	25.2	(871)	20.4	(304)	27.4	(567)	13.7	(102)
MSUN (2 Yr)	25.0	(20)	15.4	(13)	42.9	(7)	0.0	(3)
MSUN	23.2	(258)	26.8	(134)	19.4	(124)	16.7	(54)
UMW (2 Yr)	20.0	(5)	0.0	(1)	25.0	(4)	0.0	(0)
UM TECH COT	13.0	(100)	11.6	(43)	14.1	(57)	25.0	(8)
MSU GF COT	5.8	(309)	2.7	(109)	7.5	(200)	5.8	(34)
MUS (2 Yr) Case	23.9	(1,095)	23.1	(519)	24.5	(576)	11.5	(83)
MUS (4 Yr) Case	40.5	(6,820)	38.5	(3,506)	42.6	(3,314)	26.2	(486)

Note. Cohort based on 18- to 24-year old students for academic year 2001-2002. (MUS Data Warehouse, 2014)

Table 28.

GR200 Graduation Rates for 18- to 24-Year Old Students

Mini-Cases	1824-GR200 Graduation Rates (%)							
	Cohort		Males		Females		Minority	
	%	(n)	%	(n)	%	(n)	%	(n)
MSU	49.0	(2,571)	45.8	(1,466)	53.5	(1,105)	38.7	(106)
UM	45.3	(2,536)	42.6	(1,255)	48.0	(1,281)	32.1	(184)
MSUB COT	45.0	(138)	29.0	(80)	16.0	(58)	0.0	(10)
TECH	44.6	(336)	49.1	(220)	36.1	(116)	27.8	(18)
UM HLN COT	38.9	(226)	36.2	(138)	33.9	(88)	31.6	(19)
UM COT	37.1	(297)	25.1	(135)	46.9	(162)	4.5	(22)
UMW	34.6	(248)	30.7	(127)	38.8	(122)	36.3	(22)
MSUN (2 Yr)	30.0	(20)	15.4	(13)	57.2	(7)	0.0	(3)
MSUB	27.3	(871)	21.4	(304)	30.5	(567)	16.6	(102)
MSUN	23.6	(258)	20.2	(134)	20.2	(124)	16.7	(54)
UMW (2 Yr)	20.0	(5)	0.0	(1)	25.0	(4)	0.0	(0)
UM TECH COT	14.0	(100)	11.6	(43)	15.9	(57)	25.0	(8)
MSU GF COT	7.7	(309)	4.5	(109)	9.5	(200)	11.7	(34)
MUS (2 Yr) Case	25.6	(1,095)	24.1	(519)	26.9	(576)	13.6	(83)
MUS (4 Yr) Case	43.2	(6,820)	41.4	(3,506)	45.1	(3,314)	28.7	(486)

Note. Cohort based on 18- to 24-year old students for academic year 2001-2002. (MUS Data Warehouse, 2014)

The 1824-GR150 and 1824-GR200 graduation rates (Tables 27 and 28) are similar to the BSC-GR150 (Table 23, p. 117) and BSC-GR200 (Table 24, p. 118) graduation rates. Overall the MUS (2 Yr) and MUS (4 Yr) 1824-GR150 graduation rates were slightly higher than the MUS (2 Yr) and MUS (4 Yr) BSC-GR150 graduation rates, and slightly lower than the MUS (2 Yr) and MUS (4 Yr) IPEDS-GR150 graduation rates. 1824-cohort graduation rates increased slightly above the BSC-cohort graduation rates for five of the six, four-year mini-cases. MSUB was the only four-year mini-case with slightly lower 1824-GR150 and 1824-GR200 graduation rates (25.2%

and 27.3% respectively) than BSC-GR150 and BSC-GR200 graduation rates (25.6% and 27.6%, respectively). Five of the seven two-year mini-cases had lower 1824-GR150 graduation rates than BSC-GR150 graduation rates. Only two of the seven, two-year mini-cases—MSUB COT and MSU GF COT—had higher 1824-GR150 graduation rates (41.0% and 5.8%, respectively) than BSC-GR150 graduation rates (35.5% and 5.1%, respectively).

Tables 29 and 30 show ordinal rankings of the 1824-GR150 and 1824-GR200 graduation rates for each campus based on the cohort, male, female, and minority student groups.

Table 29.

Ranking of 18- to 24-Year Old Student GR150 Graduation Rates

Mini-Cases	1824-GR150 Rankings			
	Cohort	Males	Females	Minority
MSU	1	2	1	1
TECH	2	1	6	5
UM	3	3	2	4
MSUB COT	4	6	12	11
UM COT	5	8	3	10
UM HLN COT	6	4	7	3
UMW	7	5	5	2
MSUB	8	9	8	8
MSUN (2 Yr)	9	10	4	11
MSUN	10	7	10	7
UMW (2 Yr)	11	13	9	11
UM TECH COT	12	11	11	6
MSU GF COT	13	12	13	9

Note. All ordinal rankings are listed from highest value (1) to lowest value (13). Cohort based on 18- to 24-year old students for academic year 2001-2002. (MUS Data Warehouse, 2014)

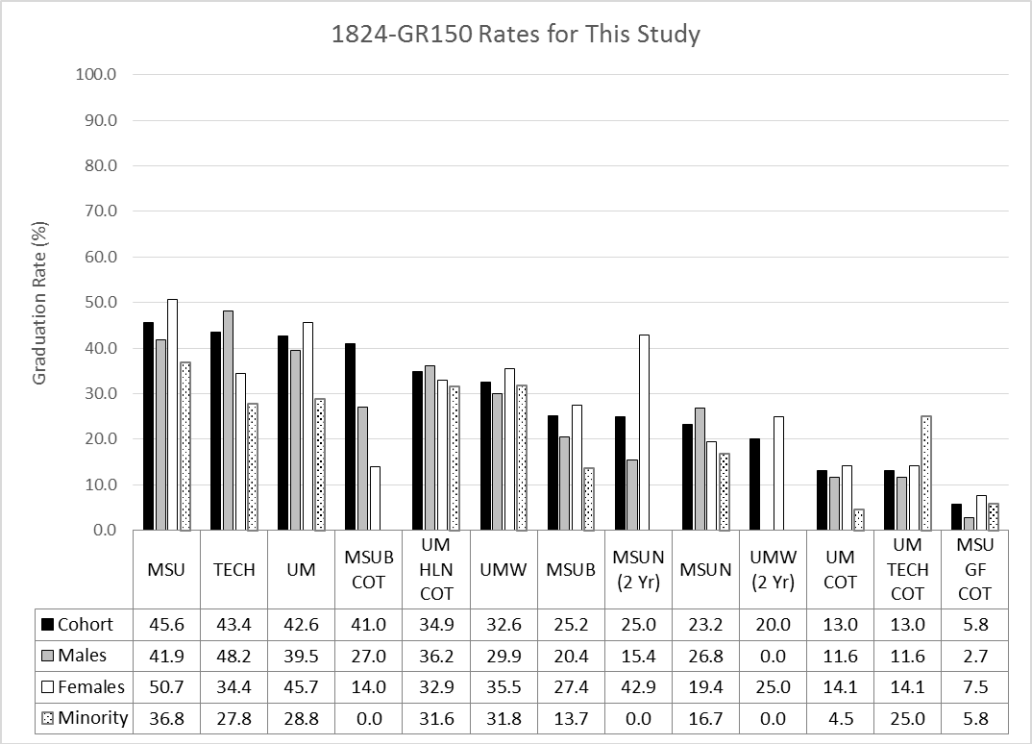
Table 30.

Ranking of 18- to 24-Year Old Student GR200 Graduation Rates

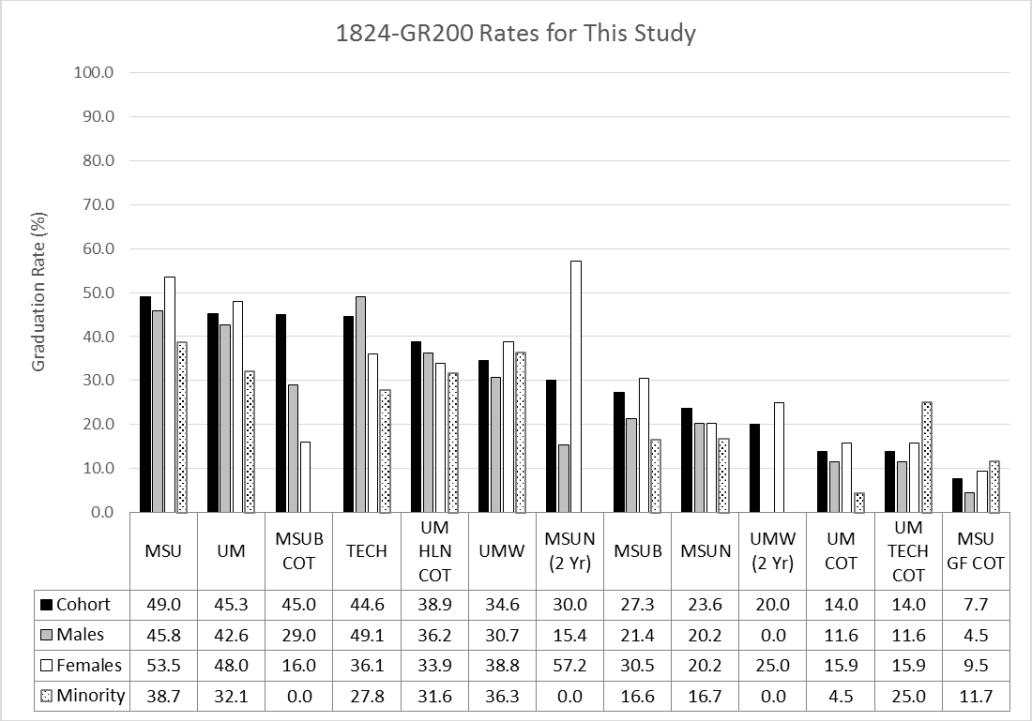
Mini-Cases	1824-GR200 Rankings			
	Cohort	Males	Females	Minority
MSU	1	2	2	1
UM	2	3	3	3
MSUB COT	3	6	11	11
TECH	4	1	6	5
UM HLN COT	5	4	7	4
UM COT	6	7	4	10
UMW	7	5	5	2
MSUN (2 Yr)	8	10	1	11
MSUB	9	8	8	8
MSUN	10	9	10	7
UMW (2 Yr)	11	13	9	11
UM TECH COT	12	11	12	6
MSU GF COT	13	12	13	9

Note. All ordinal rankings are listed from highest value (1) to lowest value (13). Cohort based on 18- to 24-year old students for academic year 2001-2002. (MUS Data Warehouse, 2014)

Figure 7 illustrates the rank order of the mini-cases relative to 1824-GR150 cohort and 1824-GR200 cohort graduation rates. The 1824 graduation rates are also depicted for male, female, and minority students. Single-digit increases were noted for all 1824-GR150 to 1824-GR200 cohort, male, female and minority rates. These increases resulted in the reordering of seven mini-cases. UM, MSUB COT, UM HLN COT, and MSUN (2 Yr) moved up in rank. TECH, UM COT, and MSU moved down in rank. A 14.3 percentage-point increase was noted for MSUN (2 Yr) female graduates from 1824-GR150 to 1824-GR200.



	MSU	TECH	UM	MSUB COT	UM HLN COT	UMW	MSUB	MSUN (2 Yr)	MSUN	UMW (2 Yr)	UM COT	UM TECH COT	MSU GF COT
Cohort	45.6	43.4	42.6	41.0	34.9	32.6	25.2	25.0	23.2	20.0	13.0	13.0	5.8
Males	41.9	48.2	39.5	27.0	36.2	29.9	20.4	15.4	26.8	0.0	11.6	11.6	2.7
Females	50.7	34.4	45.7	14.0	32.9	35.5	27.4	42.9	19.4	25.0	14.1	14.1	7.5
Minority	36.8	27.8	28.8	0.0	31.6	31.8	13.7	0.0	16.7	0.0	4.5	25.0	5.8



	MSU	UM	MSUB COT	TECH	UM HLN COT	UMW	MSUN (2 Yr)	MSUB	MSUN	UMW (2 Yr)	UM COT	UM TECH COT	MSU GF COT
Cohort	49.0	45.3	45.0	44.6	38.9	34.6	30.0	27.3	23.6	20.0	14.0	14.0	7.7
Males	45.8	42.6	29.0	49.1	36.2	30.7	15.4	21.4	20.2	0.0	11.6	11.6	4.5
Females	53.5	48.0	16.0	36.1	33.9	38.8	57.2	30.5	20.2	25.0	15.9	15.9	9.5
Minority	38.7	32.1	0.0	27.8	31.6	36.3	0.0	16.6	16.7	0.0	4.5	25.0	11.7

Figure 7. Graphs of 18- 24-year old student graduation rates (1824-GR150 and 1824-GR200).

≥25-year old students. The ≥25-year old student group represents adult students. The ≥25-GR150 and ≥25-GR200 graduation rates for this group are presented in Tables 31 and 32, respectively. Mini-cases are listed according to descending ≥25-cohort graduation rates.

Table 31.

GR150 Graduation Rates for ≥25-Year Old Students

Mini-Cases	≥25-GR150 Graduation Rates (%)							
	Cohort		Males		Females		Minority	
	%	(n)	%	(n)	%	(n)	%	(n)
MSUN (2 Yr)	63.7	(11)	66.7	(3)	62.5	(8)	33.3	(3)
MSU	40.7	(214)	41.9	(105)	39.4	(109)	28.5	(14)
MSUB COT	38.4	(112)	32.0	(50)	43.6	(62)	25.0	(16)
UM HLN COT	38.3	(146)	44.0	(84)	30.7	(62)	33.3	(9)
UM COT	37.5	(189)	23.7	(76)	46.9	(113)	34.8	(23)
TECH	31.5	(54)	40.7	(27)	22.2	(27)	50.0	(4)
UM	30.4	(244)	29.5	(112)	31.1	(132)	21.6	(37)
MSUB	27.1	(218)	25.0	(88)	29.1	(127)	11.9	(42)
UMW (2 Yr)	25.0	(4)	0.0	(0)	25.0	(4)	100.0	(1)
MSUN	20.2	(89)	21.4	(42)	19.5	(46)	15.3	(26)
UM TECH COT	17.3	(75)	14.8	(27)	18.7	(48)	0.0	(2)
UMW	13.0	(23)	0.0	(12)	13.0	(11)	0.0	(3)
MSU GF COT	4.5	(309)	5.1	(137)	4.0	(172)	0.0	(48)
MUS (2 Yr) Case	24.2	(846)	22.3	(377)	25.8	(469)	16.7	(82)
MUS (4 Yr) Case	30.6	(842)	30.9	(386)	30.7	(452)	18.3	(126)

Note. Cohort based on students 25 years and older for academic year 2001-2002. (MUS Data Warehouse, 2014)

Table 32.

GR200 Graduation Rates for ≥25-Year Old Students

Mini-Cases	≥25-GR200 Graduation Rates (%)							
	Cohort		Males		Females		Minority	
	%	(n)	%	(n)	%	(n)	%	(n)
MSUN (2 Yr)	63.7	(11)	66.7	(3)	62.5	(8)	33.3	(3)
UM COT	43.3	(189)	29.0	(76)	53.1	(113)	43.5	(23)
UM HLN COT	43.1	(146)	45.2	(84)	40.4	(62)	33.3	(9)
MSU	42.6	(214)	42.9	(105)	42.2	(109)	28.5	(14)
MSUB COT	42.0	(112)	36.0	(50)	46.8	(62)	25.0	(16)
TECH	33.4	(54)	40.7	(27)	25.9	(27)	75.0	(4)
UM	33.3	(244)	32.2	(112)	34.1	(132)	21.6	(37)
MSUB	28.9	(218)	25.0	(88)	31.5	(127)	11.9	(42)
UMW (2 Yr)	25.0	(4)	0.0	(0)	25.0	(4)	100	(1)
MSUN	20.2	(89)	21.4	(42)	19.5	(49)	15.3	(26)
UM TECH COT	17.3	(75)	14.8	(27)	18.7	(48)	0.0	(2)
UMW	13.0	(23)	0.0	(12)	27.3	(11)	0.0	(3)
MSU GF COT	6.8	(309)	7.3	(137)	6.3	(172)	2.1	(48)
MUS (2 Yr) Case	27.6	(846)	25.0	(377)	29.9	(469)	19.6	(82)
MUS (4 Yr) Case	32.5	(842)	31.9	(386)	33.1	(452)	19.1	(126)

Note. Cohort based on students 25 years and older for academic year 2001-2002. (MUS Data Warehouse, 2014)

Graduation rates for the ≥25 cohort differed from the 1824 cohort in a number of ways. The MUS (2 Yr) ≥25-GR150 and ≥25-GR200 graduation rates (24.2% and 27.6%, respectively) were higher than the MUS (2 Yr) 1824-GR150 and 1824-GR200 graduation rates (23.8% and 26.3%, respectively). MUS (4 Yr) ≥25-GR150 and ≥25-GR200 graduation rates (30.6% and 32.5%, respectively) were lower than the MUS (4 Yr) 1824-GR150 and 1824-GR200 graduation rates (40.5% and 43.2%, respectively). Whereas four-year mini-cases reported the top five graduation rates for the 1824 cohort, two-year mini-cases reported the top five graduation rates for the ≥25 cohort. MSUN (2 Yr) reported the highest ≥25-GR150 and ≥25-GR200 graduation rates (63.7%). Five of

the seven, two-year mini-cases—MSUN (2 Yr), UM COT, UMW (2 Yr), UM TECH COT, and MSU GF COT—had higher ≥25-graduation rates than 1824-graduation rates. MSUN (2 Yr) and UM COT ≥25-GR150 rates increased over 1824-GR150 rates by double digits (+33.7 and +23.5, respectively). All six four-year mini-cases had lower ≥25-graduation rates than 1824-graduation rates—double-digit declines were noted at TECH, UM and UMW. With one exception—TECH with a 25-point minority ≥25-GR150 to minority ≥25-GR200 increase (50% to 75%, respectively)—none of the ≥25-GR200 rates improved over the ≥25-GR150 rates by more than ten percentage points. It should be noted that the 25 percentage point increase measured the added success of one minority student—from two-out-of-four to three-out-of-four minority graduates.

Table 33 shows ordinal rankings of the ≥25-GR150 graduation rates for each mini-case based on the cohort, male, female, and minority students. Table 34 shows ordinal rankings of the ≥25-GR200 graduation rates for each mini-case based on the cohort, male, female, and minority students.

Table 33.

Ranking of ≥25-Year Old Student GR150 Graduation Rates

Mini-Cases	≥25-GR150 Rankings			
	Cohort	Males	Females	Minority
MSUN (2 Yr)	1	1	1	4
MSU	2	3	4	6
MSUB COT	3	5	3	7
UM HLN COT	4	2	6	4
UM COT	5	8	2	3
TECH	6	4	9	2
UM	7	6	5	8
MSUB	8	7	7	10
UMW (2 Yr)	9	12	8	1
MSUN	10	9	10	9
UM TECH COT	11	10	11	11
UMW	12	12	12	11
MSU GF COT	13	11	13	11

Note. All ordinal rankings are listed from highest value (1) to lowest value (13). Cohort based on students 25 years and older for academic year 2001-2002. (MUS Data Warehouse, 2014)

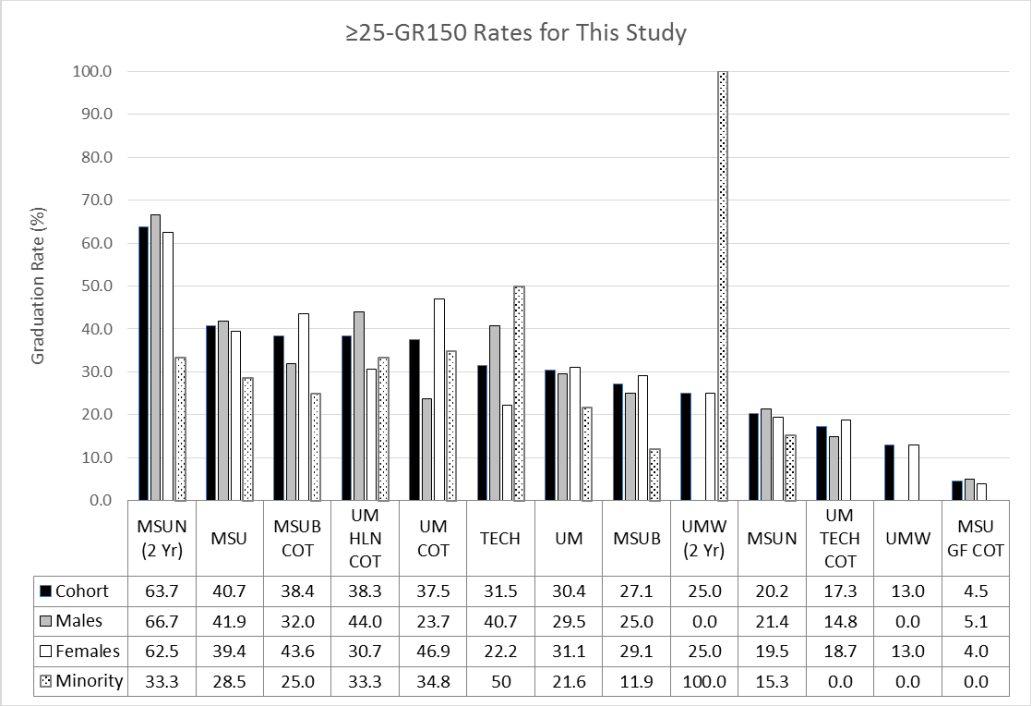
Table 34.

Ranking of ≥25-Year Old Student GR200 Graduation Rates

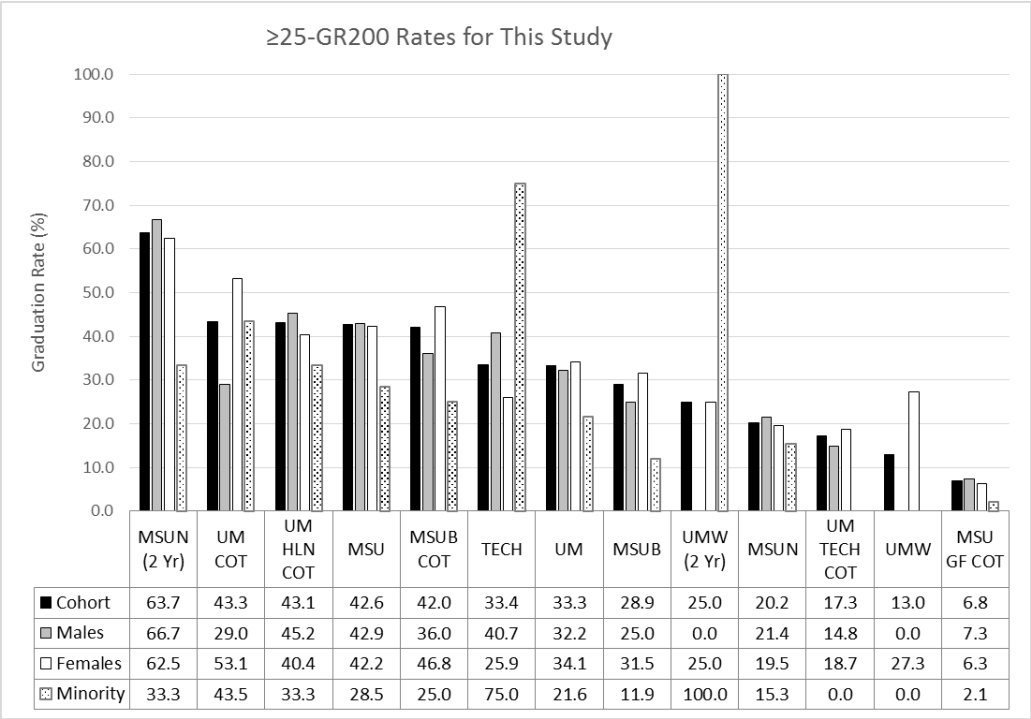
Campus	≥25-GR200 Rankings			
	Cohort	Males	Females	Minority
MSUN (2 Yr)	1	1	1	4
UM COT	2	7	2	3
UM HLN COT	3	2	5	4
MSU	4	3	4	6
MSUB COT	5	5	3	7
TECH	6	4	9	2
UM	7	6	6	8
MSUB	8	8	7	10
UMW (2 Yr)	9	12	10	1
MSUN	10	9	11	9
UM TECH COT	11	10	12	12
UMW	12	12	8	12
MSU GF COT	13	11	13	11

Note. All ordinal rankings are listed from highest value (1) to lowest value (13). Cohort based on students 25 years and older for academic year 2001-2002. (MUS Data Warehouse, 2014)

Figure 8 illustrates the rank order of MUS mini-cases relative to ≥25-GR150 and ≥25-GR200 graduation rates for cohort, male, female, and minority students. The cohort-graduation-rate increases from ≥25-GR150 to ≥25-GR200 resulted in the reordering of four mini-cases. UM COT and UM HLN COT moved up in rank, which moved MSU and MSUB COT down in rank. None of the eight bottom-ordered mini-cases changed in rank from ≥25-GR150 to ≥25-GR200; however, minor ranking changes were noted among male, female, and minority groups. It should be noted that the UMW (2 Yr) ≥25-GR150 and ≥25-GR200 graduation rates of 100% measured the success of one minority student.



	MSUN (2 Yr)	MSU	MSUB COT	UM HLN COT	UM COT	TECH	UM	MSUB	UMW (2 Yr)	MSUN	UM TECH COT	UMW	MSU GF COT
Cohort	63.7	40.7	38.4	38.3	37.5	31.5	30.4	27.1	25.0	20.2	17.3	13.0	4.5
Males	66.7	41.9	32.0	44.0	23.7	40.7	29.5	25.0	0.0	21.4	14.8	0.0	5.1
Females	62.5	39.4	43.6	30.7	46.9	22.2	31.1	29.1	25.0	19.5	18.7	13.0	4.0
Minority	33.3	28.5	25.0	33.3	34.8	50	21.6	11.9	100.0	15.3	0.0	0.0	0.0



	MSUN (2 Yr)	UM COT	UM HLN COT	MSU	MSUB COT	TECH	UM	MSUB	UMW (2 Yr)	MSUN	UM TECH COT	UMW	MSU GF COT
Cohort	63.7	43.3	43.1	42.6	42.0	33.4	33.3	28.9	25.0	20.2	17.3	13.0	6.8
Males	66.7	29.0	45.2	42.9	36.0	40.7	32.2	25.0	0.0	21.4	14.8	0.0	7.3
Females	62.5	53.1	40.4	42.2	46.8	25.9	34.1	31.5	25.0	19.5	18.7	27.3	6.3
Minority	33.3	43.5	33.3	28.5	25.0	75.0	21.6	11.9	100.0	15.3	0.0	0.0	2.1

Figure 8. Graphs of ≥25 year old student graduation rates (≥25-GR150 and ≥25-GR200)

Transfer students. The TRNS student group represents transfer students with no age delimitations. The TRNS-GR150 and TRNS-GR200 graduation rates are presented in Tables 35 and 36, respectively. Mini-cases are listed according to descending TRNS-cohort graduation rates.

Table 35.

GR150 Graduation Rates for Transfer Student

Mini-Cases	TRNS-GR150 Graduation Rates (%)							
	Cohort		Males		Females		Minority	
	%	(n)	%	(n)	%	(n)	%	(n)
UMW (2 Yr)	66.7	(3)	0.0	(0)	100.0	(3)	100.0	(1)
MSUN (2 Yr)	62.5	(16)	50.0	(4)	66.7	(12)	33.3	(3)
MSU	49.6	(811)	47.2	(430)	52.2	(381)	40.4	(42)
MSUB COT	48.5	(64)	41.4	(29)	54.3	(25)	40.0	(5)
TECH	48.4	(91)	54.0	(50)	41.5	(46)	57.2	(7)
UM	44.2	(708)	42.8	(365)	45.8	(343)	25.0	(64)
UM COT	42.1	(140)	21.7	(46)	52.1	(94)	20.0	(15)
MSUB	35.0	(380)	31.9	(144)	36.8	(236)	16.7	(66)
UMW	34.9	(83)	30.0	(42)	39.5	(43)	20.0	(5)
MSUN	33.9	(127)	40.6	(64)	27.4	(62)	22.0	(41)
UM HLN COT	32.5	(80)	31.6	(38)	33.3	(42)	42.9	(7)
UM TECH COT	20.0	(50)	37.6	(11)	11.7	(34)	0.0	(1)
MSU GF COT	6.3	(270)	6.3	(111)	6.3	(119)	2.9	(34)
MUS (2 Yr) Case	24.8	(623)	20.1	(244)	28.0	(379)	16.6	(53)
MUS (4 Yr) Case	43.8	(2,200)	43.0	(1,093)	44.7	(1,106)	25.8	(225)

Note. Cohort based on transfer students for academic year 2001-2002. (MUS Data Warehouse, 2014)

Table 36.

GR200 Graduation Rates for Transfer Students

Mini-Cases	TRNS-GR200 Graduation Rates (%)							
	Cohort		Males		Females		Minority	
	%	(n)	%	(n)	%	(n)	%	(n)
UMW (2 Yr)	66.7	(3)	0.0	(0)	66.7	(3)	100.0	(1)
MSUN (2 Yr)	62.5	(16)	50.0	(4)	66.7	(12)	33.3	(3)
MSU	51.4	(811)	49.1	(430)	54.0	(381)	42.8	(42)
TECH	50.6	(91)	54.0	(50)	46.4	(46)	71.5	(7)
MSUB COT	50.1	(64)	41.4	(29)	57.2	(35)	40.0	(5)
UM COT	46.4	(140)	26.0	(46)	56.4	(94)	26.7	(15)
UM	45.5	(708)	44.4	(365)	46.7	(343)	25.0	(64)
UM HLN COT	37.5	(80)	31.6	(38)	42.8	(42)	42.9	(7)
MSUB	36.3	(380)	31.9	(144)	38.9	(236)	18.2	(66)
UMW	36.1	(83)	30.0	(42)	41.8	(43)	20.0	(5)
MSUN	33.9	(127)	40.6	(64)	27.4	(62)	22.0	(41)
UM TECH COT	22.0	(50)	37.6	(11)	14.6	(34)	0.0	(1)
MSU GF COT	8.5	(270)	7.2	(111)	9.4	(119)	5.8	(34)
MUS (2 Yr) Case	27.7	(623)	21.3	(244)	32.0	(379)	19.6	(53)
MUS (4 Yr) Case	45.3	(2,200)	44.3	(1,093)	46.3	(1,106)	27.1	(225)

Note. Cohort based transfer students for academic year 2001-2002. (MUS Data Warehouse, 2014)

The MUS (2 Yr) and MUS (4 Yr) cohort, female, and minority TRNS-GR150 and TRNS-GR200 graduation rates (Tables 35 and 36) were higher than equivalent BSC, 1824, and ≥25 graduation rates [Tables 23 (p. 117), 24 (p. 118), 27 (p.125), 28 (p. 126), 31 (p.130), and 32 (p. 131)]. Male MUS (2 Yr) TRNS-GR150 and TRNS-GR200 graduation rates were lower than equivalent BSC, 1825, and ≥25 graduation rates.

UMW (2 Yr) and MSUN (2 Yr) had the highest cohort TRNS graduation rates for two-year campuses (66.7% and 62.5%, respectively). Both UMW (2 Yr) and MSUN

(2 Yr) had low numbers of transfer students and neither mini-case recorded additional graduates between TRNS-GR150 and TRNS-GR200.

UM TECH COT and MSU GF COT had the lowest cohort TRNS-GR150 (20.0% and 6.3%, respectively) and TRNS-GR200 (22.0% and 8.5%, respectively) graduation rates for two-year min-cases. MSU and TECH had the highest cohort TRNS-GR150 (49.6% and 48.4%, respectively) and TRNS-GR200 (51.4% and 50.6%, respectively) graduation rates for four-year mini-cases. UMW and MSUN had the lowest TRNS-GR150 (34.9% and 33.9%, respectively) and TRNS-GR200 (36.1% and 33.9%) graduation rates for four-year mini-cases.

Females had higher TRNS-150 and TRNS-GR200 graduation rates than males at four of the six, four-year mini-cases—MSU, UM, MSUB, and UMW. TECH and MSUN had higher TRNS-GR150 and TRNS-GR200 graduation rates for males at four-year mini-cases. Females had higher TRNS-GR150 and TRNS-GR200 graduation rates at six of the seven, two-year mini-cases—UMW (2 Yr), MSUN (2 Yr), MSUB COT, UM COT, UM HLN COT, and MSU GF COT. The UM TECH COT was the only two-year mini-case with higher male TRNS graduation rates.

The UM COT and UM HLN COT cohort graduation rates increased (4.3 and 5.0 percentage points, respectively) from TRNS-GR150 to TRNS-GR200. All other cohort TRNS-GR150 to TRNS-GR200 gains were less than 2.2 percentage points.

Table 37 shows ordinal rankings of the TRNS-GR150 graduation rates for each mini-case based on the cohort, male, female, and minority students. Table 38 shows

ordinal rankings of the TRNS-GR200 graduation rates for each mini-case based on the cohort, male, female, and minority students.

Table 37.

Ranking of TRNS-GR150 Graduation Rates

Mini-Cases	TRNS-GR150 Rankings			
	Cohort	Males	Females	Minority
UMW (2 Yr)	1	13	1	1
MSUN (2 Yr)	2	2	1	6
MSU	3	3	4	4
MSUB COT	4	5	3	5
TECH	5	1	7	2
UM	6	4	6	7
UM COT	7	11	5	9
MSUB	8	8	9	11
UMW	9	10	8	9
MSUN	10	6	11	8
UM HLN COT	11	9	10	3
UM TECH COT	12	7	12	13
MSU GF COT	13	12	13	12

Note. All ordinal rankings are listed from highest value (1) to lowest value (13). Cohort based on transfer students for academic year 2001-2002. (MUS Data Warehouse, 2014)

Table 38.

Ranking of TRNS-GR200 Graduation Rates

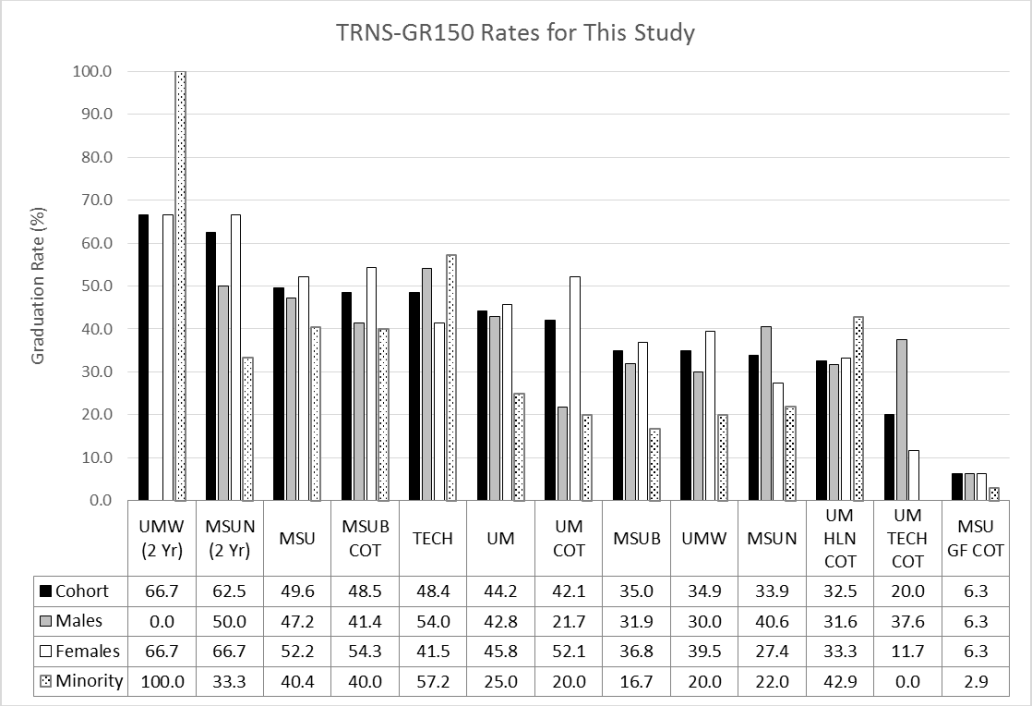
Mini-Cases	TRNS-GR200 Rankings			
	Cohort	Males	Females	Minority
UMW (2 Yr)	1	13	1	1
MSUN (2 Yr)	2	2	1	6
MSU	3	3	5	4
TECH	4	1	7	2
MSUB COT	5	5	3	5
UM COT	6	11	4	7
UM	7	4	6	8
UM HLN COT	8	9	8	3
MSUB	9	8	10	11
UMW	10	10	9	10
MSUN	11	6	11	9
UM TECH COT	12	7	12	13
MSU GF COT	13	12	13	12

Note. All ordinal rankings are listed from highest value (1) to lowest value (13). Cohort based on transfer students for academic year 2001-2002. (MUS Data Warehouse, 2014)

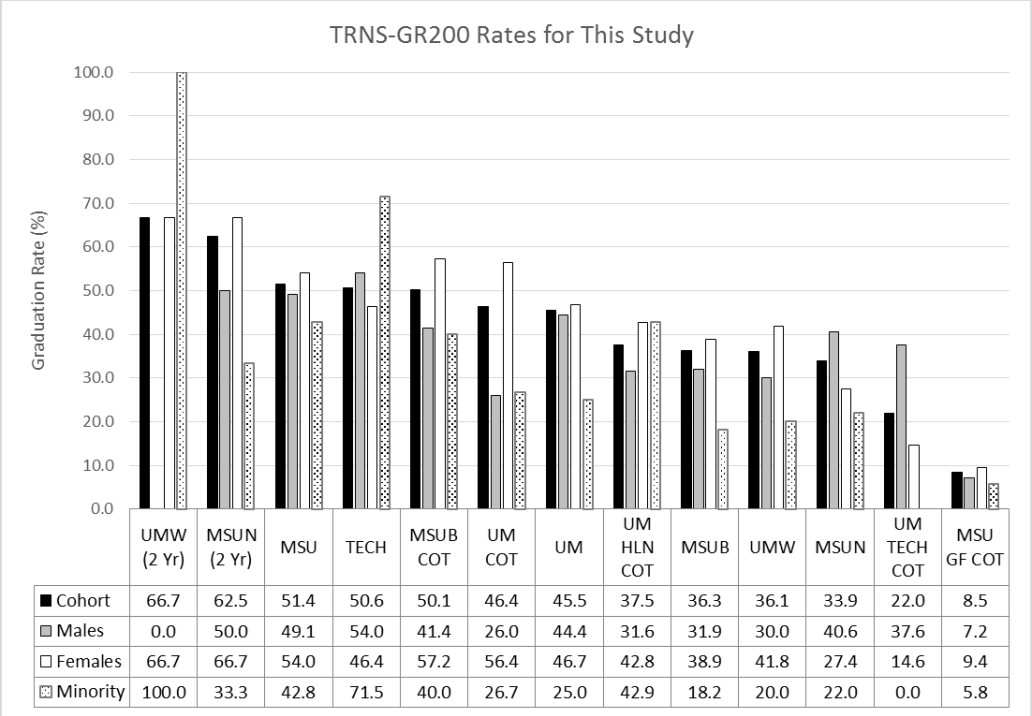
MSU, TECH, and UM had the highest cohort TRNS-GR150 and TRNS-GR200 graduation rate rankings for four-year mini-cases. UMW (2 Yr) and MSUN (2 Yr) had the highest cohort TRNS-GR150 and TRNS-GR200 rate rankings for two-year mini-cases.

Figure 9 (p. 142) illustrates the rank order of MUS mini-cases relative to TRNS-GR150 and TRNS-GR200 graduation rates. The TRNS graduation rates are also depicted for male, female, and minority students. With one exception—TECH—single-digit increases from TRNS-GR150 to TRNS-GR200 were noted for all cohort, male, female, and minority graduation rates. A 14.3 percentage-point increase was noted for TECH minority graduates from TRNS-GR150 (57.2%) to TRNS-GR200 (71.5%). The

graduation-rate increases from TRNS-GR150 to TRNS-GR200 resulted in the reordering of seven mini-cases. TECH, UM COT, and UM HLN COT moved up in rank. MSUB COT, UM, MSUB, and UMW moved down in rank. It should be noted that the UMW (2 Yr) TRNS-GR150 and TRNS-GR200 graduation rate of 100% measured the success of one minority student.



	UMW (2 Yr)	MSUN (2 Yr)	MSU	MSUB COT	TECH	UM	UM COT	MSUB	UMW	MSUN	UM HLN COT	UM TECH COT	MSU GF COT
Cohort	66.7	62.5	49.6	48.5	48.4	44.2	42.1	35.0	34.9	33.9	32.5	20.0	6.3
Males	0.0	50.0	47.2	41.4	54.0	42.8	21.7	31.9	30.0	40.6	31.6	37.6	6.3
Females	66.7	66.7	52.2	54.3	41.5	45.8	52.1	36.8	39.5	27.4	33.3	11.7	6.3
Minority	100.0	33.3	40.4	40.0	57.2	25.0	20.0	16.7	20.0	22.0	42.9	0.0	2.9



	UMW (2 Yr)	MSUN (2 Yr)	MSU	TECH	MSUB COT	UM COT	UM	UM HLN COT	MSUB	UMW	MSUN	UM TECH COT	MSU GF COT
Cohort	66.7	62.5	51.4	50.6	50.1	46.4	45.5	37.5	36.3	36.1	33.9	22.0	8.5
Males	0.0	50.0	49.1	54.0	41.4	26.0	44.4	31.6	31.9	30.0	40.6	37.6	7.2
Females	66.7	66.7	54.0	46.4	57.2	56.4	46.7	42.8	38.9	41.8	27.4	14.6	9.4
Minority	100.0	33.3	42.8	71.5	40.0	26.7	25.0	42.9	18.2	20.0	22.0	0.0	5.8

Figure 9. Graphs of transfer student graduation rates (TRNS-GR150 and TRNS-GR200)

Quantitative analysis. The quantitative research was conducted to answer the Quantitative Research Question: "How do graduation rates for all students (fulltime, part-time, beginning, and transfers) vary within one state-governed postsecondary system?" Results of this research offer a multitude of analogies. Four alternative hypotheses were posited to guide the analysis. Each hypothesis is presented and answered below.

Hypothesis One.

H_1: Institutions with higher percentages of at-risk students will have lower graduation rates.

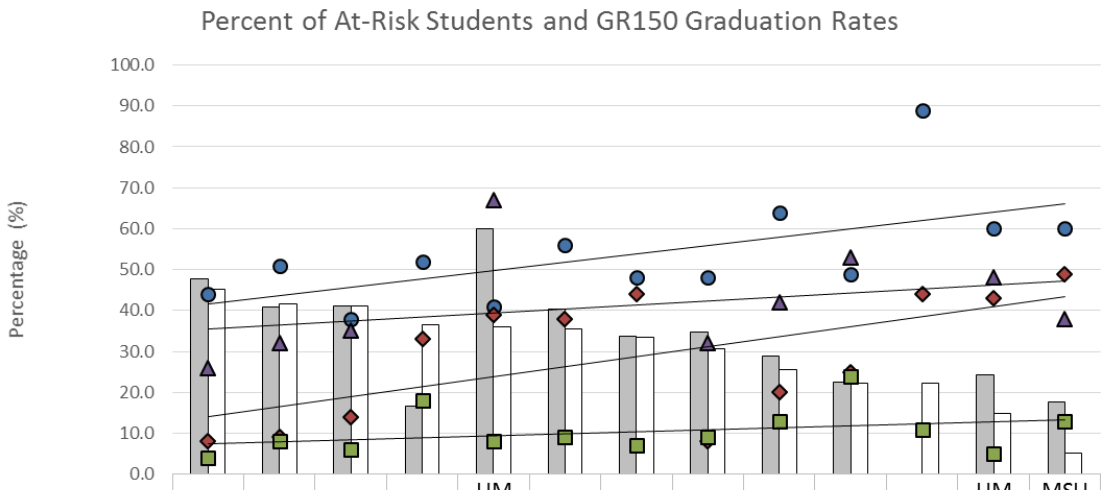
For the purposes of this study, at-risk students were delimited by age (≥25 years), gender (female), and minority status. An additional risk factor included income. Personal student income data were not available from the MUS Data Warehouse or IPEDS; however, the percent of students who received federal grant aid at most mini-case campuses was available from the NCES. The percentages of female students, minority students, and federal grant aid are summarized in Table 39 and illustrated in Figure 10. Mini-case order in Table 39 and Figure 10 was based on descending BSC-GR150 graduation rates.

Table 39.

Percentages of At-Risk Students and GR150 Graduation Rates

Mini-Cases	Percentages (%)				Graduation Rates (%)	
	Female	≥25 Yrs	Minority	Federal Aid	IPEDS-GR150	BSC-GR150
MSU	44	8	4	26	47.7	45.1
UM	51	9	8	32	40.8	41.6
TECH	38	14	6	35	41.0	41.1
MSUN (2 Yr)	52	33	18	--	16.7	36.4
UM HLN COT	41	39	8	67	59.9	36.0
UM COT	56	38	9	--	40.4	35.5
MSUB COT	48	44	7	--	33.8	33.5
UMW	48	8	9	32	34.7	30.7
MSUB	64	20	13	42	28.8	25.6
MSUN	49	25	24	53	22.4	22.3
UMW (2Yr)	89	44	11	--	0.0	22.2
UM TECH COT	60	43	5	48	24.2	14.9
MSU GF COT	60	49	13	38	17.6	5.1

Note. -- Data not available. Percentages are based on beginning student cohort for the 2001-2002 Academic Year. (MUS Data Warehouse, 2014)



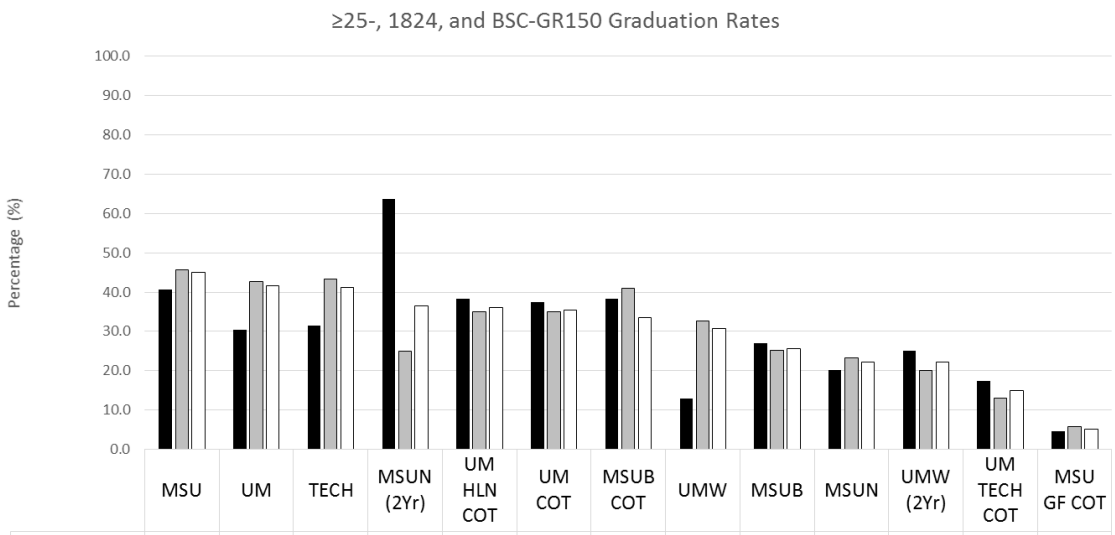
	MSU	UM	TECH	MSUN (2 Yr)	UM HLN COT	UM COT	MSUB COT	UMW	MSUB	MSUN	UMW (2Yr)	UM TECH COT	MSU GF COT
IPEDS-GR150	47.7	40.8	41.0	16.7	59.9	40.4	33.8	34.7	28.8	22.4	0.0	24.2	17.6
BSC-GR150	45.1	41.6	41.1	36.4	36.0	35.5	33.5	30.7	25.6	22.3	22.2	14.9	5.1
Female	44	51	38	52	41	56	48	48	64	49	89	60	60
≥25 Yrs	8	9	14	33	39	38	44	8	20	25	44	43	49
Minority	4	8	6	18	8	9	7	9	13	24	11	5	13
Federal Aid	26	32	35		67			32	42	53		48	38

Figure 10. Percent of at-risk students and BSC-GR150 graduation rates. Trendlines from top to bottom represent percent of females, federal aid recipients, adult students (≥25 years), and minority students.

IPEDS and BSC graduation rates in Figure 10 are shown as vertical bars. Percentages of at-risk student groups are plotted as symbols. Four risk factors are plotted: (a) percent of females in the beginning student cohort, (b) percent of students 25 years or older in the beginning student cohort, (c) percent of minority students in the beginning student cohort, and (d) percent of all campus students who received federal grant aid during the 2001-2002 academic year. Trendlines for each of the four at-risk-student-groups increase as graduation rates bars go down. These findings support Hypothesis One—Institutions with higher percentages of at-risk students had lower graduation rates.

Hypothesis Two.

H_1: At-risk student groups identified by age will have lower graduation rates than other student groups within the same institution.



	MSU	UM	TECH	MSUN (2Yr)	UM HLN COT	UM COT	MSUB COT	UMW	MSUB	MSUN	UMW (2Yr)	UM TECH COT	MSU GF COT
■ ≥25 Cohort	40.7	30.4	31.5	63.7	38.3	37.5	38.4	13.0	27.1	20.2	25.0	17.3	4.5
▒ 1824 Cohort	45.6	42.6	43.4	25.0	34.9	35.1	41.0	32.6	25.2	23.2	20.0	13.0	5.8
□ BSC-Cohort	45.1	41.6	41.1	36.4	36.0	35.5	33.5	30.7	25.6	22.3	22.2	14.9	5.1

Figure 11. Comparison of at-risk student group graduation rates.

Three student group GR150 graduation rates are shown for each mini-case in Figure 11. The groups include: (a) students 25 years and older, (b) students 18- to- 24-years of age, and (c) the full beginning student cohort. The first bar for each campus shows GR150 rates for students 25 years and older. Older students in six of the 13 mini-cases—MSU, UM, TECH, UMW, MSN, and MSU GF COT—had lower GR150 cohort graduation rates than the 1824-GR150 cohort and BSC-GR150 cohort graduation rates. Six mini-cases—MSUN (2 Yr), UM HLN COT, UM COT, MSUB, UMW (2 Yr), and UM TECH COT had higher ≥25-GR150 cohort graduation rates than 1824-GR150

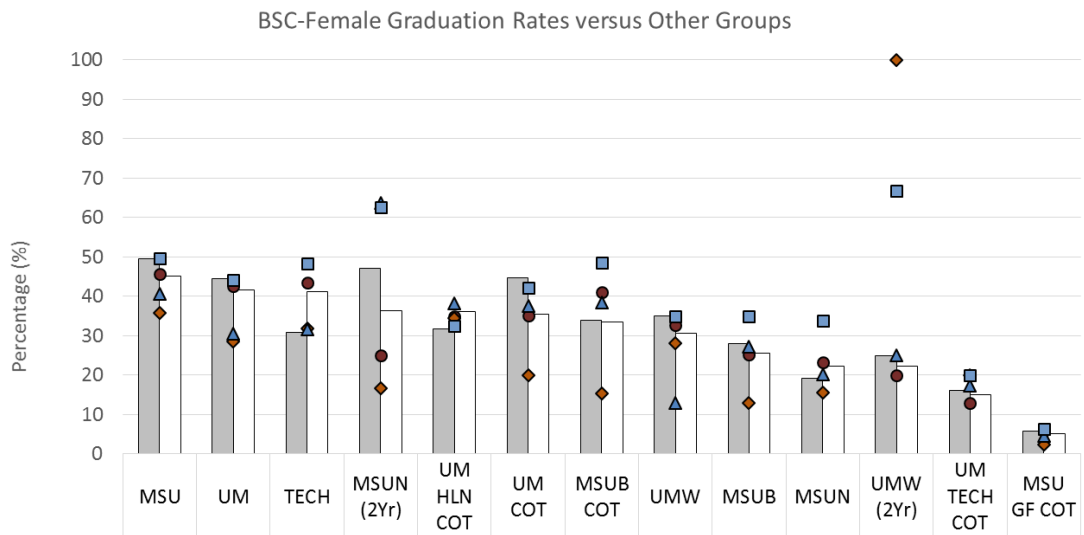
cohort and BSC-GR150 cohort graduation rates. Older students at MSUB COT graduated at lower rates than the 1842-cohort and higher rates than the BSC-cohort.

These findings do not support Hypothesis Two—At-risk student groups identified by age will have lower graduation rates than other students within the same institution. Older students in this study had higher and lower graduation rates than other student groups within the same mini-case.

Hypothesis Three.

H_1: At-risk student groups identified by gender will have lower graduation rates than other student groups within the same institution.

BSC-GR150 graduation rates for females and beginning students are shown as bars in Figure 12. GR150 graduation rates for four groups are plotted as lines: (a) traditional-age students in the 1824 cohort, (b) older students in the ≥25 cohort, (c) minority students in the BSC cohort, and (d) transfer students in the TRNS cohort.



	MSU	UM	TECH	MSUN (2Yr)	UM HLN COT	UM COT	MSUB COT	UMW	MSUB	MSUN	UMW (2Yr)	UM TECH COT	MSU GF COT
BSC Female	49.6	44.4	30.8	47.1	31.8	44.7	33.9	35.1	28	19.2	25	16.2	5.8
BSC-Cohort	45.1	41.6	41.1	36.4	36.0	35.5	33.5	30.7	25.6	22.3	22.2	14.9	5.1
1824 Cohort	45.6	42.6	43.4	25.0	34.9	35.1	41.0	32.6	25.2	23.2	20.0	13.0	5.8
BSC Minority	35.7	28.6	31.8	16.7	34.5	20	15.4	28	13	15.6	100	20	2.4
≥25 Cohort	40.7	30.4	31.5	63.7	38.3	37.5	38.4	13.0	27.1	20.2	25.0	17.3	4.5
TRNS Cohort	49.6	44.2	48.4	62.5	32.5	42.1	48.5	34.9	35.0	33.9	66.7	20.0	6.3

Figure 12. BSC-GR150 female graduation rates versus other groups.

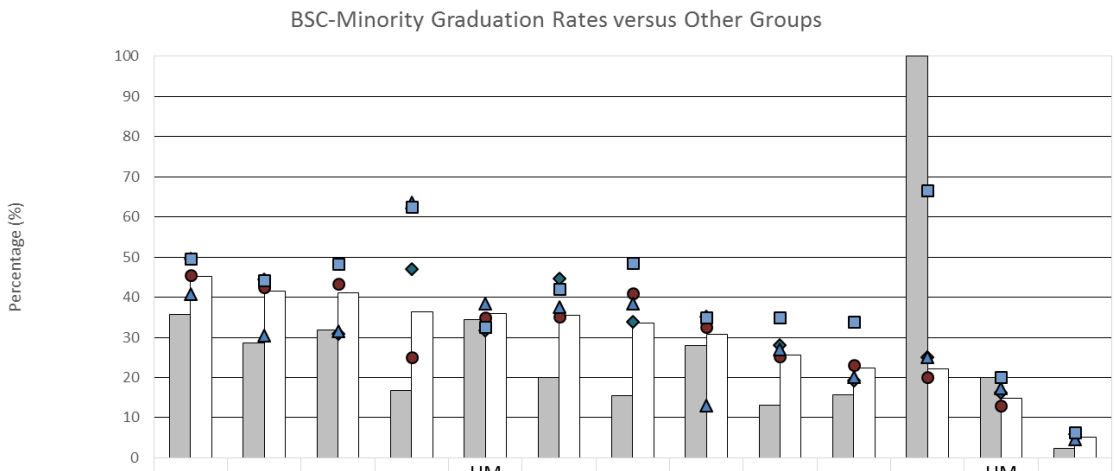
Female BSC-GR150 graduation rates were higher than BSC-cohort graduation rates for all but three mini-cases—TECH, UM HLN COT, and MSUN. Female BSC-GR150 graduation rates were higher than the BSC-cohort, 1824-cohort, and other at-risk groups at four mini-cases—MSU, UM, UM COT, and UMW. Female GR150 graduation rates fell below other at-risk groups at five mini-cases—MSUN (2 Yr), MSUB, UMW (2 Yr), UM TECH COT, and MSU GF COT. TRNS-cohort GR150 graduation rates were higher than other student groups in seven mini-cases.

These findings do not support Hypothesis Three—At-risk student groups identified by gender will have lower graduation rates than other student groups within the same institution. Females in this study had higher and lower graduation rates than other student groups within the same MUS mini-case.

Hypothesis Four.

H_1: At-risk student groups identified by minority status will have lower graduation rates than other student groups within the same institution.

BSC-GR150 graduation rates for minorities and beginning students are shown as bars in Figure 13. GR150 graduation rates for four groups are plotted as lines: (a) traditional-age students in the 1824 cohort, (b) older students in the ≥25 cohort, (c) female students in the BSC cohort, and (d) transfer students in the TRNS cohort.



	MSU	UM	TECH	MSUN (2Yr)	UM HLN COT	UM COT	MSUB COT	UMW	MSUB	MSUN	UMW (2Yr)	UM TECH COT	MSU GF COT
BSC Minority	35.7	28.6	31.8	16.7	34.5	20	15.4	28	13	15.6	100	20	2.4
BSC-Cohort	45.1	41.6	41.1	36.4	36.0	35.5	33.5	30.7	25.6	22.3	22.2	14.9	5.1
1824 Cohort	45.6	42.6	43.4	25.0	34.9	35.1	41.0	32.6	25.2	23.2	20.0	13.0	5.8
BSC Female	49.6	44.4	30.8	47.1	31.8	44.7	33.9	35.1	28	19.2	25	16.2	5.8
≥25 Cohort	40.7	30.4	31.5	63.7	38.3	37.5	38.4	13.0	27.1	20.2	25.0	17.3	4.5
TRNS Cohort	49.6	44.2	48.4	62.5	32.5	42.1	48.5	34.9	35.0	33.9	66.7	20.0	6.3

Figure 13. BSC-150 minority graduation rates versus other groups.

Minority BSC-GR150 graduation rates were lower than BSC-GR150 cohort graduation rates for all but two mini-cases—UMW (2 Yr) and UM TECH COT.

Minority GR150 graduation rates were above other at-risk groups at five mini-cases—TECH, UM HLN COT, UMW, UMW (2 Yr) and UM TECH COT).

These findings do not support Hypothesis Four—At-risk student groups identified by minority status will have lower graduation rates than other student groups within the same institution. Minorities in this study had higher and lower graduation rates than other student groups within the same institution.

Summary and Answer to the Quantitative Research Question. This study's quantitative analysis of demographic information, enrollment data, and graduation rates revealed a variety of trends, patterns, and exceptions among the 13 mini-cases. Similar to the national twenty-first century student population described in Chapter Two, the MUS student profile was quite varied. More than half of students enrolled in the MUS represent at-risk groups based on a combination of age, gender, minority status, part-time enrollment, and economic status. The only clear trend from this study was that MUS campuses with higher percentages of at-risk students had lower graduation rates (Figure 10). No single at-risk student group consistently performed better or worse than other student groups across the MUS. The success of at-risk students groups in several mini-cases was found to be of note and could not be explained without further analysis of environmental conditions unique to those campuses. The environmental conditions unique to each mini-case are presented and analyzed in the next section, Qualitative Data and Analysis.

Qualitative Data and Analysis

The qualitative data further describe internal and external characteristics and environmental conditions relative to the 13 mini-cases in this study. This section presents the qualitative data, identifies emergent patterns among the delimited campuses, and seeks to answer the Central Research Question. The Central Research Question is, "How do environmental conditions of a specific institution explain graduation rates within one state-governed postsecondary system?" Several subquestions were developed to answer the Central Research Question.

1. How do environmental conditions vary among institutions?
2. How are institutional graduation rates impacted by environmental conditions?

To answer to these questions, environmental conditions in each of the 13 mini-cases were compiled using Stake's (2006) case-study worksheet format. Stake's worksheet format was also used to summarize MUS case data for two-year campuses and for four-year campuses. The MUS (2 Yr) and MUS (4 Yr) case worksheets and Katz and Kahn's open-system framework assisted with the cross-case analysis. Stake's worksheets illustrate the answer to Subquestion One. Katz and Kahn's (1978) open-system characteristics guide the cross-case analysis of environmental conditions and answer Subquestion Two.

Mini-case data. The 11 campuses were first coded by mission, two-year versus four-year, which resulted in seven two-year mini-cases and six four-year mini-cases. Two of the campuses, MSUN and UMW, had dual missions and are represented as a two-year and a four-year mini-case. Two-year mini-case data and four-year mini-case data are presented separately. Unless otherwise cited in the narrative, campus catalogs and websites served as the primary sources of information (City College at MSU Billings, 2014; Helena College, 2014; Helena College of Technology of the University of Montana, 2001; Great Falls College - Montana State University, 2014; Missoula College, 2014; Montana State University, 2000, 2014; Montana State University - Billings, 2001a, 200b, 2014; Montana State University - Great Falls College of Technology, 2001; Montana State University - Northern, 2001, 2014; Montana Tech of the University of Montana, 2001, 2014; University of Montana, 2001, 2014; University of Montana Western, 2001, 2014). The cross-case analysis that follows presentation of the two-year and four-year mini-cases utilized Katz and Kahn's open-system characteristics to aide interpretation.

Two-year mini-cases. The seven two-year mini-cases included MSUB COT, MSU GF COT, MSN (2 Yr), UM COT, UM HLN COT, UM TECH COT, and UMW (2 Yr). A brief narrative and mini-case worksheet are provided for each mini-case. The purpose of the narrative is not to summarize what is illustrated in the mini-case worksheet—the purpose is to provide additional information regarding the size and nature of each mini-case. The mini-case narratives and worksheets represent a snapshot in time, the 2001 to 2002 academic year. The external components depicted on each mini-case worksheet include campus authority and governance, county demographic

characteristics, campus classification and accreditation, and campus revenue. The internal components depicted for each mini-case include IPEDS and modified Adelman (BSC, 1824, ≥25, and TRNS) graduation rates; two-year cohort profiles; campus degree offerings; and campus leader. Additional environmental conditions, such as number of campus-based support program, numbers of campus leaders over a four-year period, types of external boards and foundations, unduplicated fall headcount, and percentages of part-time and fulltime students are depicted in a box beneath the case circle.

MSUB COT mini-case. Figure 14 depicts the MSUB COT mini-case. MSUB COT was established in 1969 as one of five vocational training (Vo-Tech) centers under the Office of Public Instruction. Administrative authority of the Vo-Tech centers was transferred to the MUS in 1989. The Billings Vo-Tech was merged as the fourth college of MSUB in 1994 and became the MSUB College of Technology (COT). The merger was reported to have improved student services at MSUB COT.

The MSUB COT was located on an 18-acre site, seven miles west of its parent campus in Billings, Montana. Its stated mission was to provide "quality academic and technical training responsive to employer and community needs from local to international markets and promote lifelong learning" (Montana State University - Billings College of Technology, 2001, p. 9). The MSUB COT promoted specialized programs to meet area employer's needs (nursing, automobile technicians, process plant operators, computer system technicians and computer assisted drafting technicians). In addition to daytime courses, the college offered classes for evening credit and short-term specialized training. Annual enrollment of fulltime and part-time students exceeded

500. Professional training and continuing education classes annually enrolled an additional 1,000. The MSUB COT reported 525 unduplicated headcount in fall 2001.

The MUSB COT mini-case represented a partially embedded two-year campus. Two-year programs served commuter students in a separate location from the parent campus. The UM COT did not have its own residence hall facilities or athletic programs.

Montana State University-Billings College of Technology (MSUB COT)
2001-2002 Snapshot

Authority

Established in 1969 as one of five Vocational-Technical Centers. Transferred to OCHE in 1989.

Cohort Profiles

	IPEDS	modified Adelman
Headcount	133	254
% Male	57.0	52.0
% Female	43.0	48.0
% Minority	8.0	10.0
% Federal Grants	--	--
ACT	18.5	--
SAT	1003	--

Degrees (26)	
AAS	13
AAS	2
AS	1
Certificate	10

Graduation Rates

Cohort	GR150	GR200
IPEDS	33.8	--
BSC	33.5	36.6
1824	41.0	45.0
≥ 25	38.4	42.0
TRNS	48.5	50.1

Campus Leader
Dean Richard Carr

CarnegieClassification
Associate's - Public 2 under 4

Accreditation
NWCCU under MSUB

Governance
MT Board of Regents

Yellowstone Co.

Population	129,352
% Male	48.8
% Female	51.2
% Minority	7.2
MHI	$36,727
MFI	$45,277
% ≥BA	26.4

Campus Revenue

General Fund	$1,157,673
Tuition (6 cr)	$702
Tuition (12 cr)	$1,336

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	No
Advising office	Yes
Learning center	Yes
# of leaders from fall 2001-2004	2
Executive board	No
Alumni association	No
Foundation	No
% Part-time students[a]	23
% Fulltime students[a]	77
Fall unduplicated headcount	525
Annualized fulltime equivalent (FTE)	474

Figure 14. Mini-case diagram for Montana State University - Billings College of Technology (MSUB COT). [a]Based on modified Adelman cohort. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Montana State University – Billings, 2001b, 2014; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000)

MSU GF COT mini-case. Figure 15 depicts the MSU GF COT mini-case. The MSUB COT was located in a commercial district just south of the highway business district in Great Falls, Montana. MSUB COT was established in 1969 as one of five vocational training (Vo-Tech) centers under the Office of Public Instruction. Administrative authority of the Vo-Tech centers was transferred to the MUS in 1989. The MSU GF COT became a standalone, affiliate campus of the MSU in 1994. Its stated dual mission was to provide "viable technical education to prepare individuals for work in a technologically driven global economy and provide learning opportunities to enhance educational access to the Montana University System" (Montana State University – Great Falls College of Technology, 2001, p. i). MSU GF COT reported 1,247 unduplicated headcount in fall 2001.

The MSU GF COT specialized in allied health, business, and transfer programs. Two TRiO program field offices were located on the campus—one for Talent Search based out of the OCHE, the other for the Educational Opportunity Center based out of MSUN. Both programs were designed to assist students with postsecondary educational career planning and academic advising; however, neither provided college students the direct academic support offered by a TRiO Student Support Services program.

The MSU GF COT 2001 freshmen cohort was more at-risk than other two-year mini-cases based higher than average percentages of female, minority, and part-time students. Other postsecondary educational opportunities in Great Falls were available from the University of Great Falls, Malmstrom Air Force Base Education Center, and Montana State University – Northern. The MSU GF COT did not have residence hall facilities or athletic programs.

Montana State University - Great Falls College of Technology (MSU GF COT)
2001-2002 Snapshot

Authority

Established in 1969 as one of five Vocational-Technical Centers. Transferred to OCHE in 1989.

Cohort Profiles

	IPEDS	modified Adelman
Headcount	136	628
% Male	35.0	40.0
% Female	65.0	60.0
% Minority	13.0	13.0
% Federal Grants	38.0	--
ACT	20.3	--
SAT	946.9	--

Degrees (27)	
AAS	16
AA	1
AS	1
Certificate	9

Graduation Rates

Cohort	GR150	GR200
IPEDS	17.6	--
BSC	5.1	7.2
1824	5.8	7.7
≥ 25	4.5	6.8
TRNS	6.3	8.5

Campus Leader
Interim Dean Mary Moe

CarnegieClassification
Associate's - Public 2 under 4

Accreditation
NWCCU 1979

Governance
MT Board of Regents

Cascade County

Population	80,357
% Male	49.5
% Female	50.5
% Minority	9.3
MHI	$32,971
MFI	$39,949
% ≥BA	21.5

Campus Revenue

General Fund	$3,039,104
Tuition (6 cr)	$565
Tuition (12 cr)	$1,093

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	No
Advising office	No
Learning center	No
# of leaders from fall 2001-2004	1
Executive board	No
Alumni association	No
Foundation	No
% Part-time students[a]	62
% Fulltime students[a]	38
Fall unduplicated headcount	1,247
Annualized fulltime equivalent (FTE)	834

Figure 15. Mini-case diagram for MSU Great Falls College of Technology (MSU GF COT). [a]Based on modified Adelman cohort. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Great Falls College – Montana State University, 2014; Montana State University Great Falls College of Technology, 2001; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000)

MSUN (2 Yr) mini-case. Figure 16 depicts the MSUN (2Yr) mini-case. MSUN (2 Yr) was located on 115 acres south of Havre, Montana. The combined MSUN and MSUN (2 Yr) unduplicated fall headcount in 2001 was 1,589—disaggregated two-year student headcount was not available in 2001. MSUN was authorized in 1927 as two-year degree granting, postsecondary institution with the purpose of preparing teachers for the state. The first students enrolled in 1929. By 2001, MSUN was a four-year degree granting postsecondary institution with embedded two-year programming. The university's stated mission in 2001 was to "offer programs for professional preparation emphasizing discipline mastery, critical inquiry, and social responsibility" (Montana State University Northern, 2001, p.2). The campus had single-student and family residential halls.

The MSUN (2 Yr) mini-case represented a fully embedded two-year campus within a four-year campus. MSUN had a differentiated fee structure. Lower-division undergraduate students (<60 credits) paid the lower MSUN (2 Yr) tuition. Upper-division undergraduate students (>60 credits) paid the higher MSUN tuition.

The two-year programs served both residential and commuter populations. Two-year students had access to all of MSUN's student support and athletic programs.

Montana State University - Northern (MSUN (2 Yr))
2001-2002 Snapshot

Cohort Profiles

	IPEDS	modified Adelman
Headcount	12	33
% Male	75.0	48.0
% Female	25.0	52.0
% Minority	17.0	18.0
% Federal Grants	--	--
ACT	--	--
SAT	--	--

Graduation Rates

Degrees (22)	
AAS	14
AA	
AS	2
Certificates	6

Cohort	GR150	GR200
IPEDS	16.7	--
BSC	36.4	39.4
1824	25.0	30.0
≥ 25	63.7	63.7
TRNS	62.5	62.5

Campus Leader
Chancellor Alex Capdeville

Authority
Established in 1927 by the State Legislature. First students enrolled in 1929.

Carnegie Classification
Fully embedded under MSUN

Accreditation
NWCCU under MSUN.

Governance
MT Board of Regents

Hill County

Population	16,673
% Male	49.8
% Female	50.2
% Minority	20.5
MHI	$30,781
MFI	$38,179
% ≥BA	20.0

Campus Revenue

General Fund	--
Tuition (6 cr)	$642
Tuition (12 cr)	$1,433

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	Yes
Advising office	Yes
Learning center	Yes
# of leaders from fall 2001-2004	1
Executive board	Yes
Alumni association	Yes
Foundation	Yes
% Part-time students[a]	15
% Fulltime students[a]	85
Fall unduplicated headcount[b]	1,589
Annualized fulltime equivalent (FTE)[b]	1,418

Figure 16. Mini-case diagram for Montana State University - Northern Two-Year Programs (MSUN (2 Yr)). [a]Based on modified Adelman cohort. [b]Includes two-year and four-year students. Does not include graduate students. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Montana State University – Northern, 2001, 2014; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000)

UM COT mini-case. Figure 17 depicts the UM COT mini-case. The UM COT was housed in two locations in Missoula, Montana. The East campus, located approximately two miles from UM on the Missoula fairgrounds, housed the academic programs and administrative services in temporary modular buildings. The West campus, located three miles west of the East campus, housed the electronics and industrial programs. Like the other COTs, the UM COT was established in 1969 as a vocational training (Vo-Tech) center under the Office of Public Instruction. The UM Vo-Tech was transferred to the MUS in 1989. The UM COT became a two-year affiliate of UM in 1994. The UM COT did not have its own mission statement in 2001. Its stated purpose was to "provide occupation-oriented education that meets the human resource needs of business and industry" (The University of Montana, 2001, p.148).

The UM COT specialized in business, computer technology, allied health, culinary arts, general education, and industrial programs (construction, building maintenance, diesel equipment technology, heavy equipment operation, welding technology). Other four-year postsecondary educational opportunities in Missoula were available at UM. The UM COT reported 844 unduplicated headcount in fall 2001.

The UM COT mini-case represented a partially embedded two-year campus. Two-year programs served commuter students in separate locations from the parent campus. The UM COT did not have its own residence hall facilities or athletic programs. Students were serviced by administrative and academic support programs on the East campus.

University of Montana - College of Technology (UM COT)
2001-2002 Snapshot

Authority

Established in 1969 as one of five Vocational-Technical Centers. Transferred to OCHE in 1989.

Cohort Profiles

	IPEDS	Adelman
Headcount	297	495
% Male	52.0	44.0
% Female	48.0	56.0
% Minority	8.0	9.0
% Federal Grants	--	--
ACT	19.5	--
SAT	955.9	--

Degrees (26)	
AAS	15
AA	1
Certificates	10

Graduation Rates

Cohort	GR150	GR200
IPEDS	40.4	--
BSC	35.5	39.1
1824	35.1	37.1
≥ 25	37.5	43.3
TRNS	42.1	46.4

Campus Leader

Dean Dennis Lerum

Carnegie Classification

Not classified, fully embedded in UM

Accreditation

NWCCU under UM

Governance

MT Board of Regents

Missoula County

Population	95,802
% Male	50.0
% Female	50.0
% Minority	6.0
MHI	$34,454
MFI	$44,865
% ≥BA	32.8

Campus Revenue

General Fund	$1,715,387
Tuition (6 cr)	$564
Tuition (12 cr)	$1,224

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	No
Advising office	No
Learning center	Yes
# of leaders from fall 2001-2004	2
Executive board	No
Alumni association	No
Foundation	No
% Part-time students[a]	20
% Fulltime students[a]	80
Fall campus headcount	844
Annualized fulltime equivalent (FTE)	797

Figure 17. Mini-case diagram for University of Montana College of Technology (UM COT). [a]Based on modified Adelman cohort. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Missoula College, 2014; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000; University of Montana, 2001)

UM HLN COT mini-case. Figure 18 depicts the UM HLN COT mini-case. The main campus of UM HLN COT was located across the street from Helena High School, just north and east of the highway business district in Helena, Montana. Additional campus facilities were located at the airport campus. Like the other COTs, UM HLN COT was established in 1969 as a vocational training (Vo-Tech) center under the Office of Public Instruction. The Helena Vo-Tech was transferred to the MUS in 1989. The MSU HLN COT became a standalone, affiliate campus of the UM in 1994. Its stated mission was to be a "two-year institution of higher education dedicated to meeting the varied educational needs of individual students, business and industry, and the Helena community" (University of Montana – Helena College of Technology, 2001, p. 2).

In 2001, the UM HLN COT specialized in technology, trades (auto mechanics, aviation, machining, welding and electronics), business, protective service, and allied health service programs. Many of the programs were offered in planned one- and two-year cohorts (D. Bingham, personal communication, September 16, 2014). The campus reported 786 unduplicated headcount in fall 2001. Compared to other two-year mini-cases, the UM HLN COT freshman cohort had lower than average female, minority, and part-time student enrollments. The UM HLN COT was a commuter campus and did not have residence hall facilities or athletic programs.

In 2001, the UM HLN COT's administrative leadership was in transition and administrative systems and processes were not well established (D. Bingham, personal communication, September 17, 2014). One other postsecondary educational opportunity was available in Helena, Carroll College. Carroll College was a private, residential, four-year institution.

University of Montana - Helena College of Technology (UM HLN COT)
2001-2002 Snapshot

Authority

Established in 1969 as one of five Vocational-Technical Centers. Transferred to OCHE in 1989.

Cohort Profiles

	IPEDS	modified Adelman
Headcount	162	377
% Male	69.0	59.0
% Female	31.0	41.0
% Minority	6.0	8.0
% Federal Grants	67.0	--
ACT	--	--
SAT	--	--

Degrees (22)	
AAS	12
AA	1
Certificates	9

Graduation Rates

Cohort	GR150	GR200
IPEDS	59.9	--
BSC	36.0	38.1
1824	34.9	38.9
≥ 25	38.3	43.1
TRNS	32.5	37.5

Campus Leader

Interim Dean Rick Gray

CarnegieClassification

Associate's - Public, 2 under 4

Accreditation

NWCCU 1997

Governance

MT Board of Regents

Lewis and Clark County

Population	55,716
% Male	49.1
% Female	50.9
% Minority	4.8
MHI	$37,360
MFI	$46,766
% ≥BA	31.6

Campus Revenue

General Fund	$2,433,998
Tuition (6 cr)	$608
Tuition (12 cr)	$1,175

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	No
Advising office	No
Learning center	Yes
# of leaders from fall 2001-2004	2
Executive board	No
Alumni association	No
Foundation	No
% Part-time students[a]	19
% Fulltime students[a]	81
Fall unduplicated headcount	786
Annualized fulltime equivalent (FTE)	724

Figure 18. Mini-case diagram for University of Montana - Helena College of Technology (UM HLN COT). [a]Based on modified Adelman cohort. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Helena College, 2014; Helena College of the University of Montana, 2001; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000)

UM TECH COT mini-case. Figure 19 depicts the UM TECH COT mini-case. The UM TECH COT was located on 25 acres approximately 10 miles south of its parent campus in Butte, Montana. Like the other COTs, the UM TECH COT was established in 1969 as a vocational training (Vo-Tech) center under the Office of Public Instruction. The Butte Vo-Tech was transferred to the MUS in 1989. The UM TECH COT became a two-year affiliate of TECH in 1994. Its stated mission was to "provide education resulting in certifications, certificates, and AAS degrees leading to the attainment of individual goals" (Montana Tech of the University of Montana, 2001, p.61).

The UM TECH COT specialized in business technology, health, and trades (automotive, drafting, civil engineering and geographic information systems) programs. Other four-year postsecondary educational opportunities in Butte were available at TECH, the UM TECH COT's parent campus. The UM TECH COT reported 426 unduplicated headcount in fall 2001.

The UM TECH COT mini-case represented a partially embedded two-year campus. Two-year programs mostly served commuter students in a separate location from the parent campus. UM TECH COT did not have its own residence hall facilities or athletic programs. Students were serviced by support programs on the parent campus.

Montana Tech College of Technology (UM TECH COT)
2001-2002 Snapshot

Authority

Established in 1969 as one of five Vocational-Technical Centers. Transferred to OCHE in 1989.

Cohort Profiles

	IPEDS	modifed Adelman
Headcount	91	175
% Male	44.0	40.0
% Female	52.0	60.0
% Minority	8.0	5.0
% Federal Grants	48.0	--
ACT	18.5	--
SAT	926.3	--

Degrees (17)	
AAS	9
AS	1
Certificates	7

Graduation Rates

Cohort	GR150	GR200
IPEDS	24.2	--
BSC	14.9	15.5
1824	13.0	14.0
≥ 25	17.3	17.3
TRNS	20.0	22.0

Campus Leader
Dean Jane Baker

Carnegie Classification
Associate's - Public, Rural Serving, Small

Accreditation
NWCCU under Montana Tech

Governance
MT Board of Regents

Silver Bow County

Population	34,606
% Male	49.4
% Female	50.6
% Minority	4.6
MHI	$30,402
MFI	$40,018
% ≥BA	21.7

Campus Revenue

General Fund	$711,872
Tuition (6 cr)	$576
Tuition (12 cr)	$1,110

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	No
Advising office	No
Learning center	Yes
# of leaders from fall 2001-2004	1
Executive board	Yes
Alumni association	Yes
Foundation	Yes
% Part-time students[a]	25
% Fulltime students[a]	75
Fall unduplicated headcount	426
Annualized fulltime equivalent (FTE)	286

Figure 19. Mini-case diagram for Montana Tech College of Technology (TECH COT). [a]Based on modified Adelman cohort. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Montana Tech of the University of Montana, 2001, 2014a; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000)

UMW (2 Yr) mini-case. Figure 20 depicts the UMW (2Yr) mini-case. UMW was located on 127 acres on the south end of the highway business district in Dillon, Montana. Unduplicated headcount in fall 2001 was 1,163—disaggregated two-year enrollments were not available. UMW (2 Yr) was legislatively authorized in 1893 as the state normal school offering two-year degrees in education. The State Board of Education approved conferring a bachelor of education in 1931. In 1954, the State Board of Education approved a bachelor of science in secondary education and a master of science in secondary education. Additional baccalaureate degrees were approved during the 1970s and 1980s. In 1987, six years before restructuring of the MUS, the BoR administratively merged UMW with the University of Montana and rescinded several baccalaureate degrees and the master of education degree.

UMW was originally authorized as a two-year postsecondary institution with the purpose of preparing teachers for the state. By 2001, UMW was a largely a four-year postsecondary institution with embedded two-year programming. The university's stated mission in 2001 was to "emphasize experiential learning that combines theory and practice through projects and field experiences" (The University of Montana Western, 2001, p.1). The campus had six residential halls and served a residential and commuter population.

The UMW (2 Yr) mini-case represented a fully embedded two-year campus within a four-year campus. The UMW (2Yr) offered few certificate and associate programs in 2001. The program with the strongest enrollments was the certificate in early childhood education. The Early Childhood Education certificate program was designed to meet the needs of working adults in eight Montana communities (Billings,

Bozeman, Butte, Dillon, Great Falls, Havre, Helena, and Missoula). Except for daytime classes on the UMW campus in Dillon, early childhood education classes were scheduled to meet one night each week and students could complete a one-year, 24-credit certificate within two years. Students were encouraged to enroll in additional general education courses at colleges in their home communities to complete the AAS degree. Although UMW (2 Yr) served over one hundred students in its certificate and associates programs in 2001, few were included in the graduation rate calculations for IPEDS or this study.

UMW (2 Yr) programs served residential, commuter, and off-campus populations. On-campus students enrolled in UMW (2 Yr) programs had access to all of UMW's student support and athletic programs. UMW (2 Yr) students enrolled in off-campus programs (e.g. early childhood education) did not have access to the student support and athletic programs.

University of Montana Western (UMW (2 Yr))
2001-2002 Snapshot

Authority
Established in 1893 by the State Legislature as the State Normal School. Enrolled first students in 1897.

Cohort Profiles

	IPEDS	modified Adelman
Headcount	2	9
% Male	50	11
% Female	50	89
% Minority	0	11
% Federal Grants	--	--
ACT	--	--
SAT	--	--

Degrees (6)	
AAS	4
AA	1
AS	1
Certificates	0

Graduation Rates

Cohort	GR150	GR200
IPEDS	0	--
BSC	22.2	22.2
1824	20.0	20.0
≥ 25	25.0	25.0
TRNS	66.7	66.7

Campus Leader
Chancellor Stephen Hulbert

Carnegie Classification
Not classified, fully embedded in UMW

Accreditation
NWCCU under UMW

Governance
MT Board of Regents

Beaverhead County

Population	9,202
% Male	51.2
% Female	48.8
% Minority	4.1
MHI	$28,962
MFI	$39,971
% ≥BA	26.4

Campus Revenue

General Fund	--
Tuition (6 cr)	$595
Tuition (12 cr)	$1,293

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	No
Advising office	No
Learning center with UMW	Yes
# of leaders from fall 2001-2004	1
Executive board under UMW	Yes
Alumni association under UMW	Yes
Foundation under UMW	Yes
% Part-time students[a]	54
% Fulltime students[a]	46
Fall unduplicated headcount[b]	1,163
Annualized fulltime equivalent (FTE)[b]	1,028

Figure 20. Mini-case diagram for University of Montana - Western Two-Year Programs (UMW (2 Yr)). [a]Based on modified Adelman cohort. [b]Includes two-year and four-year students. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000; University of Montana - Western, 2001, 2014)

Four-year mini-cases. The six four-year mini-cases included MSU, MSUB, MSUN, UM, TECH, and UMW. A one-page narrative and mini-case worksheet are provided for each mini-case. The purpose of the narrative is not to summarize what is illustrated in the mini-case worksheet—the purpose is to provide additional information regarding the size and nature of each mini-case. The mini-case narratives and worksheets represent a snapshot in time, the 2001 to 2002 academic year. The external components depicted for each mini-case include campus authority and governance, county demographic characteristics, campus classification and accreditation, and campus revenue. The internal components depicted for each mini-case include IPEDS and modified Adelman (BSC, 1824, ≥25, and TRNS) graduation rates; four-year cohort profiles; campus degrees offerings; and campus leader. Additional environmental conditions, such as number of campus-based support programs, numbers of campus leaders over an eight-year period, types of external boards and foundations, unduplicated headcount, and percentages of part-time and fulltime students are depicted in a box beneath the case circle.

MSU mini-case. Figure 21 depicts the MSU mini-case. Under a provision of the Morrill Act of 1862, MSU was legislatively authorized as the state land grant institution in 1893 and originally named the Agricultural College of the State of Montana. MSU was located on 1,170 acres south of Bozeman, Montana. Campus enrollment in fall 2001 was nearly 12,000. The university did not publish a designated mission statement in 2000; however, it did describe itself as “a four-year public, comprehensive, land grant university with undergraduate and graduate programs in liberal arts, basic sciences, the

professional areas, agriculture, architecture, business, nursing, education and engineering" (Montana State University, 2000, p. 1).

MSU's seven undergraduate colleges offered nearly 50 baccalaureate degrees with numerous program options. Ninety-two percent of the student body enrolled in baccalaureate programs. Eight percent enrolled in graduate programs.

The MSU campus included 40 classroom and administrative buildings, 10 residence halls, four cafeterias, a physical education complex, and a student union building. MSU's men and women athletes competed in seven Big Sky Conference sports, as well as alpine skiing, Nordic skiing, and rodeo. The campus had well established administrative services, executive and advisory boards, a foundation, and an alumni association.

Montana State University (MSU)
2001-2002 Snapshot

Authority

Established by an act of the State Legislature in 1893 as a land-grant institution.

Cohort Profiles

	IPEDS	modified Adelman
Headcount	1720	2820
% Male	58.0	56.0
% Female	43.0	44.0
% Minority	3.0	4.0
% Federal Grants	26.0	--
ACT	23.2	--
SAT	1105.3	--

Degrees (49)	
BA	10
BS	38
BM	1

Graduation Rates

Cohort	GR150	GR200
IPEDS	47.7	--
BSC	45.1	48.4
1824	45.6	49.0
≥ 25	40.7	42.6
TRNS	49.6	51.4

Campus Leader

Interim Chancellor Terry Roark

Carnegie Classification

Research University (Very high research activity)

Accreditation

NWCCU 1932

Governance

MT Board of Regents

Gallatin County

Population	67,831
% Male	52.0
% Female	48.0
% Minority	3.8
MHI	$38,120
MFI	$46,639
% ≥BA	41.0

Campus Revenue

General Fund	$35,066,727
Tuition (6 cr)	$708
Tuition (12 cr)	$1,539

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	Yes
Advising office	No
Learning center	No
# of leaders from fall 2001-2008	2
Executive board	Yes
Alumni association	Yes
Foundation	Yes
% Part-time students[a]	14
% Fulltime students[a]	86
Fall unduplicated headcount[b]	11,745
Annualized fulltime equivalent (FTE)[b]	10,411

Figure 21. Mini-case diagram for Montana State University (MSU). [a]Based on modified Adelman cohort. [b]Does not include graduate students. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Montana State University, 2001, 2014; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000)

MSUB mini-case. Figure 22 depicts the MSUB mini-case. MSUB was located on 98 acres beneath the Rimrock in Billings, Montana. MSUB, originally Eastern Montana Normal School, was established in 1927 to serve the growing needs of rural communities in the eastern half of the state with two-year teacher education programs (Hart, 2002). Prior to 1927, the Montana Normal School in Dillon (UMW), offered summer programming in Billings (Hart, 2002).

The State Board of Education approved conferring a bachelor of science in elementary education in 1946. Additional liberal arts degrees were approved following campus growth in the 1950s. MSUB was merged with MSU in1994. Campus enrollment in fall 2001 was nearly 4,000.

The MSUB campus included 19 buildings for classroom and administrative functions, residential housing, dining services, entertainment, and physical fitness. MSUB was a member of the National Collegiate Athletic Association and competed in the Pacific West Conference. Men competed in basketball, cross country, soccer, and tennis. Women competed in basketball, cross country, soccer, tennis, volleyball, and softball. The campus had established administrative services, executive and advisory boards, a foundation, and an alumni association.

Montana State University - Billings (MSUB)
2001-2002 Snapshot

Cohort Profiles

	IPEDS	modified Adelman
Headcount	514	1107
% Male	34.0	36.0
% Female	66.0	64.0
% Minority	11.0	13.0
% Federal Grants	--	--
ACT	21.0	--
SAT	989.1	--

Authority
Established in 1927 by the State Legislature. First students enrolled in 1929.

CarnegieClassification
Master's Colleges and Universities Medium Programs

Accreditation
NWCCU 1932 Assoc., Bac., Mast.

Governance
MT Board of Regents

Degrees (34)

AA	5
AS	4
BAS	1
BA	11
BS	12
BLS	1

Graduation Rates

Cohort	GR150	GR200
IPEDS	28.8	--
BSC	25.6	27.6
1824	25.2	27.3
≥ 25	27.1	28.9
TRNS	35.0	36.3

Campus Leader
Chancellor Ronald Sexton

Yellowstone Co.

Population	129,352
% Male	48.8
% Female	51.2
% Minority	7.2
MHI	$36,727
MFI	$45,277
% ≥BA	26.4

Campus Revenue

General Fund	$13,244,632
Tuition (6 cr)	$807
Tuition (12 cr)	$1,576

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	Yes
Advising office	Yes
Learning center	Yes
# of leaders from fall 2001-2008	1
Executive board	Yes
Alumni association	Yes
Foundation	Yes
% Part-time students[a]	23
% Fulltime students[a]	77
Fall unduplicated headcount[b]	3,818
Annualized fulltime equivalent (FTE)[b]	3,364

Figure 22. Mini-case diagram for Montana State University - Billings (MSUB). [a]Based on modified Adelman cohort. [b]Does not include graduate students. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Montana State University - Billings, 2001a, 2014; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000)

MSUN mini-case. Figure 23 depicts the MSUN mini-case. MSUN was established in 1927 as a two-year liberal arts school and enrolled its first students in 1929 (Montana State University – Northern, 2002) . MSUN was located on 115 acres south of Havre, Montana. The combined two-year and four-year unduplicated headcount was 1,589 in fall 2001. The State Board of Education approved conferring baccalaureate degrees in elementary and secondary education in 1954 (Montana State University - Northern, 2002). In 1970, MSUN began offering master's degrees in elementary and technical/vocational education. In 2001, MSUN was predominantly a four-year degree granting postsecondary institution with embedded two-year programming. The university's stated mission in 2001 was to "offer programs of professional preparation emphasizing discipline mastery, critical inquiry, and social responsibility in teacher preparation, mechanical and engineering technologies, business and computer information systems, nursing, and arts and sciences " (Montana State University Northern, 2001, p. 2). MSUN had a differentiated fee structure. Lower-division undergraduate students (<60 credits) paid the lower MSUN (2 Yr) tuition. Upper-division undergraduate students (>60 credits) paid the higher MSUN tuition.

The MSUN campus included 23 major buildings for classroom and administrative functions, residential housing, dining services, entertainment, and physical fitness. MSUN was a member of the National Association of Intercollegiate athletics and competed in the Frontier Conference. Men competed in basketball, football, wrestling, and rodeo. Women competed in basketball, volleyball, golf, and rodeo. The campus had established administrative services, executive and advisory boards, a foundation, and an alumni association.

Montana State University - Northern (MSUN)
2001-2002 Snapshot

Authority

Established in 1927 by the State Legislature. First students enrolled in 1929.

Cohort Profiles

	IPEDS	modified Adelman
Headcount	165	350
% Male	56	51
% Female	44	49
% Minority	18	24
% Federal Grants	53	--
ACT	19.8	--
SAT	966.6	--

Degrees (19)	
BAS	1
BA	12
BSEd	6

Graduation Rates

Cohort	GR150	GR200
IPEDS	22.4	--
BSC	22.3	22.6
1824	23.2	23.6
≥ 25	20.2	20.2
TRNS	33.9	33.9

Campus Leader
Chancellor Alex Capdeville

Carnegie Classification
Baccalareate College
Diverse Fields

Accreditation
NWCCU
1932 Assoc., Bac., Mast.

Governance
MT Board of Regents

Hill County

Population	16,673
% Male	49.8
% Female	50.2
% Minority	20.5
MHI	$30,781
MFI	$38,179
% ≥BA	20.0

Campus Revenue

General Fund	$6,671,086
Tuition (6 cr)	$716
Tuition (12 cr)	$1,607

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	Yes
Advising office	Yes
Learning center	Yes
# of leaders from fall 2001-2008	2
Executive board	Yes
Alumni association	Yes
Foundation	Yes
% Part-time students[a]	33
% Fulltime students[a]	67
Fall unduplicated headcount[b]	1,589
Annualized fulltime equivalent (FTE)[b]	1,418

Figure 23. Mini-case diagram for Montana State University - Northern (MSUN). [a]Based on modified Adelman cohort. [b]Includes two-year and four-year students. Does not include graduate students. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Montana State University – Northern, 2001, 2014; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000)

UM mini-case. Figure 24 depicts the UM mini-case. UM was legislatively authorized in 1893. In 2001, the UM campus was located on 200 acres at the base of Mount Sentinel in Missoula, Montana (University of Montana, 2002). Campus enrollment in fall 2001 was nearly 12,000. The university did not publish a mission statement in 2001—it published a theme of discovery.

> *The Discovery Continues* is the University's institutional theme for the new millennium. It encompasses exploration of new knowledge through research, scholarship, and creative activities and aggressively brings that knowledge to bear on solutions for societal problems and challenges. This search is based on a solid foundation of values and wisdom derived from understanding and respecting a diversity of cultures and perspectives. (University of Montana, 2001, inside front cover)

UM's College of Arts and Sciences and six undergraduate professional schools offered 44 baccalaureate degrees with various program options. The UM campus included 63 major buildings for classroom and administrative functions, residential housing, cafeteria and food services, health services, entertainment, physical fitness, and sports. UM's men and women athletes competed in National Collegiate Athletic Association and the Big Sky Conference. Men competed in basketball, cross-country, football, indoor and outdoor track, and tennis. Women competed in basketball, cross-country, indoor and outdoor track, volleyball, golf, and soccer. The campus had well established administrative services, executive and advisory boards, a foundation, and an alumni association.

University of Montana (UM)
2001-2002 Snapshot

Authority
Established in 1893 by an act of the State Legislature.

Cohort Profiles

	IPEDS	modified Adelman
Headcount	1,846	2,822
% Male	48.0	49.0
% Female	52.0	51.0
% Minority	6.0	8.0
% Federal Grants	32.0	--
ACT	22.6	--
SAT	1085.6	--

Graduation Rates

Degrees (44)		Cohort	GR150	GR200
BAS	1	IPEDS	40.8	--
BA	29	BSC	41.6	44.3
BS	11	1824	42.6	45.3
BM	1	≥ 25	30.4	33.3
BME	1	TRNS	44.2	45.5

Campus Leader
President George Dennison

Carnegie Classification
Research University, High Research Activity
Accreditation
NWCCU
1932, Assoc., Bac., Mast.

Governance
MT Board of Regents

Missoula County

Population	95,802
% Male	50.0
% Female	50.0
% Minority	6.0
MHI	$34,454
MFI	$44,865
% ≥BA	32.8

Campus Revenue

General Fund	$35,066,727
Tuition (6 cr)	$719
Tuition (12 cr)	$1,533

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	Yes
Advising office	Yes
Learning center	Yes
# of leaders from fall 2001-2008	1
Executive board	Yes
Alumni association	Yes
Foundation	Yes
% Part-time students[a]	11
% Fulltime students[a]	89
Fall unduplicated headcount[b]	11,825
Annualized fulltime equivalent (FTE)[b]	10,573

Figure 24. Mini-case diagram for The University of Montana (UM). [a]Based on modified Adelman cohort. [b]Does not include graduate students. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000; University of Montana, 2001, 2014)

TECH mini-case. Figure 25 depicts the TECH mini-case. TECH was legislatively authorized in 1893, but was not established as the Montana School of Mines until 1896. The first students were enrolled in 1900. In 2001, the main TECH campus was located on 125 acres in Butte, Montana (Montana Tech of the University of Montana, 2010). Unduplicated headount in fall 2001 was 1,660. The institution's stated mission in 2001 was to "provide graduates with the knowledge and skills necessary for successful lives and careers, conduct basic and applied research, and provide related services to the citizens of Montana and beyond" (Montana Tech of the University of Montana, 2001, p. ii). TECH's three colleges and one school offered 21 baccalaureate degrees with various program options. The main TECH campus included 19 major buildings for classroom and administrative functions, residential housing, cafeteria and food services, and physical fitness. TECH's men and women scholarship athletes competed in the Frontier Conference. Men competed in basketball, football, and wrestling. Women competed in basketball and volleyball. The campus had well established administrative services, executive and advisory boards, a foundation, and an alumni association.

Montana Tech (TECH)
2001-2002 Snapshot

Authority

Authorized by an act of the State Legislature in 1893 as the Montana School of Mines. Enrolled first students in 1900.

Cohort Profiles

	IPEDS	modified Adelman
Headcount	271	397
% Male	66.0	62.0
% Female	34.0	38.0
% Minority	5.0	6.0
% Federal Grants	35.0	--
ACT	23.1	--
SAT	1093.7	--

Degrees (21)	
BAS	3
BS	18

Graduation Rates

Cohort	GR150	GR200
IPEDS	41.0	--
BSC	41.1	42.6
1824	43.4	44.6
≥ 25	31.5	33.4
TRNS	48.4	50.6

Campus Leader

Chancellor W. Franklin Gilmore

CarnegieClassification

Baccalaureate Colleges, Diverse Fields

Accreditation

NWCCU 1932 Assoc., Bac., Mast.

Governance

MT Board of Regents

Silver Bow County

Population	34,606
% Male	49.4
% Female	50.6
% Minority	4.6
MHI	$30,402
MFI	$40,018
% ≥BA	21.7

Campus Revenue

General Fund	$8,937,749
Tuition (6 cr)	$746
Tuition (12 cr)	$1,485

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	No
Advising office	No
Learning center	Yes
# of leaders from fall 2001-2008	1
Executive board	Yes
Alumni association	Yes
Foundation	Yes
% Part-time students[a]	11
% Fulltime students[a]	89
Fall unduplicated headcount[b]	1,660
Annualized fulltime equivalent (FTE)[b]	1,658

Figure 25. Mini-case diagram for Montana Tech (TECH). [a]Based on modified Adelman cohort. [b]Does not include graduate students. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Montana Tech of the University of Montana, 2001, 2014; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000)

UMW mini-case. Figure 26 depicts the UMW mini-case. UMW was located on 39 acres on the south end of the highway business district in Dillon, Montana. UMW was legislatively authorized in 1893 as the state normal school offering two-year degrees in education. The State Board of Education approved conferring a bachelor degree in 1931. Additional bachelor and master degrees were approved in 1954. Liberal arts baccalaureate degrees were approved during the 1970s and 1980s. In 1987, six years before restructuring of the MUS, the BoR administratively merged UMW with UM and rescinded several baccalaureate degrees and the master of education degree.

By 2001, UMW was predominantly a four-year degree granting postsecondary institution with embedded two-year programs. UMW had a differentiated fee structure. Lower-division undergraduate students (<60 credits) paid the lower UMW (2 Yr) tuition. Upper-division undergraduate students (>60 credits) paid the higher UMW tuition. Campus unduplicated headcount was 1,163 in fall 2001. The university's stated mission was to "emphasize experiential learning that combines theory and practice through projects and field experiences" (University of Montana Western, 2001, p. 1). The campus had six residential halls, and served residential and commuter populations.

The UMW campus included 21 major buildings for classroom and administrative functions, residential housing, dining services, entertainment, and physical fitness. UMW was a member of the National Association of Intercollegiate Athletics and competed in the Frontier Conference. Men competed in basketball, football, golf, and rodeo. Women competed in basketball, volleyball, golf and rodeo. The campus had well established administrative services, executive and advisory boards, a foundation, and an alumni association.

University of Montana Western (UMW)
2001-2002 Snapshot

Authority
Established in 1893 by the State Legislature as the State Normal School. Enrolled first students in 1897.

Cohort Profiles

	IPEDS	modified Adelman
Headcount	173	277
% Male	51	52
% Female	49	48
% Minority	8	9
% Federal Grants	32	--
ACT	19.9	--
SAT	931	--

Degrees (4)	
BAS	1
BS	2
BA	1

Graduation Rates

Cohort	GR150	GR200
IPEDS	34.7	--
BSC	30.7	32.9
1824	32.6	34.6
≥ 25	13.0	13.0
TRNS	34.9	36.1

Campus Leader
Chancellor Stephen Hulbert

Carnegie Classification
Baccalaureate College, Diverse Fields

Accreditation
NWCCU 1932
Assoc., Bac.

Governance
MT Board of Regents

Beaverhead County

Population	9,202
% Male	51.2
% Female	48.2
% Minority	4.1
MHI	$28,962
MFI	$39,971
% ≥BA	26.4

Campus Revenue

General Fund	$4,436,578
Tuition (6 cr)	$667
Tuition (12 cr)	$1,417

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	No
Advising office	No
Learning center	Yes
# of leaders from fall 2001-08	2
Executive board	Yes
Alumni association	Yes
Foundation	Yes
% Part-time students[a]	17
% Fulltime students[a]	83
Fall unduplicated headcount[b]	1,163
Annualized fulltime equivalent (FTE)[b]	1,028

Figure 26. Mini-case diagram for University of Montana - Western (UMW). [a]Based on modified Adelman cohort. [b]Includes two-year and four-year students. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000; University of Montana – Western, 2001, 2014)

Summary of the mini-case data. This section presented qualitative data from 13 mini-cases—seven mini-cases represented two-year campuses, six mini-cases represented four-year campuses. The mini-cases were coded by two- and four-year degree-granting status, because the external environmental conditions (legislative authority, Carnegie classification, NWCCU accreditation, and campus revenue) naturally divided the mini-cases into those categories and resulted in distinct internal environmental conditions (numbers and types of degrees, available campus services, cohort profiles, etc.). Each of the 13 mini-case worksheets illustrated how environmental conditions differed among the campuses (Subquestion One). The mini-case worksheets also showed how campus graduation rates varied among the campuses (Subquestion Two).

Although each mini-case worksheet contributed to understanding the environmental conditions and resulting graduation rates at each campus, the worksheet data do not by themselves explain how environmental conditions affect graduation rates within one postsecondary education system. Greater understanding is achieved by summarizing the two-year mini-case data into a MUS (2 Yr) case worksheet and summarizing the four-year mini-case data into a MUS (4 Yr) case worksheet. These summary worksheets are presented in the following section and discussed in the MUS cross-case analysis.

MUS cross-case analysis. Stake's (2006) worksheet was useful to depict the specific external and internal components unique to each of the 13 mini-cases. Stake's worksheet format was also useful to depict generalized external and internal components unique to the MUS case. Worksheets that summarize mini-case data from the seven two-year-campus mini-cases and six four-year-campus mini-cases are presented as Figures 27 and 28. Figure 27 represents the MUS Two-Year Campus Case. Figure 28 represents the MUS Four-Year Campus Case. Collectively, these two figures summarize the findings of this study and illustrate variations in the MUS Case.

MUS Two-Year Campus Case Study
2001-2002 Snapshot

Authority

Mixed. COTs authorized under OPI and tranferred to MUS. 2 Yr campuses legislatively authorized.

Cohort Profiles

	IPEDS	modifed Adelman
Headcount	1,352	1,971
% Male	52.0	46.0
% Female	48.0	54.0
% Minority	7.0	10.0
% Federal Grants	--	--
MUS ACT	18.5-20.3	--
MUS SAT	926.3-1003	--

Degrees (146)	
AAS	83
AA	5
AS	7
Certificates	51

Graduation Rates

Cohort	GR150	GR200
IPEDS	36.6	--
BSC	23.6	26.3
1824	23.9	25.6
≥ 25	24.2	27.6
TRNS	24.8	27.7

MUS Commissioner
Dr. Richard A. Crofts

Carnegie Classification
Not all classified, classifications not consistent

Accreditation
Not all idependently accredited

Governance
MT Board of Regents

Montana

Population	902,195
% Male	49.8
% Female	50.2
% Minority	9.4
MHI	$33,024
MFI	$40,487
% ≥BA	24.4

Campus Revenue

General Fund[a]	$9,058,034
Tuition (6 cr)	$564-$702
Tuition (12 cr)	$1,093-$1,336

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	1
Advising office	2
Learning center	6
# of campus leaders from fall 2001-04	1-2
# of MUS leaders from fall 2001-04	3
Executive board	2
Alumni association	2
Foundation	2
% Part-time students[a]	15-62%
% Fulltime students[a]	38-85%
Fall unduplicated headcount[b]	3,828
Annualized fulltime equivalent (FTE)[b]	3,114

Figure 27. Mini-case diagram for the Montana University System Two-year Case (MUS (2 Yr)). [a]Based on modified Adelman cohort. [b]Does not include MSUN (2 Yr) and UMW (2 Yr) headcount. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000)

MUS Four-Year Campus Case Study
2001-2002 Snapshot

Cohort Profiles

	IPEDS	modified Adelman
Headcount	4,689	7,773
% Male	52.0	51.0
% Female	48.0	49.0
% Minority	6.0	8.0
% Federal Grants	--	--
MUS ACT	19.8-23.1	--
MUS SAT	933-1093.7	--

Degrees (170)	
AA	4
AS	5
BAS	7
BLS	1
BA	63
BS	87
BM/BME	3

Graduation Rates

Cohort	GR150	GR200
IPEDS	41.0	--
BSC	39.3	41.9
1824	40.5	43.2
≥ 25	30.6	32.5
TRNS	43.8	45.3

MUS Commissioner
Dr. Richard A. Crofts

Authority
All legislatively authorized with mixed purposes.

Carnegie Classification
All classified, classifications not all similar
Accreditation
All independently accredited by NWCCU

Governance
MT Board of Regents

Montana

Population	902,195
% Male	49.8
% Female	50.2
% Minority	9.4
MHI	$33,024
MFI	$40,487
% ≥BA	24.4

Campus Revenue

General Fund	$107,560,328
Tuition (6 cr)	$667-$807
Tuition (12 cr)	$1,417-$1,576

Environmental Conditions:

Campus-based student support programs:	
TRiO SSS	4
Advising office	3
Learning center	5
# of campus leaders from fall 2001-08	1-2
# of MUS leaders from fall 2001-08	3
Executive board	6
Alumni association	6
Foundation	6
% Part-time students[a]	11-33%
% Fulltime students[a]	67-89%
Fall unduplicated headcount[b]	31,799
Annualized fulltime equivalent (FTE)[b]	28,452

Figure 28. Mini-case diagram for the Montana University System Four-year Case (MUS (4 Yr)). [a]Based on modified Adelman cohort. [b]Includes MSN (2 Yr) and UMW (2 Yr) headcount. Does not include graduate students. (Carnegie Foundation, 2001; MUS Data Warehouse, 2014; Northwest Commission on Colleges and Universities, 2001; U.S. Census, 2000)

The case-study narrative that follows addresses the quantitative and qualitative findings of this study in the context of Katz and Kahn's (1978) open-systems characteristics and the postsecondary education analogies presented in Tables 7 and 8 (p. 77). The order of Katz and Kahn's open-systems characteristics in the case-study narrative differs from the order presented in Tables 7 and 8 (p. 77). The open-system characteristics have been reordered to align with the external and internal components illustrated in the mini-case worksheets.

Integration and coordination. Katz and Kahn (1978) recognized that open systems were subject to orderly and systematic articulation of functions achieved through priority setting, policy development, and scheduling. Such integration and coordination in postsecondary education systems occurs through internal and external regulatory processes.

Responsibility for orderly and systematic articulation of internal functions in the MUS belonged to the BoR and Commissioner of Higher Education. The six four-year mini-cases were authorized and granted their codified purposes by the Montana Legislature. The Montana Legislature also authorized the BoR to have governing control and supervision of the units of the MUS. Some of the legislatively authorized responsibilities of the BoR included:

- provide, subject to the laws of the state, rules for the government of the system;
- have general control of all receipts and disbursements of the system;
- appoint a president or chancellor and faculty for each of the institutions of the system;
- prevent unnecessary duplication of courses at the units of the system;

- ensure an adequate level of security for data within the state university system. (MCA 20-25-301)

This study found the central governance structure was one of the few things that unified all of the MUS mini-cases in 2001. Granting authority to a single entity to govern the MUS ensured a consistent approach to policy development and collection of uniform data elements—it did not ensure equal results. The restructured MUS was designed to achieve system efficiency through better defined two-year and four-year programming. The differences between two-year and four-year mini-cases resulted in different institutional governance structures and programming that were recognized and affirmed by external bodies and agencies.

Two-Year Case. In 2001, the seven two-year mini-cases varied by campus governance structure. Two of the COTs—MSUB GF COT and UM HLN COT—were treated as standalone institutions with their own on-site administration, student services, facilities, and academic programs. Three of the COTs—MSUB COT, UM COT, and UM TECH COT—were partially embedded institutions with partial on-site administration, shared student services, separate facilities, and shared programming with their parent four-year campuses (MSUB, UM, and TECH, respectively) . MSUN (2 Yr) and UMW (2 Yr) were fully embedded two-year programs at MSUN and UMW with no separately designated administration, student services, facilities, and curriculum processes. The differences between standalone and embedded two-year mini-cases were many; however, the standalone mini-cases had more autonomy. Embedded two-year mini-cases were subject to internal four-year campus regulatory processes (resource allocations, curriculum approval, data collection procedures, etc.).

Two external bodies that recognize and accredit MUS campuses include the Carnegie Foundation and the Northwest Commission on Colleges and Universities (NWCCU). Table 43 shows the Carnegie classification (Carnegie Foundation, 2014) and accredited degree levels (Northwest Commission on Colleges and Universities, 2014) for each of the seven two-year mini-cases. Only four of the two-year mini-case campuses —MSUB COT, MSU GF COT, UM HLN COT, and UM TECH COT—were independently classified by the Carnegie Foundation. Three of the two-year mini-case campuses—MSUB COT, MSU GF COT, and UM HLN COT—were classified as two-year schools under a four-year school. UM TECH COT was classified as an independent two-year school. MSN (2 Yr), UM COT, and UMW (2 Yr) were not independently recognized by the Carnegie Foundation.

Table 40.

Carnegie Classification and Accredited Degree Levels for Two-Year Mini-Cases

Mini-Case	Carnegie Classification	Accredited Degree Levels
MSUB COT	Associates - Public 2 under 4	Associate under MSUB
MSU GF COT	Associates - Public 2 under 4	Associate since 1979
MSN (2 Yr)	--	Associate under MSUN
UM COT	--	Associate under UM
UM HLN COT	Associates - Public 2 under 4	Associate since 1977
UM TECH COT	Associates - Public, rural serving, small	Associate under TECH
UMW (2 Yr)	--	Associate under UMW

Note. MSN (2 Yr), UM COT, and UMW (2 Yr) had embedded governance structures under MSN, UM, and UMW and were neither classified nor accredited as independent institutions. (Carnegie Foundation, 2014; Northwest Commission on Colleges and Universities, 2014)

All of the two-year mini-case campuses offered associate-degree programs accredited by the NWCCU. The NWCCU did not independently accredit associate programs at five of the two-year mini-cases—MSUB COT, MSUN (2 Yr), UM COT, UM TECH COT, and UMW (2 Yr). MSU GF COT and UM HLN COT were the only two-year mini-cases independently accredited by the NWCCU.

Four-Year Case. In 2001, the MUS four-year mini-cases varied by governance structure and degree granting status. MSU and UM were the flagship research institutions. MSUB and MSUN were affiliate four-year campuses to MSU. TECH and UMW were affiliate four-year campuses to UM. Pursuant to statute (MCA 20-25-301) the BoR discouraged program duplication among campuses. These differences resulted in different institutional characteristics that were recognized and affirmed by external bodies and agencies. Table 41 shows the Carnegie classification (Carnegie Foundation, 2014) and accredited degree levels (Northwest Commission on Colleges and Universities, 2014) for each of the six four-year mini-cases.

Table 41.

Carnegie Classification and Accredited Degree Levels for Four-Year Mini-Cases

Mini-Case	Carnegie Classification	Accredited Degree Levels
MSU	Research University (Very high research activity)	Associate, Baccalaureate, Masters, Doctorate
UM	Research University (High research activity)	Associate, Baccalaureate, Masters, Doctorate
TECH	Baccalaureate College, Diverse Fields	Associate, Baccalaureate, Masters
MSUB	Master's Colleges and Universities (Medium programs)	Associate, Baccalaureate, Masters
MSUN	Baccalaureate College, Diverse Fields	Associate, Baccalaureate, Masters
UMW	Baccalaureate College, Diverse Fields	Associate, Baccalaureate

Note. All MUS four-year campuses received initial accreditation from the Northwest Commission on Colleges and Universities (NWCCU) in 1932. (Carnegie Foundation, 2014; Northwest Commission on Colleges and Universities, 2014)

All of the four-year mini-case campuses received approval from the BoR and the NWCCU to award associate and baccalaureate degrees in accredited programs. Five mini-case campuses—MSU, UM, TECH, MSUB and MSUN—were approved to award master degrees in accredited programs. The two flagship research campuses—MSU and UM—were approved to award doctorate degrees in accredited programs. UMW was the only four-year mini-case without approval to offer graduate-level degrees.

This study found that an integrated and coordinated system of external governance did not ensure uniformity across a postsecondary education system. Institutional purpose and the requirement to prevent unnecessary course duplication resulted in policies that produced differentiated campuses.

Cycles of events. Katz and Kahn (1978) recognized that open systems are subject to cycles of events or patterns of recurring energy exchange. In public postsecondary education systems, these cycles of events are largely determined by the academic year and legislative sessions.

All of the MUS mini-cases in this study operated under a standard three-semester system—summer, fall, and spring. Semester beginning and end dates varied by a few days, but the length of terms and the part-time and fulltime credit loads were consistent—15-week terms, 6-credits for part time load, and 12-credits for a fulltime load. The MUS received biennial appropriations by the legislature. Campuses budgeted on fiscal years that started July 1 of one year and ended June 30 of the following year. Each biennium, the legislature appropriated funds for the MUS. The BoR allocated the general fund appropriation between the MSU and UM flagship campuses. Biennial distribution of the general fund appropriation to the affiliate two-year and four-year two-year campuses was determined by the flagship campuses, not the BoR or the legislature. This study found similar cycles of events for all the MUS mini-cases.

Differentiation. Katz and Kahn (1978) recognized that open systems are subject to growing complexity and specialized functions. In public postsecondary education systems, differentiation occurs in the form of specialized academic and student support programs and unique institutional mission and purpose. This study found differences between the two-year and four-year mini-cases based on campus authority, history, and purpose. Environmental conditions in the two-year and four-year mini-cases follow.

Two-Year Case. Two of the seven two-year mini-cases—MSUN (2 Yr) and UMW (2 Yr)—were authorized with the founding MSUN and UMW legislative

authorization (1927 and 1893, respectively). The MSUN (2 Yr) and UMW (2 Yr) mini-cases represent fully embedded two-year programs on four-year campuses. Five of the two-year mini-cases—MSUB COT, MSUB GF COT, UM COT, UM TECH COT, and UM HLN COT—were first established in 1932 as training centers under the authority of the Office of Public Instruction. The centers were legislatively authorized as Vocational Technical Centers (Vo-Tech) in 1969. Administrative oversight for the Vo-Tech Centers was transferred to the OCHE in 1987 and they were designated as Colleges of Technology (COT). In 1993, the five COTs were formally affiliated with a parent four-year institution in Baker's (1993) restructure of the MUS. Baker identified the COTs as a means to address workforce needs, improve student access to higher education, and incentivize MUS enrollments with differentiated tuition and transfer opportunities.

From their beginnings, the five COTs had a similar purpose; however, that purpose was not aligned with postsecondary education. The original COTs were secondary-level vocational training programs. The origins and the purposes of the seven two-year mini-cases were varied. Those origins and purposes influenced the inputs and throughputs for each mini-case.

Four-Year Case. All six four-year campus mini-cases were originally authorized by the Montana State Legislature. MSU, UM, UMW, and TECH and were authorized in 1893; the four original campuses first enrolled students in 1893, 1895, 1897, and 1900, respectively. MSUB and MSUN were authorized in 1927. MSUB first enrolled students in 1927, MSUN first enrolled students in 1929. The purposes of MSU, UM, UMW, TECH and MSUN were codified into Montana law as follow:

MSU shall be a comprehensive institution carrying out programs of research and public service and offering instruction in the sciences, literature, and arts, including military science, as well as professional programs in agriculture, engineering, and other fields as may be prescribed by the regents. (MCA 20-25-221)

UM shall have for its purpose instruction in all the departments of science, in literature, in the arts, and in industrial and professional education.

A law school is established at the university of Montana-Missoula.

A forestry school is established at the university of Montana-Missoula. (MCA 20-25-206)

TECH has for its purpose instruction and education in chemistry, metallurgy, mineralogy, geology, mining, milling, engineering, mathematics, mechanics and drawing, and the laws of the United States and Montana relating to mining. (MCA 20-25-211)

UMW has for its primary purpose the instruction and training of teachers for the public schools of Montana. (MCA 20-25-253)

MSUN has for its purpose instruction and education in:

(1) the English language, history, literature, mathematics, bookkeeping, moral philosophy, and political, rural, and household economy;

(2) mechanical arts, agricultural chemistry, animal and vegetable anatomy and physiology, and veterinary art;

(3) entomology, geology, and such other natural sciences as may be

prescribed by the regents;

(4) agriculture, horticulture, and especially the application of science and the mechanical arts to practical agriculture in the field;

(5) irrigation and use of water for agricultural purposes; and

(6) all that relates to an efficient, modern manual training school. (MCA 20-25-256)

MSUB was originally authorized as a normal school to serve central and eastern Montana (Montana State University Billings, 2014). MSUB was the only four-year campus without a legislatively codified purpose.

Summary of two- and four-year mini-case differentiation. From their beginnings, the five two-year COT mini-cases and all of the four-year campuses had different purposes. The six four-year campuses were legislatively authorized with higher education purposes. Campus purposes were codified for five of the six four-year campuses—MSUB did not have a codified purpose. The five two-year COTs were originally established as technical training programs in the secondary school system. Responsibility for oversight of the COTs was transferred from the OPI to the BoR in 1989. General legislative provisions defining the purposes of the COTs were repealed in 1997 (MCA 20-30-101 through 20-30-105). The COTs and other two-year mini-cases did not have a BoR-approved mission until May 2011 (http://mus.edu/2yr/2yr_Mission_and_Vision.asp).

This study found the 11 MUS campuses did not share similar histories, purposes, or administrative structures. The differences in histories, purposes, and administrative structure influenced the degree programs and cohort profiles at each campus. The

differences in degree programs and cohort profiles are discussed in the following sections as importation of energy and throughputs.

Importation of energy. Katz and Kahn (1978) recognized that open systems are subject to different qualities of primary inputs from external environments. In the case of public-postsecondary educational systems, these qualities include numbers of new students by age, gender and minority status, average standardized test scores, grant aid dependence, and state allocated financial resources. This study found different qualities of input in each of the mini-cases. The most striking differences in energy inputs occurred between the Two-Year Case and Four-Year Case (Figures 27 and 28, pg. 184 and 185).

Two-Year Case. Beginning student enrollments in the two-year mini-cases ranged between 9 at (UMW (2 Yr)) and 628 at MSU GF COT. Forty-nine percent of beginning student enrollments in the two-year mini-cases were of traditional age (18 to 24 years); 49% were 25-years or older. Transfer students comprised 43% of the combined beginning student enrollments in the two-year mini-cases. The combined beginning student cohort in the two-year mini-cases was 60% female and 13% minority. Part-time enrollments ranged between 15% at MSUN (2Yr) and 62% at MSU GF COT. Tuition and fees for 12 credits at two-year campuses ranged between $1,093 at UM GF COT and $1,336 at MSUB COT. Standardized test score and federal grant aid data were not available for all of the two-year campuses. ACT scores were available for three of the two-year campuses and ranged from 18.5 at MSUB and UM TECH COT to 20.3 at MSU GF COT. Percentages of federal grant aid awarded were available for three of the two-year campuses and ranged from 38% at MSU GF COT to 67% at UM HLN COT.

Campus versus community characteristics included such inputs as gender and educational preparedness and attainment. Figure 29 summarizes the two-year campus versus community characteristics from the mini-case worksheets and illustrates how the two-year campus mini-case data relate to each other. The reader should note figures throughout this study graph male percentages, not female percentages. No gender bias is intended. Selection of one gender simplifies presentation of the data. Trends of female percentages logically oppose trends of male percentages.

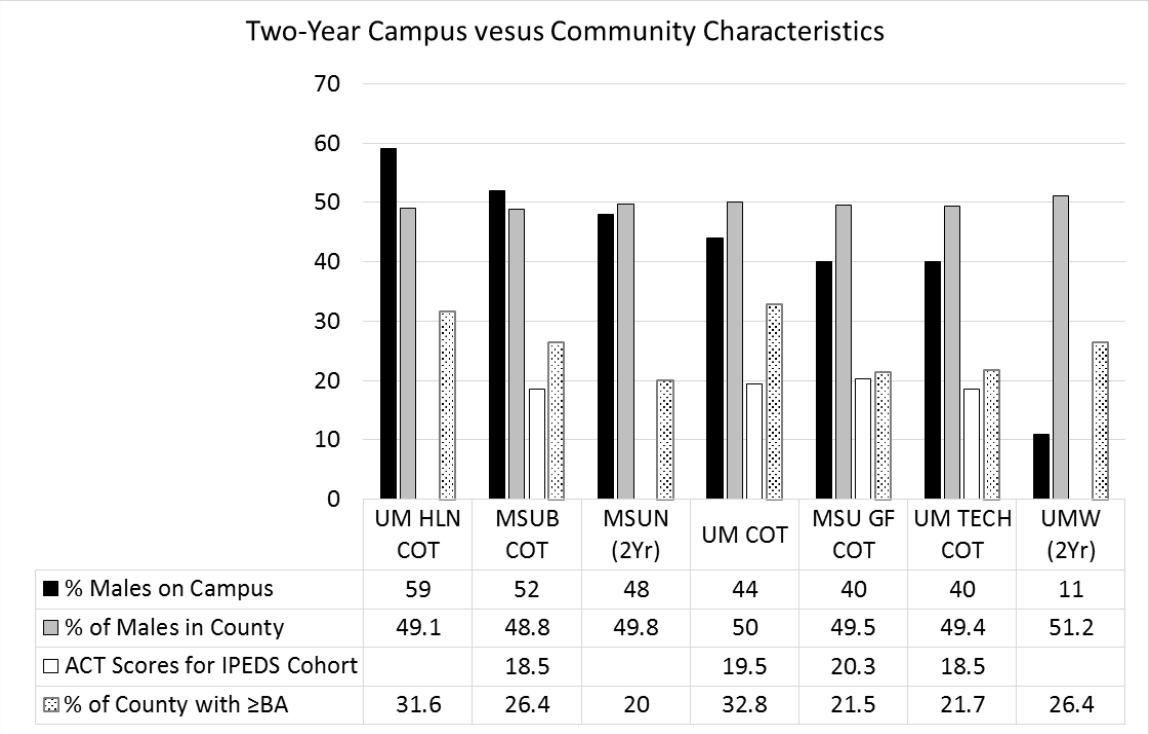


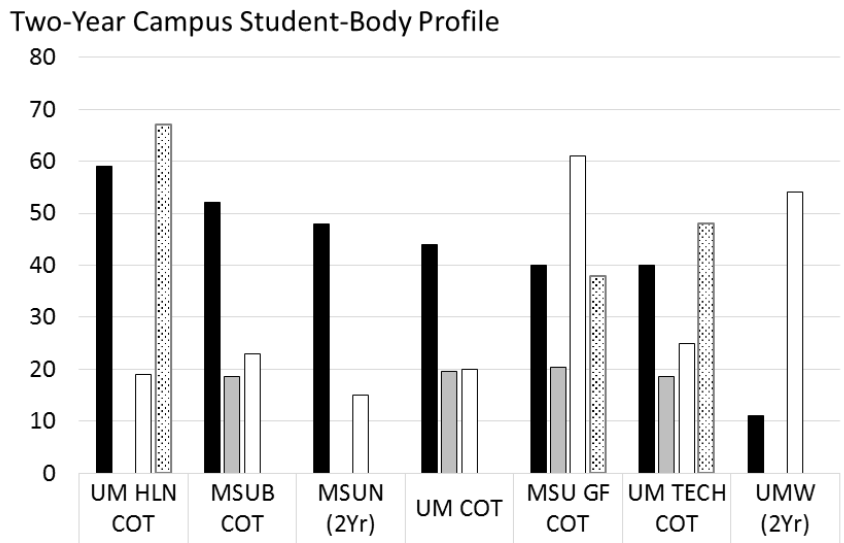
Figure 29. Campus and community educational preparedness for two-year mini-cases sorted by male gender. Female percentages increase as male percentages decrease.

The percentage of males enrolled in two-year campuses did not match the percentage of males living in the surrounding county. The percentage of males at two-year campuses ranged from a high of 59 at UM HLN COT to a low of 11 (UMW (2 Yr). The percentage of males in the surrounding communities ranged from 48.8 in Billings to

51.2 in Dillon. This study found gender ratios in the two-year mini-cases did not match gender ratios in the surrounding county.

Although standardized test scores were only available for three two-year campuses, higher percentages of male students did not correspond to higher standardized test scores. A rough comparison was made between student academic preparedness at each campus, measured as ACT scores, and postsecondary educational attainment in the surrounding community, measured as percent of the adult population having earned a bachelor's degree or higher (%≥BA) in the county. The %≥BA data did not correspond well to the ACT data. This study found that student academic preparedness in the two-year mini-cases did not correspond to postsecondary educational attainment in the surrounding community.

The student-body profile for each campus included inputs such as dominant gender, educational preparedness, enrollment status, and grant aid. Figure 30 summarizes some of the student-body data from the two-year mini-case worksheets and illustrates how the student-body profiles relate to each other. Campuses in Figures 30 are ranked in order of decreasing male percentages.



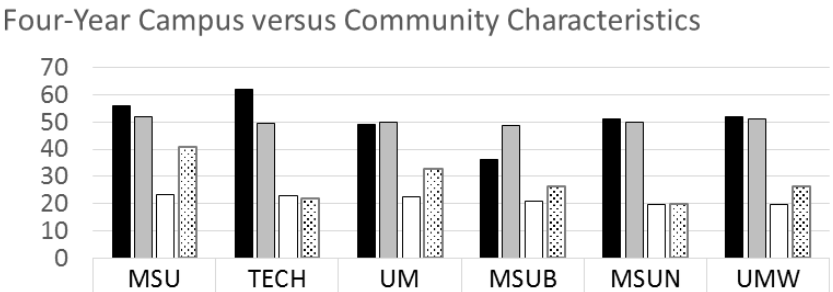
	UM HLN COT	MSUB COT	MSUN (2Yr)	UM COT	MSU GF COT	UM TECH COT	UMW (2Yr)
% Males on Campus	59	52	48	44	40	40	11
ACT Scores for IPEDS Cohort		18.5		19.5	20.3	18.5	
% Parttime Students	19	23	15	20	61	25	54
% Federal Grant Aid	67				38	48	

Figure 30. Two-year mini-case student-body profiles sorted by male gender. ACT scores were not available for three of the two-year campuses—MSUN (2 Yr), UM HLN COT, and UMW (2 Yr). Federal grant aid data was not available for MSUB COT, MSUN (2 Yr), UM COT, and UMW (2 Yr). Female percentages increase as male percentages decrease.

The data presented in Figure 30 show variability in the cohort profiles among the two-year campuses. The percentage of males decreased in six of the two-year campuses as the percent of part-time students increased. MSU GF COT and UMW (2 Yr) had higher percentages of part-time students than the other two-year mini-cases. ACT and federal grant aid was missing for many of the mini-cases. Few trends were evident largely because the two-year data set was not complete. Reasons for incomplete two-year data were likely related to inconsistent internal integration and coordination of two-year campuses (e.g., independent, partially embedded, and fully embedded administrative structures).

Four-Year Case. Beginning student enrollments in the four-year mini-cases ranged from 277 at UMW to 2,822 at UM. Eighty-eight percent of beginning student enrollments in the four-year mini-cases were of traditional age (18 to 24 years); 11% were 25-years or older. Transfer students comprised 28% of beginning student enrollments in four-year mini-cases. The beginning student cohort in four-year mini-cases was 49% female and 8% minority. Part-time enrollments ranged from 11% at UM and TECH to 33% at MSUN. Tuition and fees for 12-credits at the four-year min-cases ranged between $1,417 at UMW and $1,576 at MSUB. ACT scores at the four-year mini-cases ranged from 19.8 at UMW to 23.2 at MSU. Percentages of federal grant aid awarded at four-year mini-cases ranged from 26% at MSU to 53% at MSUN.

The campus and community characteristics evaluated in this study included such inputs as gender and educational preparedness and attainment. Figure 31 summarizes the four-year campus versus community characteristics from the mini-case worksheets and illustrates how the four-year campus data relate to each other. Campuses in Figure 31 are ranked in order of decreasing male percentages.



	MSU	TECH	UM	MSUB	MSUN	UMW
■ % Males on Campus	56	62	49	36	51	52
▒ % of Males in County	52	49.4	50	48.8	49.8	51.2
□ ACT Scores for IPEDS Cohort	23.2	23.1	22.6	21	19.8	19.6
▒ % of County with ≥BA	41	21.7	32.8	26.4	20	26.4

Figure 31. Campus and community educational preparedness for four-year mini-cases sorted by male gender. Campuses ranked on descending male percentages. Female percentages increase as male percentages decrease.

Figure 31 shows the percentage of males trended downward as ACT scores trended downward. MSUN's and UMW's ACT scores fell slightly below the trend, likely because ACT scores for the associate-degree seeking cohort on those dual-mission, fully embedded mini-cases were included. The associate-degree seeking cohorts at MSUN (2 Yr) and UMW (2 Yr) were dominated by female students and the average ACT scores represented the full IPEDS cohort that included both two-year and four-year degree seeking students.

The percentage of male students was higher than female students at four mini-cases—MSU, TECH, MSUN, and UMW. In each of these four-year campus mini-cases, the percentage of males was also higher than the percentage of males in the surrounding county. The percentage-point difference between campus and community male populations was 4.0 at MSU, 12.6 at TECH, and 12.8 at MSUB. This study found gender ratios in the four-year mini-cases did not correspond to gender ratios in the surrounding community.

A rough comparison was made between academic preparedness at each four-year mini-case, measured as ACT scores, and postsecondary educational attainment in the surrounding community, measured as percent of the adult population having earned a bachelor's degree or higher (%≥BA) in the county. Figure 31 shows the %≥BA data did not correspond well to the ACT data. This study found student academic preparedness in the four-year mini-cases did not correspond to postsecondary educational attainment in the surrounding community.

The cohort data presented in Figures 32 and 33 show variability in the quality of inputs to the four-year mini-cases. Mini-cases in Figure 32 are sorted by male gender. Mini-cases in Figure 33 are sorted by ACT scores. Similar to the two-year mini-cases, the percentage of males in four-year mini-cases generally decreased as the percent of part-time students increased. MSUN was the exception with higher percentages of part-time students than the other four-year mini-cases.

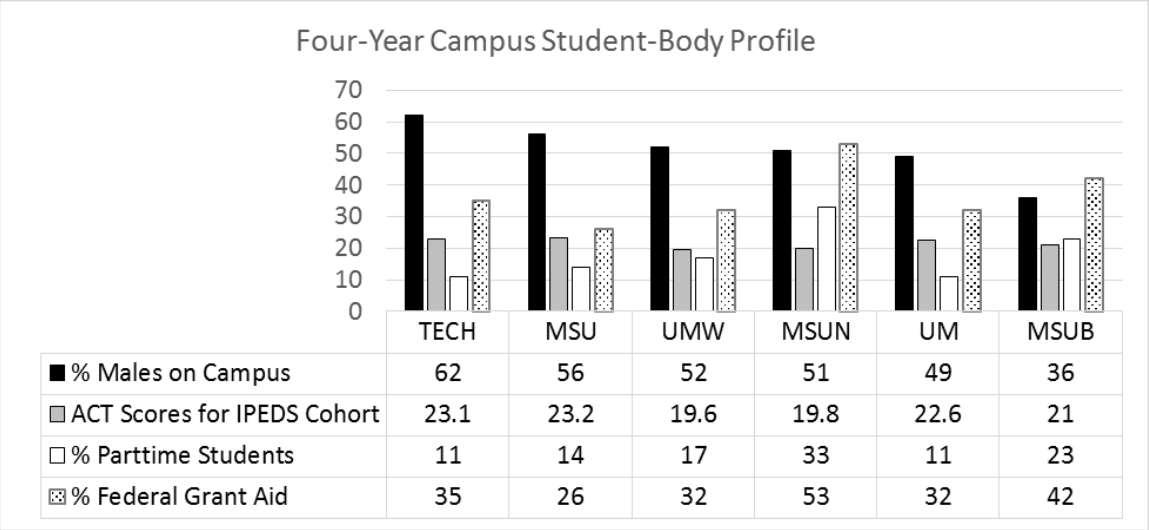


Figure 32. Four-year mini-case student-body profiles sorted by male gender. *Note*. Female percentages increase as male percentages decrease.

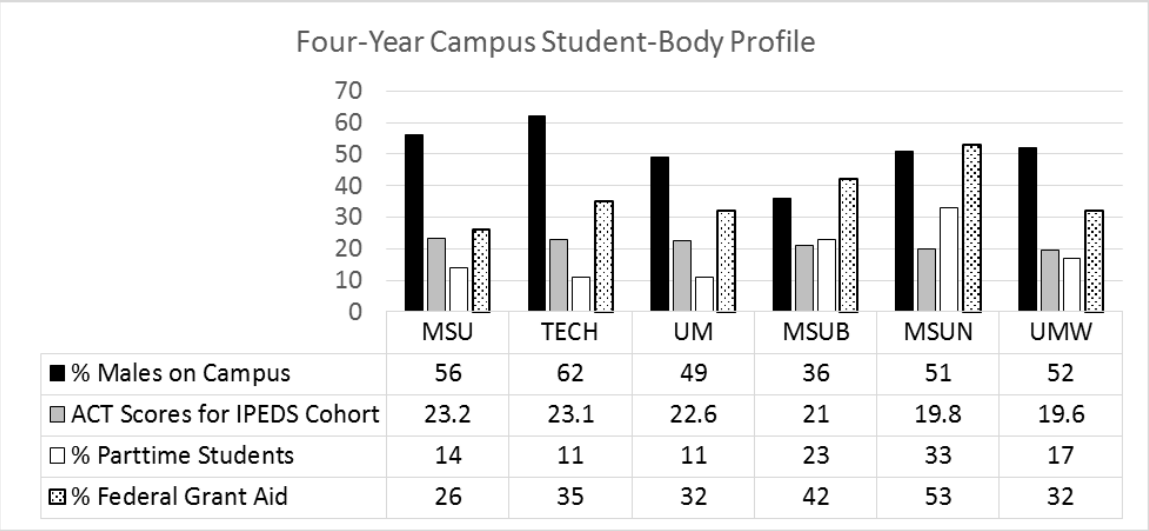


Figure 33. Four-year mini-case student body profiles sorted by ACT scores.

Figure 33 shows the percentage of students who received federal grant aid increased as male percentages decreased, ACT scores decreased, and the percentage of part-time students increased. Female percentages increased as male percentages decreased, resulting in the corollary finding that percentages of students who received federal grant aid increased as female percentages increased. MSUN and UMW were

exceptions—both campuses had slightly higher percentages of males. UMW had a lower than expected percentage of students receiving federal grant aid.

Importation of energy summary. The findings from this study indicate fewer students enrolled in two-year campuses. Percentages of 25 year and older students, transfer students, female students, minority students, and part-time students were higher at two-year campuses. Tuition and fees at two-year campuses were lower than at four-year campuses. Although the data set was not complete for two-year campuses, ACT scores were lower than four-year campuses and percentages of federal grant aid were higher than four-year schools. The student profile at two-year campuses had more risk factors. In both two-year and four-year campuses, at-risk factors such as female gender, part-time enrollment status and financial need increased as ACT scores decreased.

Throughput. Katz and Kahn (1978) recognized that open systems are subject to different qualities of throughput. In public postsecondary education systems, throughputs vary from number of student support programs to number of degree offerings to types of degree offerings to academic policies. Similar to differences in inputs, this study found differences in throughputs for two- and four-year mini-cases. Two-year mini-cases had fewer throughput offerings than four year mini-cases. Differences between the Two-Year Case and the Four-Year Case follow.

Two-Year Case. Table 42 summarizes the number and types of degrees and certificates offered at each of the seven two-year mini-cases in fall 2001.

Table 42.

Degree Inventory at Two-Year Mini-cases in 2001

Degrees		Campus						
		MSU GF COT	UM COT	MSUB COT	UM TECH COT	MSUN (2Yr)	UM HLN COT	UMW (2Yr)
Associate of Applied Science	AAS	16	15	13	9	14	12	4
Associate of Arts	AA	1	1	2				1
Associate of Science	AS	1		1	1	2	1	1
Certificates		9	10	10	7	6	9	
Degree Totals		27	26	26	17	22	22	6

Note. (College Catalogs)

The Associate of Applied Science (AAS) was the only degree offered at all seven two-year mini-cases. As defined in BoR policy (BoR 301.12), AAS degrees are designed to prepare students for immediate employment. Associate of Art and Associate of Science degrees are designed for transfer to a four-year institution. The table shows the highest number of degree offerings at MSU GF COT, UM COT, and MSUB COT.

Several exceptions to male enrollment percentages were noted in the prior section (Figure 29, p. 196). UM HLN COT and MSUB COT had higher than average male enrollments. UMW (2 Yr) had lower than average male enrollments. The percentage of males enrolled in two-year programs at UMW (11%) was more than 29 percentage points lower than the percent of males enrolled in two-year programs at other campuses. The percentage of males enrolled UM HLN COT and MSUB COT was 2 to

10 points higher than the state average for males (49.8%) The exceptions in male enrollment noted at MSUB COT, UM HLN COT, and UMW could be attributed to number and types of degrees offered at each campus. Figure 34 shows the number of AAS degree offerings and percentage of males at each two-year campus.

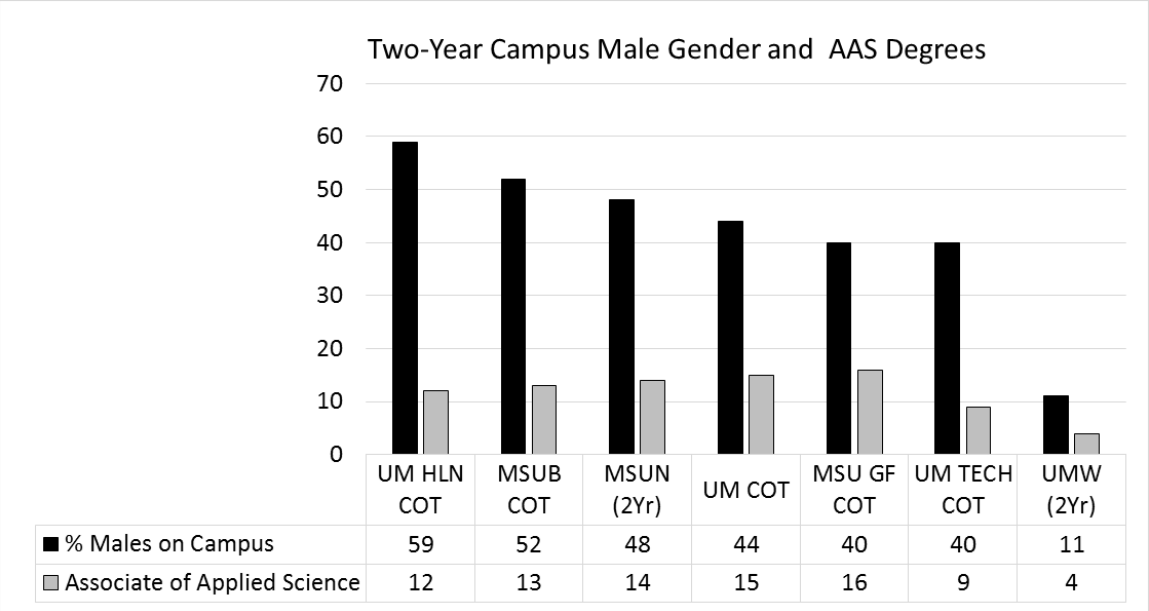


Figure 34. Percent male gender and number of AAS degrees at two-year mini-cases. *Note.* Female percentages increase as male percentages decrease.

AAS degree options at MSUB COT and UM HLN COT were dominated by Ag and Industrial-Diesel Technology; Automobile Collision Repair and Refinishing; Automotive Technology; Aviation Maintenance Technology; Computer Systems Technology; Computer Technology; Construction Technology; Diesel Technology; Drafting Technology; Heating, Ventilation, Air Conditioning and Refrigeration; Electronics Technology; Metals Technology; Microcomputer Operations; Paramedic; Process Plant Technology; Protective Services; and Truck-Diesel Technology. Additional AAS degree options at MSUB COT and UM HLN COT consisted of

Accounting Technology, Administrative Assistant, Medical Secretary, Office Technology, and Practical Nursing. AAS degree options at UMW (2 Yr) were more limited. UMW (2 Yr) offered four AAS degrees—Business; Computer Layout and Design; Early Childhood Education; and Tourism and Recreation. AAS enrollment at UMW (2 Yr) was dominated by females pursing Early Childhood Education. These three two-year mini-case exceptions indicate a potential relationship between degree offerings and student gender.

Table 43 summarizes the number and type of student support programs that were available at the two-year mini-cases. Learning centers were available at all but one two-year mini-case—MSU GF COT. Only two mini-cases had formal advising centers MSUB COT and MSUN (2 Yr). MSUN (2 Yr) was the only mini-case with a federally funded TRiO Student Support Services program.

Table 43.

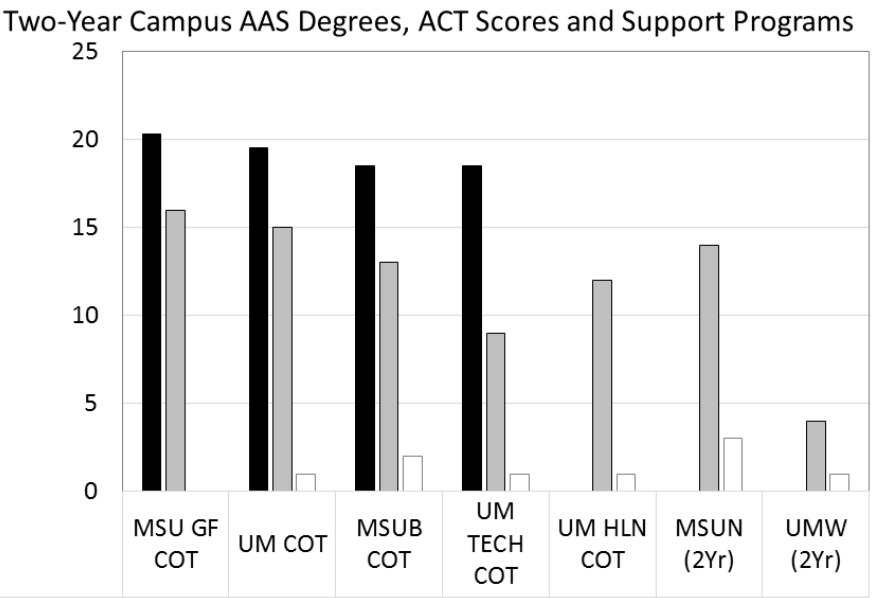
Student Support Programs at Two-Year Mini-cases

Program	Campus						
	MSU GF COT	UM COT	MSUB COT	UM TECH COT	MSUN (2Yr)	UM HLN COT	UMW (2Yr)
TRiO SSS					1		
Learning Center		1	1	1	1	1	1
Advising Center			1		1		
Program Totals	0	1	2	1	3	1	1

Note. UMW received a federal TRiO SSS grant in 2001, but program services were not available until 2002. (College Catalogs)

Figure 35 shows the numbers of AAS degree offerings and student support programs at each two-year mini-case. Mini-cases in Figure 35 are ranked in order of ACT scores. The reader is reminded that ACT scores were not available for UM HLN

COT, MSUN (2 Yr) and UMW (2 Yr). For those mini-cases with ACT scores, the number of AAS degree offerings decreased with decreasing ACT scores. The limited number of support programs available at two-year mini-cases did not allow for trend analysis.



	MSU GF COT	UM COT	MSUB COT	UM TECH COT	UM HLN COT	MSUN (2Yr)	UMW (2Yr)
■ ACT Scores for IPEDS Cohort	20.3	19.5	18.5	18.5			
▒ Associate of Applied Science	16	15	13	9	12	14	4
□ # Support Programs	0	1	2	1	1	3	1

Figure 35. Two-year mini-case AAS degrees, ACT scores, and student support programs.

Four-Year Case. Table 44 summarizes the number and types of baccalaureate degrees offered at each of the six four-year mini-cases in fall 2001.

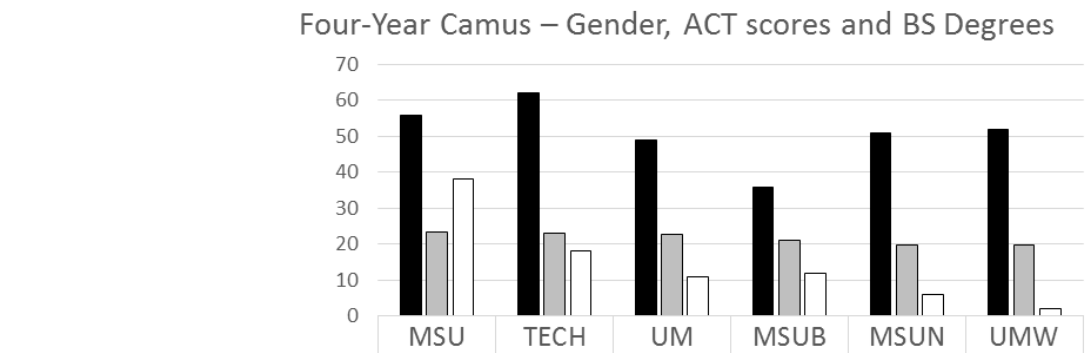
Table 44.

Undergraduate Degree Inventory at Four-Year Mini-cases in 2001

Degrees		Mini-case					
		MSU	MSUB	MSUN	TECH	UM	UMW
Associate of Arts	AA		5				
Associate of Science	AS		4				
Bachelor of Applied Science	BAS		1	1	3	1	1
Bachelor of Liberal Studies	BLS		1				
Bachelor of Arts	BA	10	11	12		29	1
Bachelor of Science	BS	38	12	6	18	11	2
Bachelor of Music	BM	1				1	
Bachelor of Music Education	BME					1	
Totals		49	34	19	21	43	4

Note. Graduate degrees not included. MSUB offers associate degrees that are not listed in the MSUB COT catalog. Associate degrees offered at MSUN and UMW are summarized under the two-year mini-cases. (College catalogs)

The Bachelor of Science (BS) was the only degree offered at all six four-year mini-cases. MSU and TECH had the highest number of BS degrees (38 and 18, respectively). The number of BS degrees is also included on the graph in Figure 36. Figure 36 also shows that MSU and TECH also had the highest percentage of male students (56 and 62, respectively) and the highest average ACT (23.2 and 23.1, respectively). The graph shows parallel trends between the number of BS degrees, the percentage of male students, and standardized test scores. As the number of degree options decreases, the percentage of males and average IPEDS ACT scores decreases.



	MSU	TECH	UM	MSUB	MSUN	UMW
% Males on Campus	56	62	49	36	51	52
ACT Scores for IPEDS Cohort	23.2	23.1	22.6	21	19.8	19.6
Number of BS Degrees	38	18	11	12	6	2

Figure 36. Four-year mini-case male percentages, ACT scores and number of BS Degrees

Similar to male enrollment exceptions in the two-year mini-cases, male enrollment exceptions in the four-year mini-cases may be attributed to the numbers and types of degrees offered at each mini-case. MSU's and TECH's BS degree options were dominated by science, technology, engineering, and mathematics fields (e.g., environmental engineering, geological engineering, metallurgical and materials engineering, petroleum engineering, agricultural business, agricultural operations, technology, animal science, biotechnology, land resource science, plant science, range science, chemistry, electrical engineering, civil engineering, mechanical engineering, computer science, construction engineering technology, mathematics, and physics). MSUB's and UM's degree options were dominated by education and the liberal arts (e.g., education, journalism, English, geography, communications, classical languages, dance, drama, music, ecology, fine arts, psychology, history, liberal studies, environmental studies, sociology).

Table 45 summarizes the number and type of student support programs that were available at the four-year mini-cases. All of the four-year mini-cases had one or more student support programs. UMW had received TRiO grant in 2001, but did not offer program services until 2002. This study found that four-year mini-cases had more student support programs than two-year mini-cases.

Table 45.

Student Support Programs at Four-Year Mini-cases in 2001

Program	Mini-case					
	MSU	MSUB	MSUN	TECH	UM	UMW
TRiO SSS	1	1	1		1	
Learning Center		1	1	1	1	1
Advising Center		1	1		1	
Totals	1	3	3	1	3	1

Note. UMW received a federal TRiO SSS grant in 2001, but program services were not available until 2002. (College catalogs)

Summary of throughputs. This study found that gender enrollments might be influenced by the number and types of degrees offered. Percentages of male enrollments were higher at mini-cases that offered degrees in science, technology, engineering, and mathematics. Percentages of females were higher at mini-cases that offered education, health sciences, and liberal arts. Mini-case degree offerings were related to legislated purposes (differentiation) and BoR responsibilities to prevent unnecessary duplication (integration and coordination).

Four-year mini-cases had more student support programs than two-year mini-cases. Mini-cases with higher standardized test scores had lower numbers of student

support programs, but the limited number of support programs did not allow for trend analysis.

Negative entropy. Katz and Kahn (1978) recognized that open systems accumulate reserves to safeguard the system from running down or moving toward disorganization. By importing more energy than is expended, Katz and Kahn (p. 25) argued, "open systems can store energy and acquire negative entropy". In public postsecondary education systems, reserves occur in the form of stable leadership, administrative processes, enrollment and financial trends analysis and contingency planning.

Reserves in this study were evaluated based on leadership stability, enrollment trends, general fund allocations, and federal grant-aid trends. Longitudinal trends for two-year and four-year mini-cases were evaluated relative to the beginning cohort year and IPEDS graduation periods (GR100, GR150 and GR200). Two-year mini-case trends were tracked over a four-year period (2001 to 2005). Four-year mini-case trends were tracked over an eight-year period (2001 to 2009). This study found different levels of reserves at each mini-case, particularly between the two-year and four-year cases.

Leadership stability. The most uniform reserve was stable leadership. Leadership stability was evaluated over a four-year period (2001-2005) for two-year mini-cases and an eight-year period (2001-2009) for four-year mini-cases. None of the 11 campuses (13 mini-cases) had more than two campus leaders within the defined periods of time; however, three commissioners oversaw the MUS between 2001 and 2009. This study found campus leadership was more stable than MUS leadership.

Enrollment and financial trends. Enrollment and financial trends for each mini-case were evaluated as an indicator of institutional reserves. Enrollment trends were based on unduplicated fall headcount and annualized fulltime equivalents (FTE). The MUS calculates semester FTE by dividing the total number of credits generated in a given term by 15 credits (1 FTE = 15 credits). Annualized FTE is calculated by dividing the sum of summer-, fall- and spring-term FTE by two. Annualized FTE in this study is reported in reference to a given fiscal year (FY). Fiscal years in the MUS start July 1st of one year and end June 30th of the following year (e.g., FY02 started July 1, 2001, and ended June 30, 2002).

Financial trends were evaluated based on general fund allocations per fiscal year. In 2001, the MUS received a lump sum allocation from the legislature. The OCHE divided the lump between MSU and the UM. Allocation of the general fund to the two- and four-year affiliates was determined by the flagship campuses, MSU and UM. Enrollment and financial trend data for the two-year and four-year cases are presented separately below.

Two-year case. Unduplicated headcount enrollments for five of the seven two-year mini-cases from fall 2001 to fall 2004 are summarized in Table 46 and illustrated in Figure 37. Fall headcount data for the MSUN (2 Yr) and UMW (2 Yr) mini-cases were not available.

Table 46.

Unduplicated Headcount for Two-Year Mini-Cases, Fall 2001 to 2004

Two-Year Mini-Cases	Fall Unduplicated Headcount			
	2001	2002	2003	2004
MSU GF COT	1,247	1,353	1,431	1,431
UM COT	844	933	964	1,069
UM HLN COT	786	814	883	865
SUB COT	525	620	685	887
UM TECH COT	426	261	296	319
Two-Year Case	3,828	3,981	4,259	4,571

Note. Data not available for MSUN (2 Yr) and UMW (2 Yr) mini-cases. (MUS Data Warehouse, 2014)

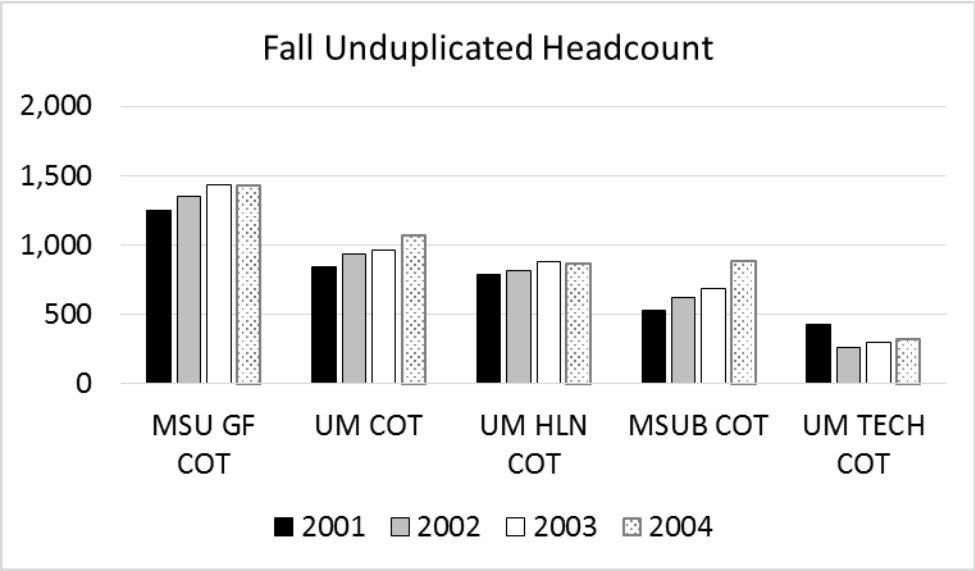


Figure 37. Unduplicated headcount for two-year mini-cases, fall 2001 to 2004.

Most of the two-year enrollment data shown in Table 46 and Figure 37 show similar longitudinal trends. MSU GF COT maintained the highest unduplicated headcount and grew 15% from fall 2001 to fall 2004. UM COT maintained the second highest unduplicated headcount and grew 27% from fall 2001 to fall 2004. UM HLN COT and MSUB COT unduplicated headcount grew 10% and 70%, respectively.

Unduplicated headcount at UM TECH COT declined 25%. The combined unduplicated fall headcount growth for the two-year case was 19%.

The annualized FTE data for two-year mini-cases in Table 47 show similar longitudinal growth trends to fall enrollments.

Table 47.

Annualized Fulltime Equivalency for Two-Year Mini-cases

Mini-Cases	Annualized FTE			
	FY02	FY03	FY04	FY05
MSU GF COT	952	1,053	1,098	1,080
UM COT	802	886	896	917
UM HLN COT	736	738	749	684
MSUB COT	510	580	660	667
UM TECH COT	295	232	260	280
MSUN (2Yr)	--	--	--	--
UMW (2 Yr)	--	--	--	--
Two-Year Case	1,832	1,857	1,904	1,881

Note. Fulltime equivalent (FTE). Fiscal year (FY). -- Data not available. Annualized FTE data for MSUN (2 Yr) and UMW (2 Yr) were not available. (MUS Data Warehouse)

MSU GF COT maintained the highest annualized FTE and grew 13% from FY02 to FY05. UM COT maintained the second highest annualized FTE and grew 14% from FY02 to FY05. Annualized FTE for UM HLN COT and TECH COT declined 7% and 5%, respectively. The combined annualized-FTE growth from FY02 to FY05 for the five two-year mini-cases was 3%. Annualized FTE growth (3%) was lower than fall unduplicated headcount growth (19%) because annualized FTE included spring- and summer-term enrollments, which are usually lower than fall enrollments, and the two-year mini-cases included a higher percentage of part-time students (15-62% for the two-year mini-cases versus 11-33% for the four-year mini-cases, see Figures 27 and 28).

Table 48 summarizes general-fund allocations for two-year mini-cases from FY02 to FY05. The period of time represented in Tables 46, 47, and 48 corresponds with the GR200 period-to-graduation for the two-year mini-cases. General fund allocations for the MSUN (2 Yr) and UMW (2 Yr) mini-cases were not available

Table 48.

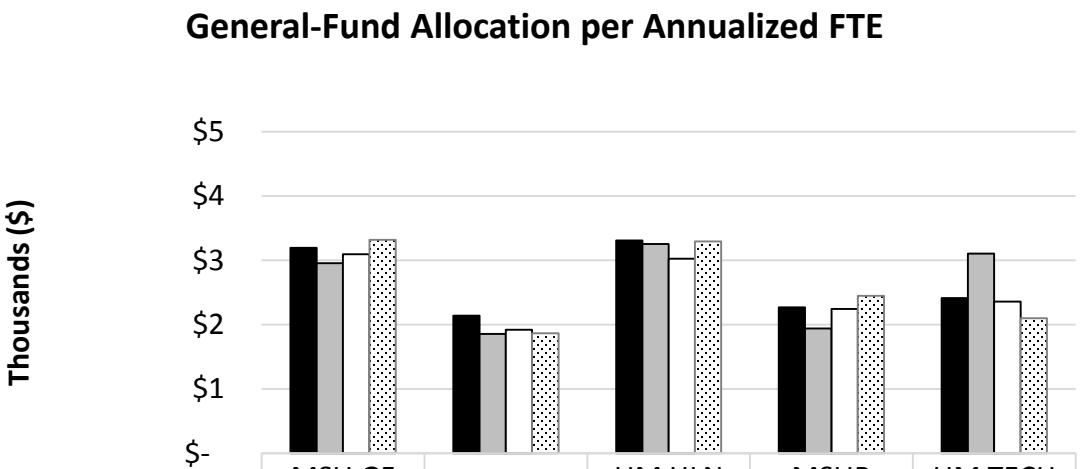
General Fund Allocations for Two-Year Mini-Cases from Fiscal Year 2002 to 2005

Two-Year Mini-Cases	Fiscal Year (FY)			
	FY02[a]	FY03[b]	FY04[c]	FY05[d]
MSU GF COT	$ 3,039	$ 3,111	$ 3,398	$ 3,582
UM HLN COT	$ 2,434	$ 2,400	$ 2,264	$ 2,253
UM COT	$ 1,715	$ 1,645	$ 1,720	$ 1,709
MSUB COT	$ 1,158	$ 1,126	$ 1,480	$ 1,633
TECH COT	$ 712	$ 720	$ 613	$ 588
Two-Year Case	$ 9,058	$ 9,002	$ 9,475	$ 9,765

Note. All values listed in thousands. [a]FY02 corresponds with the cohort year for this study. [b]FY03 corresponds with the GR100 for two-year mini-cases. [c]FY04 corresponds with the GR150 for two-year mini-cases. [d]FY05 corresponds with the GR200 for two-year mini-cases. (OCHE Section E, Program 9-Appropriation Distribution Reports from FY02 to FY05)

Total general-fund allocations for the two-year case increased $706,981 from FY02 to FY05 (8%). The 8% general-fund allocation increase was less than the 19% increase noted in fall enrollments and more than the 3% increase noted in annualized FTE. Despite a 27% increase in fall headcount and 14% increase in annualized FTE, UM COT received a 1% decrease in general fund revenue from FY02 to FY05. UM HLN COT, with a 10% increase in fall headcount and 7% decrease in annualized FTE, received a 7% decrease in general fund revenue. TECH COT, with a 25% decrease in fall headcount and 5% decrease in annualized FTE, received an 18% decrease in general

funds. Although fall enrollment growth outpaced general-fund growth, more moderate growth in annualized FTE resulted in some two-year mini-cases receiving an increase in general-fund allocation per FTE while others received a decrease. General-fund allocations per annualized FTE for the two-year mini-cases are shown in Figure 38.



	MSU GF COT	UM COT	UM HLN COT	MSUB COT	UM TECH COT
Fiscal Year 2002	$3,192	$2,139	$3,307	$2,270	$2,413
Fiscal Year 2003	$2,954	$1,856	$3,252	$1,942	$3,103
Fiscal Year 2004	$3,095	$1,920	$3,022	$2,242	$2,359
Fiscal Year 2005	$3,317	$1,864	$3,293	$2,448	$2,100

Figure 38. General-fund allocation per annualized FTE for two-year mini-cases. Fiscal years 2002, 2003, 2004 and 2005 correspond to the cohort year, GR100, GR150 and GR200 for two-year students in this study.

MSU GF COT and MSUB COT both received increases in general-fund allocations per annualized FTE from FY02 to FY05. UM COT, UM HLN COT and UM TECH COT received decreases. The highest general-fund allocations per annualized FTE were at the standalone two-year mini-cases—MSU GF COT and UM HLN COT. The lowest general-fund allocations per annualized FTE were at the partially embedded

two-year mini-cases—UM COT, MSUB COT, and UM TECH COT. The average general fund allocation per FTE for the two-year case decreased from $2,664 in FY02 to $2,604 in FY05.

Four-year case. Table 49 summarizes and Figure 39 illustrates the unduplicated headcount enrollment for the six four-year mini-cases from fall 2001 to fall 2008. The MSUN and UMW mini-cases data include the MSUN (2 Yr) and UMW (2 Yr) mini-case data.

Table 49.

Unduplicated Fall Headcount for Four-Year Mini-Cases

Four-Year Mini-Cases	Fall Unduplicated Headcount							
	2001	2002	2003	2004	2005	2006	2007	2008
UM	11,824	12,125	12,388	12,489	12,326	12,477	12,326	12,566
MSU	11,745	11,934	12,135	12,003	12,250	12,338	12,170	12,369
MSUB	3,818	3,787	3,985	3,815	3,832	3,709	3,752	3,598
TECH	1,660	1,900	1,936	1,869	1,813	1,928	1,900	1,980
MSUN	1,589	1,531	1,513	1,421	1,350	1,388	1,215	1,217
UMW	1,163	1,142	1,128	1,146	1,159	1,176	1,148	1,190
Four-Year Case	31,799	32,419	33,085	32,743	32,730	33,016	32,511	32,920

Note. MSUN and UMW include two-year enrollments.

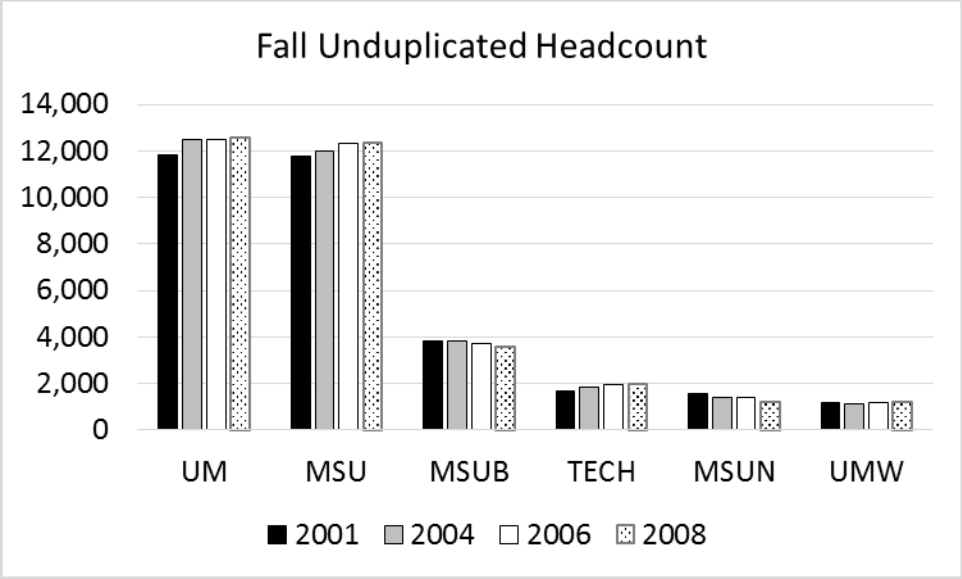


Figure 39. Unduplicated headcount for four-year mini-cases, fall 2001 to 2008.

Most of the four-year mini-case enrollment data in Table 49 and Figure 39 show similar longitudinal growth trends. UM maintained the highest unduplicated headcount and grew 6% from fall 2001 to fall 2008. MSU maintained the second highest headcount and grew 5% from fall 2001 to fall 2008. TECH and UMW unduplicated headcounts grew 19% and 2%, respectively. MSUB and MSUN unduplicated headcounts declined 6% and 23%, respectively. The combined unduplicated headcount growth from fall 2001 to fall 2008 for the four-year case was 4%.

Table 50 summarizes annualized fulltime equivalency (FTE) for the four-year mini-cases from FY02 to FY09. Annualized FTE for MSUN and UMW included two-year enrollments.

Table 50.

Annualized Fulltime Equivalents for Four-Year Mini-Cases, Fiscal Years 2002 to 2009

Four-Year Mini-Cases	Annualized FTE							
	FY02[a]	FY03	FY04	FY05[b]	FY06	FY07[c]	FY08	FY09[d]
UM	10,830	10,933	11,118	11,032	10,963	11,042	11,160	11,360
MSU	10,444	10,674	10,665	10,528	10,642	10,555	10,467	10,509
MSUB	3,409	3,382	3,502	3,484	3,552	3,434	3,384	3,384
TECH	1,608	1,751	1,797	1,692	1,679	1,784	1,791	1,889
MSUN	1,489	1,446	1,431	1,319	1,255	1,207	1,096	1,075
UMW	1,014	997	1,006	1,069	1,090	1,117	1,110	1,133
Four-Year Case	28,794	29,184	29,520	29,123	29,181	29,140	29,072	29,350

Note. Fulltime equivalency (FTE). Fiscal year (FY). MSUN and UMW include two-year annualized FTE. [a]FY02 corresponds with the cohort year for this study. [b]FY05 corresponds with the GR100 for four-year mini-cases. [c]FY07 corresponds with the GR150 for four-year mini-cases. [d]FY09 corresponds with the GR200 for four-year mini-cases. (MUS Data Warehouse, 2014)

Annualized FTE data for the four-year mini-cases in Table 50 show similar longitudinal growth trends to the fall unduplicated headcount data. UM maintained the highest annualized FTE and grew 5% from FY02 to FY09. MSU maintained the second highest annualized FTE and grew less than 1% from FY02 to FY09. TECH and UMW annualized FTE grew 17% and 12%, respectively. MSUB and MSUN annualize FTE declined 1% and 28%, respectively. The combined annualized-FTE growth from FY02 to FY09 for the four-year case was 2%.

Table 51 summarizes general-fund allocations for the four-year mini-cases from FY02 to FY09. General fund allocations for MSUN and UMW included funding for two-year programs.

Table 51.

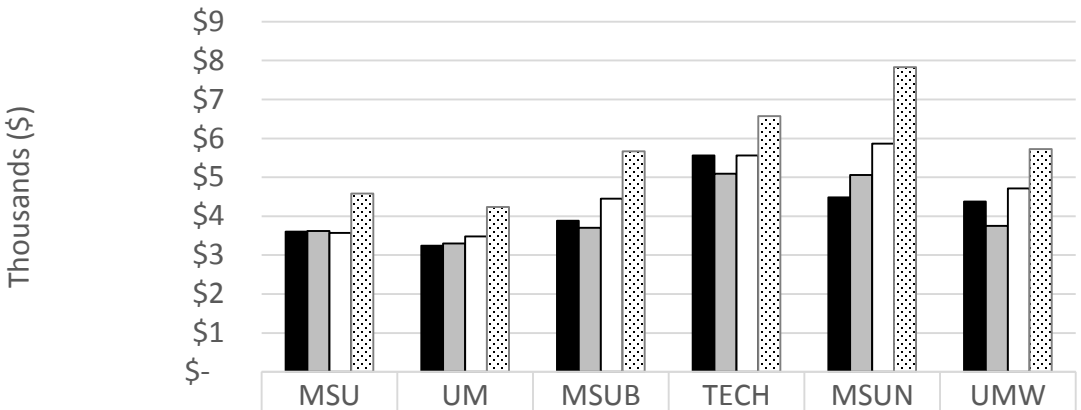
General Fund Allocations for Four-Year Mini-Cases from Fiscal Years 2002 to 2009

Four-Year Mini-Cases	Fiscal Year (FY)							
	FY02[a]	FY03	FY04	FY05[b]	FY06	FY07[c]	FY08	FY09[d]
MSU	$ 38	$ 38	$ 38	$ 38	$ 40	$ 38	$ 44	$ 48
UM	$ 35	$ 34	$ 36	$ 36	$ 39	$ 38	$ 44	$ 48
MSUB	$ 13	$ 13	$ 13	$ 13	$ 14	$ 15	$ 18	$ 19
TECH	$ 9	$ 8	$ 8	$ 9	$ 9	$ 10	$ 11	$ 12
MSUN	$ 7	$ 7	$ 7	$ 7	$ 6	$ 7	$ 8	$ 8
UMW	$ 4	$ 4	$ 4	$ 4	$ 4	$ 5	$ 6	$ 6
Four-Year Case	$ 106	$ 104	$ 105	$ 107	$ 113	$ 114	$ 132	$ 143

Note. All values listed in millions. [a]FY02 corresponds with the cohort year for this study. [b]FY05 corresponds with the GR100 for four-year mini-cases. [c]FY07 corresponds with the GR150 for four-year mini-cases. [d]FY09 corresponds with the GR200 for four-year mini-cases. (OCHE Section E, Program 9-Appropriation Distribution Reports from FY02 to FY09)

The combined general-fund allocation for the four-year case increased $818,293 (1%) from FY02 to FY05 (the GR100 period). The combined general-fund allocation for the four-year case increased $37 million (35%) from FY02 to FY09 (the GR200 period).

General-fund allocations per FTE for the four-year mini-cases are shown in Figure 40.



	MSU	UM	MSUB	TECH	MSUN	UMW
Fiscal Year 2002	$3,606	$3,238	$3,886	$5,558	$4,479	$4,374
Fiscal Year 2005	$3,620	$3,301	$3,706	$5,095	$5,062	$3,750
Fiscal Year 2007	$3,568	$3,480	$4,452	$5,557	$5,867	$4,712
Fiscal Year 2009	$4,586	$4,234	$5,668	$6,576	$7,832	$5,724

Figure 40. General-fund allocation per annualized FTE for four-year mini-cases. Fiscal years 2002, 2005, 2007 and 2009 correspond to the cohort year, GR100, GR150 and GR200 for four-year students in this study.

All of the four-year mini-cases experienced increases in general-fund allocations per annualized FTE from FY02 to FY09. The greatest increases occurred at MSUB (46%) and MSUN (75%). MSUN and TECH had the highest general-fund allocations per annualized FTE. The lowest general-fund-allocations per annualized FTE were at the two flagship institutions with the highest enrollments—MSU and UM. The average general-fund-allocation per annualized FTE for the four-year case decreased (1%) from $4,190 in FY02 to $4,089 in FY05; however, the average general-fund-allocation per annualized FTE increased 38% from FY02 to FY09 ($4,190 to $5,770, respectively). In 2005, the average general-fund-allocation per annualized FTE for four-year mini-cases was 57% higher than the average general-fund-allocation per annualized FTE for the two-year mini-cases ($4,089 versus $2,604, respectively).

Federal grant aid. All of MUS campuses were Title IV eligible in 2001, meaning that MUS students could receive federal grant aid. Unlike loan programs, grant aid does not have to be paid back. Pell grants were awarded to undergraduate students based on financial need. The Pell Grant Program was the largest federal grant aid program, but not the only federal grant program. Until 2009, the campuses were required to report the total percentage of federal grant aid recipients at each Title IV school (U.S. Department of Education, 2014). In 2009, Title IV schools were required to report the percentage of Pell grant recipients and the percentage of other federal grant recipients. Table 52 summarizes the percent of students at each MUS mini-case that received any type of federal grant aid from fiscal year 2002 through 2009.

Table 52.

Percent of Students Awarded Federal Grants from Fiscal Year 2002 through 2009

Mini-Cases	Percentage of Students Awarded Federal Grants each Fiscal Year (FY)							
	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09
UM HLN COT	67	49	51	29	54	42	45	45
MSUN	53	59	50	55	46	39	54	44
UM TECH COT	48	58	58	56	63	52	49	57
MSUB	42	43	41	42	33	28	31	32
MSU GF COT	38	48	55	56	54	56	52	47
TECH	35	38	36	31	25	27	26	27
UM	32	34	32	31	29	30	28	28
UMW	32	49	43	51	58	41	40	49
MSU	26	27	29	28	49	21	22	21
UM COT	--	--	--	--	--	--	--	--
MSUB COT	--	--	--	--	--	--	--	--
UMW (2 Yr)	--	--	--	--	--	--	--	--
MSUN (2 Yr)	--	--	--	--	--	--	--	--

Note. -- Data not available from the IPEDS Data Center. (U.S. Department of Education, 2014)

Figure 41 shows the percent of students at three of the two-year mini-cases that received federal grant aid from FY02 to FY05. Data for the other four two-year mini-cases were not available—UM COT, MSUB COT, UMW (2 Yr) and MSUN (2 Yr). Federal grant aid information was available for only three two-year mini-cases. UM HLN COT was the only two-year mini-case that showed a decrease in the percent of students who received federal grant aid from FY02 to FY05. UM TECH COT and MSU GF COT showed slight increases in the percent of students who received federal grant aid from FY02 to FY05.

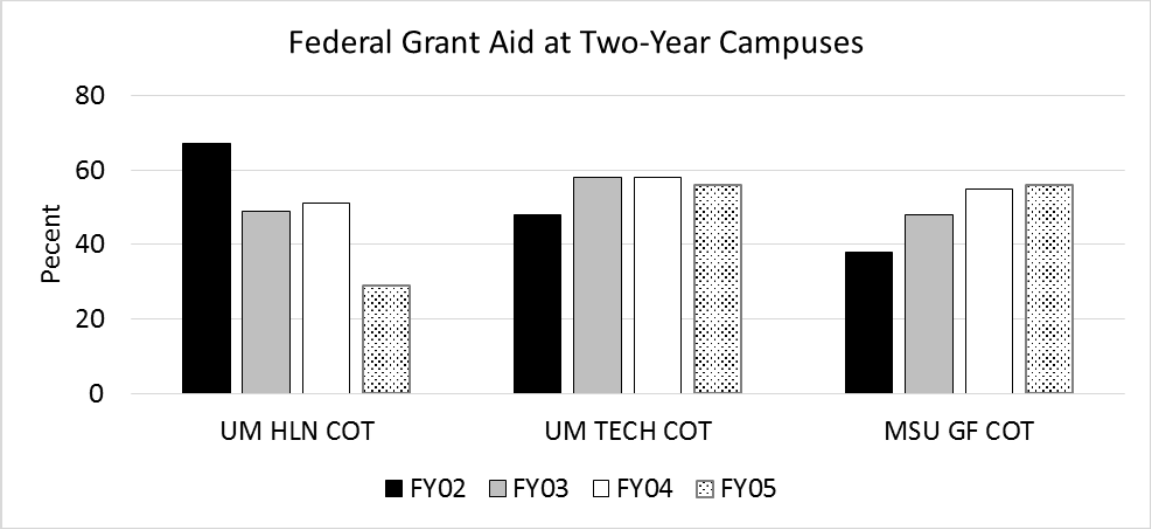


Figure 41. Percent of students awarded federal grant aid at two-year mini-cases from FY02 to FY05.

Figure 42 shows the percent of students at each four-year mini-case that received federal grant aid from FY02 to FY09. UMW was the only four-year mini-case that showed an increase in the percent of students who received federal grant aid from FY02 to FY09. The other four-year mini-cases showed a decline in the percent of students who received federal grant aid between FY02 and FY09.

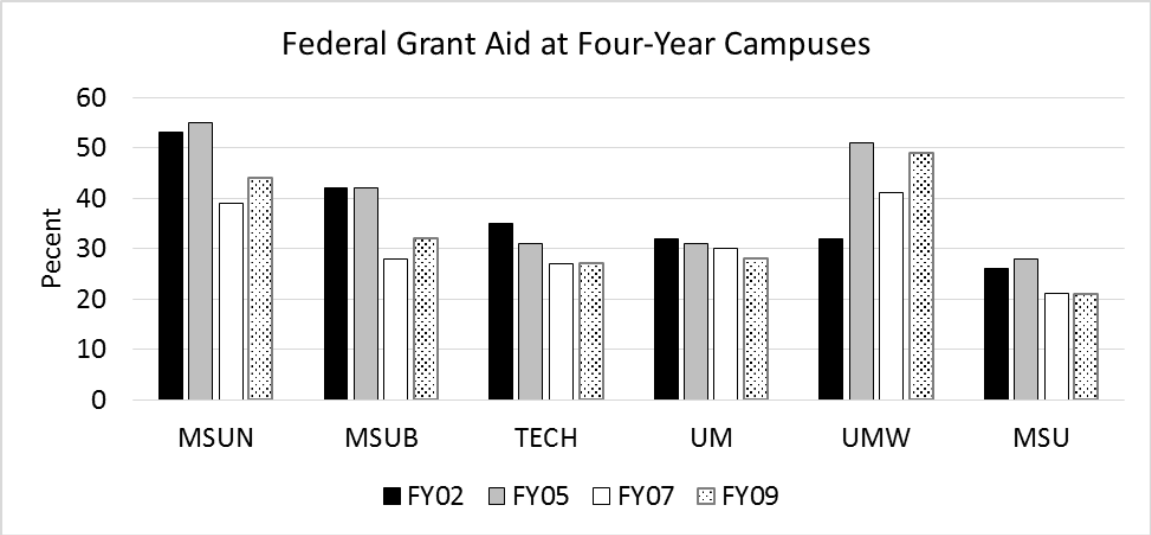


Figure 42. Percent of students awarded federal grant aid at four-year mini-cases.

Reasons for increasing or declining percentages of grant aid awarded at MUS mini-cases were not indicated by the collected data. The percentage of students receiving federal grant aid at the UM HLN COT decreased as its general fund allocation decreased. Grant aid increased at UM TECH COT and MSU GF COT even though the general fund allocation for those two-year mini-cases increased. The percentage of students receiving federal grant aid at the four-year mini-cases generally decreased as general fund allocations increased—UMW was the exception. The percentage of students receiving grant aid at UMW increased even though UMW's general fund allocation also increased. The buffering or safeguard relationship between grant aid and

the general fund allocation were not evaluated in this study; however, the percentage of students receiving grant aid at the two-year mini-cases was higher than at the four-year mini-cases. The combination of lower general-fund-allocations per annualized FTE for the two-year mini-cases and higher percentages of students requiring grant aid at the two-year mini-cases results in lower institutional reserves.

Summary of negative entropy. Missing mini-case data complicated the negative entropy analysis. The relationship between mini-case financial data and student financial data should include analysis of student loan packages, federal Pell Grant program policies, and mini-case tuition over time. Evaluation of those data elements was beyond the scope of this study.

Feedback. Katz and Kahn (1978) recognized that open systems need feedback mechanisms to receive and process incoming information and to make corrections. In public postsecondary education systems, feedback mechanisms include stable administrative structures, shared governance, and external advisory boards.

As previously noted under the Integration and Coordination and Differentiation sections, administrative structures that governed two-year mini-cases differed from those at four-year mini-cases. The six four-year mini-cases had greater administrative autonomy with mini-case chancellors reporting to the MSU and UM presidents. Reporting structures at the two-year mini-cases varied depending on whether the mini-case was standalone, partially embedded, or fully embedded. Two-year deans did not all have direct reporting lines to a campus chancellor or president. The variable and layered administrative structures at two-year schools may have inhibited feedback mechanisms.

Five of the six two-year mini-cases had shared governance structures in 2001. MSUN ratified a shared governance documents in 2007. Neither of the standalone COTs—UM HLN COT or MSU GF COT—established shared governance structures until the mid-2000s. Three of the partially embedded COTs (UM COT, UM TECH COT, and MSUB) and fully embedded UMW (2Yr) were minimally represented in shared governance structures at UM, TECH, and UMW. This study found that shared governance structures were not consistently established across the MUS in 2001.

None of the COTs catalogs published information on advisory boards, alumni associations, and foundations in 2001. The four-year mini-cases published information in the form of contact information for individuals involved with external alumni

associations, foundations, and local executive boards. Information about the actions and activities of these groups was not readily available.

Prior to 2013 (BoR Item #159-109-R0513), all campuses were required to have active local executive boards. The executive board membership included three governor appointed community citizens. Local executive board responsibilities included:

- Function as liaisons between the local units and their constituents.
- Foster increased public awareness of the contributions and value of their associated units to their local areas and to the state as a whole.
- Encourage discussion and support of steps and plans to enhance the system units' ability to carry out their missions, especially through contact with community opinion leaders.
- Utilize factual information from the commissioner of higher education, CEOs of individual units, and other qualified sources as needed to accomplish these duties.
- Become knowledgeable on materials and issue communications provided by the regents or commissioner of higher education.
- Each member is expected to faithfully attend and participate in local executive board individual and group meetings. (BOR Policy 217.1)

This study found a general lack of administrative-systems stability and advisory feedback mechanisms for two-year mini-cases. Feedback mechanisms in the six four-year mini-cases included better defined administrative systems; shared faculty and administrative governance structures; and established foundations, alumni associations, and local executive boards.

Output. Katz and Kahn (1978) recognized that open systems produce output. In public postsecondary education systems, the most widely recognized and quantifiable end product is graduates and the primary measure of output is graduation rates.

This study used two methodologies to calculate graduation rates—the standard IPEDS methodology and a modified Adelman (1978) methodology. The results of these two methods are summarized in the mini-case worksheets (Figures 14 through 28) and in Appendix A (Tables A1 through A15). A narrative of findings was presented with the Quantitative Data and Analysis Section. This study found different graduation rates for different groups of students across the two-year and four-year mini-cases. MUS IPEDS-GR150 cohort rates ranged between 0.0% at UMW (2 Yr) and 59.9% at UM HLN COT. The average two-year mini-case, IPEDS-GR150 cohort graduation rate was 36.6% and BSC-GR150 cohort graduation rate was 23.6%. The average four-year mini-case, IPEDS-GR150 cohort graduation rate was 41.0% and BSC-GR150 cohort graduation rate was 39.3%. The differences between two- and four-year mini-case outputs are addressed below.

Two-Year Case. Table 53 summarizes MUS two-year GR150 and R200 graduation rates resulting from the IPEDS and modified Adelman methodologies.

Table 53.

MUS Two-Year Graduation Rates

Cohort	Two-Year Graduation Rates (%)		% Point Differences
	GR150	GR200	
IPEDS	36.6	--	--
BSC	23.6	26.3	2.7
1824	23.9	25.6	1.7
≥ 25	24.2	27.6	3.4
TRNS	24.8	27.7	2.9

The IPEDS-GR150 cohort rate was the highest. Modified Adelman GR150 and GR200 rates from this study were lower than the IPEDS-GR150 cohort rate. Traditional 18- to 24 year olds (1824) had the lowest GR150 and GR200 graduation rates at two-year mini-cases. Transfer students (TRNS) had the highest GR150 and GR200 graduation rates at two-year mini-cases. The greatest gains between GR150 and GR200 rates at two-year mini-cases were made by transfer students and students 25 years and older (≥25).

Figure 43 shows the percentage of males, number of AAS degrees and GR150 graduation rates for the two-year mini-cases. Although percentage of males and numbers of degrees show a similar relationship, there were marked differences between the IPEDS-GR150 and BSC-GR150 graduation rates. These differences were likely the result of different cohort profiles related to at-risk factors such as age, gender, enrollment, and minority status.

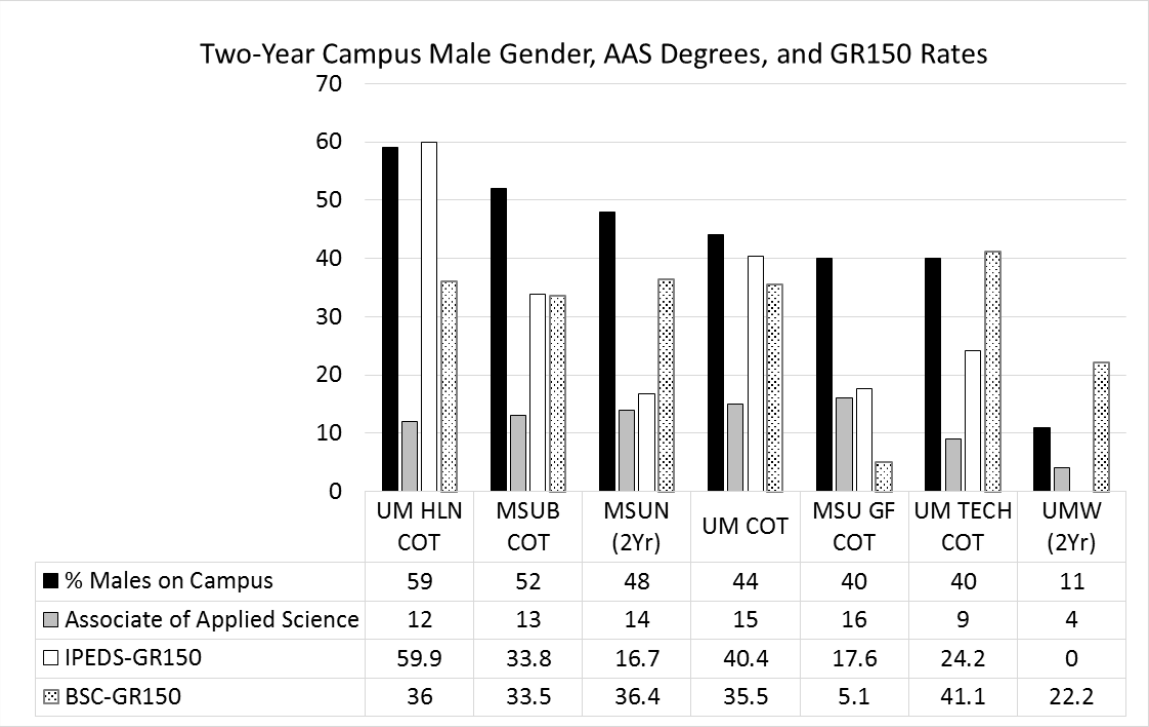


Figure 43. Two-year AAS programs and GR150 graduation rates sorted by male gender. Female percentages increase as male percentages decrease.

Four-Year Case. Table 54 summarizes MUS four-year GR150 and GR200 graduation rates resulting from the IPEDS and modified Adelman methodologies.

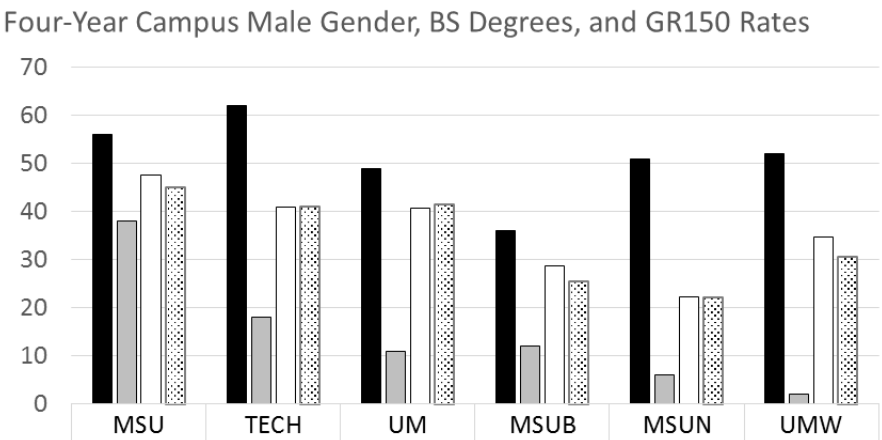
Table 54.

Four-Year Graduation Rates for the MUS

Cohort	Four-Year Graduation Rates (%)		% Point Differences
	GR150	GR200	
IPEDS	41.0	--	--
BSC	39.3	41.9	2.6
1824	40.5	43.2	2.7
≥ 25	30.6	32.5	1.9
TRNS	43.8	45.3	1.5

Modified Adelman GR150 and GR200 rates from this study were generally lower than the IPEDS-GR150 cohort rate. Transfer students (TRNS) had the highest GR150 graduation rates at four-year mini-cases. Students 25 years and older (≥25) had the lowest GR150 and GR200 graduation rates at four-year mini-cases. The greatest gains between GR150 and GR200 rates at four-year mini-cases were made by 18- to 24-year old students (1824).

Figure 44 shows decreasing graduation rates with decreasing percentages of male students and decreasing numbers of BS degrees. The IPEDS-GR150 and BSC-GR150 graduation rates from four-year mini-cases follow similar trends, indicating similar cohort profiles—by definition, both cohort groups are largely represented by traditional college students with fewer at-risk factors.



	MSU	TECH	UM	MSUB	MSUN	UMW
% Males on Campus	56	62	49	36	51	52
Number of BS Degrees	38	18	11	12	6	2
IPEDS-GR150	47.7	41	40.8	28.8	22.4	34.7
BSC-GR150	45.1	41.1	41.6	25.6	22.3	30.7

Figure 44. Four-year mini-case male percentages, BS degrees and GR150 graduation rates sorted by number of BS degrees. MSUN's and UMW's graduation rates and male percentages represented exceptions.

Summary of Outputs. This study found that four-year GR150 graduation rates for the MUS were higher than two-year graduation rates for the MUS. Modified Adelman GR150 and GR200 rates from this study were generally lower than the IPEDS-GR150 cohort rate for both two-year and four-year mini-cases. Traditional 18- to 24 year olds had the lowest GR150 and GR200 graduation rates at two-year mini-cases. Students 25 years and older had the lowest GR150 and GR200 graduation rates at four-year mini-cases. Transfer students had the highest GR150 graduation rates at two- and four-year mini-cases.

Similar to the findings under throughputs, this study found that outputs were influenced by the number and types of degrees offered. Graduation rates were higher at mini-cases with higher percentages of male enrollments, higher ACT scores, and higher numbers of STEM degrees. Degree offerings were related to legislated purposes (differentiation) and BoR responsibilities to prevent unnecessary duplication (integration and coordination).

Steady state and dynamic homeostasis. Katz and Kahn (1978) recognized that open systems sought to preserve the character or qualitative aspects of a system. In postsecondary educational systems, steady state and dynamic homeostasis is achieved through a regulatory process of managing inputs and outputs. This was a difficult open-system characteristic to qualify for the MUS and not the focus of this study. All of the 11 campuses developed programs, initiatives, and policies to increase enrollment, provide student access, improve student learning, and maximize system capacity. Major system initiatives included distance education and online learning, workforce development grant programs, and pursuit of research grants.

Equifinality. Katz and Kahn (1978) identified a tenth common characteristic of an open system—equifinality. Equifinality assumes that open systems will achieve an equal end state from multiple starting points and internal pathways. In the context of the national postsecondary education productivity agenda, equifinality assumes campuses can achieve equal production rates and qualities of graduates.

The mini-case data in this study did not show equal production of graduates across the MUS. Campus purposes and degree-granting missions were not established to meet a uniform national standard. Campus purposes and degree-granting missions were established to increase access to postsecondary programs, discourage course duplication, and improve internal efficiencies. Given the innate variability among MUS campuses, it is unlikely that campuses can individually meet a state of equifinality. It is possible that the BoR can manage the MUS as a unified open-system to meet national productivity goals; however, the MUS would have to be viewed in the context of other uniform public, postsecondary educational systems.

Summary and answer to the Central Research Question. None of the mini-cases in this study were equal. Environmental conditions at each campus differed by more than a few measures, resulting in no two mini-cases being the same. All of the MUS mini-cases uniquely differed by founding authority and purpose; Carnegie Classification; NWCCU accreditation; number and types of degrees; total enrollments; ratio of males, females, and minorities; part-time versus fulltime enrollments; number and type of support programs; general fund allocation; and tuition revenue. The only unifying environmental condition was the central governance structure.

Chapter Five – Findings, Recommendations, and Conclusions

This mixed-method study was designed to examine graduation rates as one of several indicators of institutional effectiveness in twenty-first century, public, postsecondary institutions in Montana. The research was delimited to 11 MUS campuses, resulting in 13 mini-cases. Three questions guided the cross-case analysis: (a) How do graduation rates for all students vary within one state-governed postsecondary system, (b) How do graduation rates of a specific institution explain graduation rates within one state-governed postsecondary system, and (c) How can open-systems theory inform practice in evaluating effectiveness of postsecondary institutions? The findings, recommendations, and conclusions resulting from this research follow.

Findings

This research produced four types of findings: (a) quantitative findings, (b) qualitative findings, (c) holistic findings, and (d) exceptions. The quantitative and qualitative findings relate directly to the Quantitative Research Question and the Central Research Question. Holistic findings relate to the General Research Question and to the chosen research methodology. Exceptions indicate unique findings that warrant further investigation. Each type of finding is addressed separately.

Quantitative findings. The Quantitative Research Question was concerned with how graduation rates for all students vary within one public, postsecondary system. To answer the Quantitative Research Question, four hypotheses were posited. The hypotheses focused on graduation rates of at-risk students. For purposes of this study, at-risk students were delimited by age (>24), gender (female), and minority status. A

modified Adelman (2007) methodology was used to obtain graduation rate data for the identified at-risk groups. The following paragraphs summarize the quantitative research findings for each hypothesis and relate the findings back to the literature review in Chapter Two.

Quantitative findings of this research support Hypothesis One. Hypothesis One stated, "Institutions with higher percentages of at-risk students will have lower graduation rates." This research found that MUS institutions with higher percentages of at-risk students had lower graduation rates (Figure 10). This finding is consistent with the findings of other researchers (Bash, 2003; CAEL, 2000; Engle & Tinto, 2008; Hanford, 2011; Stokes, 2006; Tinto, 1993). Similar to Engle and Tinto (2008), this research found that higher percentages of at-risk students were more likely to enroll in two-year colleges than in four-year colleges.

Quantitative findings of this research do not support Hypothesis Two. Hypothesis Two stated, "At-risk student groups identified by age will have lower graduation rates than other student groups within the same institution." This research found that at-risk student groups identified by age (25 years and older) did not have lower graduation rates than other student groups within the same institution. This finding is not consistent with other researchers (Bash, 2001; Bearer-Friend, 2009; CAEL, 2000) who found older students more at risk for not completing a certificate or degree. At-risk student groups identified by age (25 years and older) had higher and lower graduation rates than other student groups in MUS institutions. Graduation rates for older students (≥25 years) at two-year campuses were generally, but not always, higher than graduation rates for traditional-aged students (18-24 years) at two-year

schools. Graduation rates for older students (≥25 years) at four-year campuses were generally, but not always, lower than graduation rates for traditional-aged students (18-24 years). These findings indicate age is not by itself an indication of risk.

Quantitative findings of this research did not support Hypothesis Three. Hypothesis Three stated, "At-risk student groups identified by gender will have lower graduation rates than other student groups within the same institution." This research found that at-risk student groups identified by gender (female) did not have lower cohort graduation rates than other student groups within the same institution. Unlike national enrollment trends (Aud et al., 2013), female enrollments in the MUS in 2001 were slightly less than male enrollments; however, female students accounted for the majority (57%) of two-year and four-year graduates in the MUS. With few exceptions, female graduation rates were higher than male and minority graduation rates for all student groups (BSC, 1824, ≥25, and TRNS). These findings were similar to Tinto (1993) who found females were more likely than males to graduate once enrolled in postsecondary education. The findings of this research indicate female gender is not by itself an indication of risk.

Quantitative findings of this research did not support Hypothesis Four. Hypothesis Four stated, "At-risk student groups identified by minority status will have lower graduation rates than other student groups within the same institution." This research found that at-risk student groups identified by minority status did not have lower graduation rates than other student groups within the same institution. Minority group achievement was generally lower than other groups within the same institution, but minority groups had both higher and lower graduation rates than other groups within

the same institution. These findings indicate minority status by itself is not an indication of risk.

In summary, quantitative findings of this research confirmed that institutions with higher percentages of at-risk student groups, identified by age, gender, and minority status had lower graduation rates; however, no single at-risk student group identified by age, gender, or minority status consistently performed better or worse than other student groups. As indicated in Chapter Two, results of this research support previous research findings that compounding risk factors conspire against academic success and completion (Bash, 2003; Berkner, He, & Cataldi, 2003; CAEL, 2000; Engle & Tinto, 2008; Hanford, 2011; Horn & Premo, 1995; Horn, 1996; Stokes, 2006; Tinto, 1993); however, neither age, gender, nor minority status by themselves indicate risk.

Qualitative findings. The Central Research Question was concerned with how graduation rates of a specific institution explain graduation rates within one state-governed postsecondary system. Two subquestions were developed to answer the Central Research Question. Subquestion One was concerned with how environmental conditions vary among institutions. Subquestion Two was concerned with how institutional graduation rates were impacted by environmental conditions.

To answer the Central Research Question, 13 mini-cases were developed for the 11 delimited campuses using Stake's (2006) case-study worksheet format. Seven of the mini-cases represented campuses with two-year degree-granting missions (Figures 14 through 20). Six of the mini-cases represented campuses with four-year degree-granting missions (Figures 21 through 26). Internal and external components, as well as environmental conditions unique to each mini-case, were summarized on individual

worksheets. After the 13 mini-case worksheets and their associated narratives were developed, two summary case-study worksheets were developed, one for the MUS (2 Yr) case (Figure 27) and one for the MUS (4 Yr) case (Figure 28). The cross-case analysis employed Katz and Kahn's (1978) open-systems characteristics as a research framework to evaluate differing environmental conditions. Katz and Kahn's open-systems characteristics included: (a) integration and coordination, (b) cycles of events, (c) differentiation, (d) importation of energy, (e) throughput, (f) negative entropy, (g) feedback, (h) output, (i) steady state and dynamic homeostasis, and (j) equifinality. The following paragraphs summarize the qualitative research findings and relate the findings back to the literature review in Chapter Two.

Qualitative findings of this study, in response to Subquestion One, show variability of environmental conditions among the 13 MUS mini-cases. Environmental conditions among the 13 mini-cases varied by institutional purposes, student profiles, financial resources, degree offerings, administrative structures, qualities of leadership, and community engagement. The cross-case analysis showed greater variation in environmental conditions among the seven two-year mini-cases than among the six four-year institutions. These findings are consistent with other researchers (Pascarella & Terenzini, 2005; Richardson & Martinez, 2009; Tinto, 2013) who found that no two postsecondary educational institutions share similar governance, mission, student body profile, degree programs, tuition costs and funding models.

Qualitative findings of this study, relative to Subquestion Two, indicate institutional graduation rates were strongly impacted by environmental conditions. Given the variability of environmental conditions among the 13 MUS mini-cases, it

follows that student body profiles and graduation rates would also vary. Institutional authority, purpose, and program differentiation had the greatest impact on graduation rates. Four-year mini-cases with clear purposes, autonomy, and distinct academic programs had the highest graduation rates. Two-year mini-cases with no codified purpose, mixed autonomy, and highly variable programming had the lowest graduation rates. These findings are consistent with Richardson and Martinez (2009) who demonstrated there is a need to evaluate institutional productivity and performance in a way that accounts for differentiating conditions.

Summary of the Central Research Question. Qualitative findings of this research indicate variability among all of the mini-case studies. No two institutions were exactly the same and neither the IPEDS nor modified Adelman graduation rates from a specific institution could be generalized to all MUS campuses. Qualitative analysis of graduation rates in this study also found that variations among Adelman's student groups (BSC, 1824, ≥25, and TRNS) within a given institution could not be generalized to all MUS campuses. These findings are consistent with other researchers (Adelman, 2007; Brookfield & Holst, 2010; Cook & Pullaro, 2010; Ewell, 2009) who argued that graduation rates were too narrowly defined. These researchers found graduation rates by themselves did not account for differences among institutions and graduation rates should not be used as the sole measure of institutional productivity.

Holistic findings. The quantitative and qualitative findings resulting from the Quantitative Research Question and the Central Research Question were not unexpected. The research findings reinforced findings found in the literature—graduations rates are variable among institutions (Cook & Pullaro, 2010), institutions with higher percentages of at-risk students have lower graduation rates (Engle &Tinto, 2008), no single identified at-risk student group consistently performed better or worse than other student groups (Berkner et al., 2003; Engle & Tinto, 2008), no two institutions have the same characteristics (Richardson & Martinez, 2009), and graduation rates by themselves do not account for the differences between institutions (Adelman, 2007; Ewell, 2009). The greater significance of this research was tied to employing an alternative methodology to calculate graduation rates using state-level data and to evaluate resulting institutional performance data within an open systems framework. This approach resulted in two categories of additional findings related to differentiated graduation rates and environmental conditions. These findings are addressed below.

Graduation rates. Numerous researchers (Adelman, 2007; Bowen, Chingos, & McPherson, 2009; Cook & Pullaro, 2010; Garcia & L'Orange, 2009; Kelly, P.J., 2009; Richardson & Martinez, 2009) have recognized that the national IPED-GRS database has limited utility, it excludes nearly 50% of students, and it does not allow for evaluation of institutional effectiveness relative to unique student profiles. Those researchers recommended analysis of state-level data to better understand institutional effectiveness and student success. The research conducted for this study utilized a modified Adelman (2007) methodology to calculate graduation rates from student unit records in the MUS Data Warehouse. Similar to the IPEDs methodology, graduation

rates resulting from the modified Adelman methodology showed variability among the 13 MUS mini-cases. The modified Adelman methodology, however, allowed for a more holistic and more nuanced understanding of graduation rates. The following bullets summarize some of the major findings from this research.

- The number of students included in the 2001 two-year cohort increased from 1,352 (IPEDS) to 1,971 (Adelman)—an increase of 46%.
- The number of students included in the 2001 four-year cohort increased from 4,689 (IPEDS) to 7,773 (Adelman)—an increase of 67%.
- GR150 and GR200 graduation rates resulting from the modified Adelman methodology were generally lower than graduation rates for the IPEDS GR150 cohort.
- Traditional (18- to 24-year old) students had the lowest GR150 and GR200 graduation rates at two-year campuses. Traditional students also showed the lowest gains between GR150 and GR200 at two-year campuses.
- Transfer students had the highest GR150 and GR200 graduation rates at two-year and four-year campuses.
- Adult students (≥25 years) had the lowest GR150 and GR200 graduation rates at four-year campuses. Adult students at two-year campuses showed the greatest percentage point gains from GR150 to GR200.
- Female graduation rates for all student groups (BSC, 1824, ≥25, and TRNS) in two- and four-year campuses showed the greatest percentage point gains from GR150 to GR200.

The above findings are important because they show patterns of student success suggestive of student motivations rather than institutional productivity or effectiveness. Several examples are provided that might explain these patterns.

Example One. Adult students (≥25 years) had the lowest GR150 and GR200 graduation rates of student groups in the MUS (4 Yr) case (30.6% and 32.5%, respectively). Adult students had the highest GR150 and GR200 graduation rates of student groups in the MUS (2 Yr) case (24.2% and 27.6%, respectively). Although adult student graduation rates were slightly higher in the MUS (4 Yr) case, gains from GR150 to GR200 were greater for the MUS (2 Yr) case (1.9 percentage points versus 3.4 percentage points, respectively). One possible explanation is that several of the two-year campuses [MSUB COT, MSUN (2 Yr), UMW (2 Yr)] provided alternative scheduling options for part-time adult students. Because the targeted population was part-time, the expected time-to-degree was extended to accommodate the needs of the intended population.

Example Two. Traditional (18- to 24-year old) students had the lowest GR150 and GR200 graduation rates at two-year campuses (23.9% and 25.6%, respectively). Traditional students also showed the lowest gains between GR150 and GR200 at two-year campuses (1.7 percentage points). Lower completion of two-year degree programs for traditional students may be more reflective of a student financial strategy than institutional productivity. As evidenced by their lower standardized test scores and higher federal aid dependency, the MUS two-year campuses offered less prepared and lower-income students a lower cost alternative to begin college. The range of tuition at the two-year campuses was lower than the range of tuition at four-year schools ($564-

$702 and $667-$807, respectively) and only two of the seven two-year schools—MSUN (2 Yr) and UMW (2 Yr)—had residential housing. Students could reduce their cost of attendance by living at home while completing lower-division, general education courses. Many students transferred to four-year schools without completing a two-year program and were never counted as a completion in IPEDS. This could explain why the modified Adelman TRNS graduation rates for four-year campuses (TRNS-GR150 43.8% and TRNS-GR200 45.3%) were higher than for any other MUS student group.

The reasons for these patterns warrant further investigation, but they suggest Montana's two-year institutions effectively serve a population of students that want and need a more cost effective means to start college or more time to complete a postsecondary degree. The lower graduation rates in two-year campuses may indicate student choice more than institutional productivity. Viewed a different way, low two-year graduation rates in combination with high four-year transfer graduation rates may be an indirect measure of MUS efficiency. The MUS has established pathways for students to transfer up from a two-year campus to a four-year campus in pursuit of a baccalaureate degree. It is not necessary to complete a two-year associate degree before transferring and many students opt to transfer after one or two years and never complete a two-year degree. These pathways cannot be recognized nor measured using IPEDS graduation rates. These pathways and differentiated patterns of student success only emerge from a more nuanced analysis of student groups and environmental conditions. Policy strategies to transfer credits from a four-year institution back to a two-year institution could result in higher associate degree completions and improve two-year graduation rates across the MUS.

Environmental conditions. The General Research Question used in this study was concerned with how open-systems theory could inform practice in evaluating effectiveness of postsecondary institutions. This research utilized Katz and Kahn's (1978) open system characteristics to guide the cross-case analysis and to evaluate environmental conditions at each of the 13 mini-cases. By examining graduation rates at multiple institutions in the framework of one postsecondary system, patterns of environmental conditions started to emerge. It became clear that campus inputs and throughputs were controlled by campus history, legislated purposes, and approved degree programs. Variations in campus outputs were partly the result of inconsistencies in legislative authority and BoR governance. The cross-case analysis found two of Katz and Kahn's open-system characteristics had the most impact on environmental conditions – (a) integration and coordination and (b) differentiation.

Exceptions. Throughout the quantitative and qualitative analysis several mini-cases stood out as exceptions to overall trends or patterns. Two-year mini-cases represented exceptions more often than four-year campuses. Four-year campus graduation rankings were more consistent than two-year rankings for all cohort student groups (BSC, 1824, ≥25, and TRNS). Cohort graduation rates for four-year mini-cases usually ranked in the following order: (1st) MSU, (2nd and 3rd) TECH and UM, (4th) MSUB, (5th) UMW, and (6th) MSUN. Cohort graduation rates for two-year mini-cases demonstrated higher variability. The top two-year mini-case rankings changed as follows: UM HLN COT had the highest IPEDS-GR150 graduation rate; MSUN (2 Yr) had the highest BSC-GR150 and BSC-GR200 graduation rates; MSUB COT had the highest 1824-GR150 and 1824-GR200 graduation rates; MSUN (2 Yr) had the highest

≥25-GR150 and ≥25-GR200 graduation rates; and UMW (2 Yr) had the highest TRNS-GR150 and TRNS-GR200 graduation rates. The bottom two-year mini-case rankings changed as follows: UMW (2 Yr) had the lowest IPEDS-GR150 graduation rates, and the MSU GF COT had the lowest GR150 and GR200 graduation rates for all cohort student groups (BSC, 1824, ≥25, and TRNS).

The above findings are important because they reflect student enrollment patterns not institutional productivity. They also reflect how graduation rates are affected by serving the special needs of twenty-first century populations. Several explanations are provided for the noted exceptions.

Explanation One. This research found that two-year campuses with higher percentages of full-time students had higher graduation rates. The three two-year campuses with the highest graduation rates (MSUB COT, MSUN (2 Yr) and UM HLN COT) had the lowest percentage of part-time students (20%, 15% and 19%, respectively). Two-year campuses with higher percentages of part-time students had lower graduation rates. MSU GF COT and UMW (2 Yr) had the lowest cohort group graduation rates and the highest percentage of part-time students (62% and 54%, respectively).

Explanation Two. The UMW (2 Yr) IPEDS cohort included two students, the UMW (2 Yr) modified Adelman cohort included 9 students. Each of the modified Adelman graduation rates reported for UMW (2 Yr) cohort groups included no more than two graduates. The size of the IPEDS and modified Adelman cohort groups were underreported and resulted in misleading graduation rates for the UMW (2 Yr) and the UMW mini-cases. In 2001, UMW started four off-campus sections in the Early

Childhood Education (ECE) program—34 beginning students were enrolled part-time. The ECE coursework is designed to articulate from a certificate to an associate to a baccalaureate; however, when the ECE students were admitted they were not required to declare themselves as certificate seeking. The majority of beginning ECE students declared themselves as baccalaureate students; therefore, they were never included in the UMW (2 Yr) cohort. They were included in the UMW baccalaureate cohort. The result of miscoding the part-time ECE students upon admission was they never showed up in the UMW (2 Yr) mini-case data and they took longer to graduate in the UMW mini-case. This is one of the pitfalls of mixed degree mission institutions, both graduation rate metrics suffered from an internal process that was in compliance with system policy.

Open-systems theory informs policymakers to consider the forces of external control when evaluating institutional productivity. Even though all of the campuses studied belonged to one state-governed system, environmental conditions among the 13 MUS mini-cases were quite varied. The MUS's two-year campuses served higher percentages of at-risk students with fewer financial and program resources. Higher percentages of two-year students attended school part-time. As a result they did not progress to degree as quickly as fulltime students.

Recommendations

This research affirmed Adelman's (2007) and Ewell's (2009) findings that SRK graduation rates are a narrowly defined productivity metric. Graduation rates in the MUS did not account for institutional differences and they should not be generalized as an appropriate measure of institutional effectiveness. A number of recommendations follow from the research findings and are targeted at policymakers, practitioners, and future researchers.

Policymakers. Like other states across the country, Montana is challenged to produce more postsecondary graduates, but graduation numbers do not tell the full story of postsecondary productivity. Postsecondary campuses serve student bodies with distinct characteristics. Some student bodies are more at-risk due to characteristics of age, gender, minority, or enrollment status. The literature review summarized some of the global, national, and state policy agendas that influence policymakers. This study also described how graduation rates and environmental conditions varied among the 13 MUS mini-cases. The following recommendations are offered to policymakers.

Recommendation One. Higher education policymakers need to view the national accountability agenda, not purely as increased degree production, but as a means to accomplish social and economic equity. This idea is not new. Brookfield and Holst (2010) argued that education in America is designed to advance a political, capitalistic democracy not an economic, socialist democracy. The MUS case supports Brookfield's and Holst's argument. Each MUS mini-case had a unique identity based on its environmental conditions (e.g., legislated purpose, degree offerings, study body profile, and allocated resources). If the goal of Montana policymakers is to improve the

economic and social lives of all Montanans, indicators of postsecondary institutional productivity must be evaluated more broadly than a simple rate of degree completion. Institutional productivity is more nuanced and may need to be viewed in terms of unique student pathways or institutional attributes rather than one universal standard.

Recommendation Two. Policy makers need to understand how environmental conditions vary among campuses and how system policies influence those conditions. In 2001, four-year campuses had many advantages over two-year schools. Four-year campuses had clear legislated purposes, more approved degree options, more direct allocation of state resources, higher revenue generating potential through tuition, more administrative autonomy, and more academically prepared students. Two-year campuses suffered from ambiguous purposes, few degree options, less direct allocation of state resources, less revenue generating potential through tuition, less administrative autonomy, and higher percentages of at-risk students. If policymakers hold institutions accountable to high levels of productivity without acknowledging the inherent difference in environmental conditions at specific institutions, policymakers effectively advantage institutions that serve a privileged class of students and disadvantage institutions that serve at-risk students.

Recommendation Three. Policymakers need to examine interrelationships and patterns in postsecondary systems and to develop sensibilities for the unique interconnections that give postsecondary systems their unique character. This recommendation in rooted in Senge's (2006) concept of the fifth discipline—that of an adaptive learning organization. This type of approach could lead to system-level data-management and credit-transfer policy changes that facilitate associate degree

completions for students who transfer early from a two-year campus to a four-year campus. Sophisticated degree audit software and transfer back policies could result in automatic awarding of associated degrees to transfer students and greatly improve graduation rates for two-year institutions.

Practitioners. Jones (2009) made several recommendations to the BoR to increase system efficiency. His recommendations included reducing the demands that each student places on the system by eliminating remediation, accelerating learning, improving rates of course completion, reducing credit hours to degree, awarding credit for prior experience, and encouraging use of assessment and test-out options. Campus practitioners are cautioned that these recommendations may decrease the cost of education, but they conflict with the competing interests of twenty-first century public postsecondary institutions as noted in this study.

In addition to demonstrating increased efficiency, twenty-first century public postsecondary institutions and practitioners are challenged to provide greater access and ensure greater success for at-risk students (Bash, 2003; Engle & Tinto, 2008; Kuh, 2005); offer more programs, service and degree flexibility (CAEL, 2000; Kuh,2005), cut back on services (Jones, 2009), prove higher learning outcomes (NGA, 2010; U.S. Department of Education, 2006), produce more credentialed citizens (Lumina Foundation, 2013; Obama, 2009a; U.S. Department of Education, 2006), and restore human capital (Levins, 2008). Perhaps the biggest lesson in attempting to meet these varied and sometime conflicting demands is that no institution can do it all and one metric cannot prove the value of an institution's efforts. Postsecondary practitioners or campus leaders need discipline to set priorities and adhere to conflating policies.

Recommendation One. Practitioners—campus leaders, faculty, and staff—must understand and be adept at using disaggregated data to better understand student body characteristics, needs, and the environmental conditions that affect student success metrics. This is especially important as institutions position to serve greater numbers of at-risk students. Enrollment management policies and metrics must be developed that demonstrate incremental student success. These findings are in keeping with numerous researchers (Bash, 2003; CAEL, 2000; Cook & Pullaro, 2010; Engle & Tinto, 2008) who have argued for better metrics to measure success of adult, non-traditional, and at-risk students.

Recommendation Two. Campus leaders must identify, embrace, and articulate unique institutional missions, as determined by the student body needs. It is then the leader's responsibility to advocate for the role that the institution plays in meeting the needs of the state.

Recommendation Three. Although part of a system, all campus practitioners must identify themselves as leaders and promote systems thinking, where all workers are responsible for developing an in-depth understanding of the external and internal environmental conditions of the institution they serve and for creating conditions that matter for student success. These recommendations come directly from Chaleff (2009), Kuh et al. (2005) and Senge (2008)

Future Study. The future significance of this research will be based on the results of longitudinal changes in the MUS—changes related to system coordination and integration, differentiation, inputs, throughputs, feedback, and steady state and dynamic homeostasis. Additional longitudinal research within the MUS is necessary to evaluate

how coordinated system-level changes (e.g., common course numbering, College!Now, the two-year community college mission, Complete College Montana, etc.) affect system-level and campus-level productivity and effectiveness. Alternative metrics are also needed to evaluate productivity and effectiveness. Graduation rates alone do not provide an adequate measure. System-level and campus-level initiatives are well underway in the Montana. The MUS Data Warehouse contains more than twelve years of consistent and reliable student unit records. The system and its database are a rich resource for longitudinal analysis of productivity, performance, and efficiency indicators. In particular, well-developed efficiency indicators could result from nuanced evaluation of differential student-group successes (e.g., longer period-to-graduation for at-risk student groups, student motivations behind two-year to four-year transitions, and enrollment strategies two-year to four-year transitions

Conclusions

Policymakers must understand the environmental conditions that affect individual institutional performance, productivity, and effectiveness—they must also understand how environmental conditions at individual institutions relate to system-level policies. Katz and Kahn's common characteristics of open-systems provided a useful framework for evaluating environmental conditions of the MUS. Adelman's (2007) graduation-rate methodology provided the basis for understanding differential successes of at-risk student groups in postsecondary educational institutions. Senge's (2006) systems thinking theory, the fifth discipline, challenges leaders to create adaptive organizations based on disciplined examination of interrelationships and patterns. Through acquired knowledge and in-depth understanding, policymakers obtain the insight and discipline necessary to solve complex problems. This study challenges policymakers to fully understand postsecondary educational systems and to evaluate campuses not as standalone entities, but as integral parts of a dynamic educational system.

This study was concerned with institutional productivity, performance, and effectiveness. It utilized terminology such as inputs, throughputs, feedback, outputs, and environmental conditions. These terms were useful to describe institutional characteristics, but they mask the essential human characteristics of the students enrolled those institutions. Policymakers must understand how policy shapes individual institutions and how those policies effect student lives. Determining how effectively an institution serves students relative to their unique needs is ultimately more important than measuring standardized rates of productivity.

Afterward

W.B. Cameron's (1963) statement, "not everything that can be counted counts, and not everything that counts can be counted" (p. 13), served as the inspiration for this research. The quote raised questions about what it means to measure student and institutional success in higher education. Who defines success? What defines success? Who measures success? How is success measured? When is it appropriate to measure success? What value is there in some measurements? Should uniformly established success measures be rewarded? Should differentiated success measures be allowed? I have learned much while exploring these questions and conducting this research. The IPEDS-GRS serves as a national standard for numeric measurement of student and institutional success, but as should be evident from this research, the IPEDS methodology has many shortcomings and the resulting graduation rates do not reflect the true nature of student and institutional success. It is relatively easy and interesting to count things. It is more difficult and important to understand what things count.

This research focused on graduation rates as the primary measure of institutional success in the MUS. Prior to initiating the research, I understood that each campus attracted a unique student body that contributed to the character of the institution and I wondered if universal success was achievable. Given the unique character of each institution it seemed improbable for all campuses to achieve the same or even similar numeric success with graduation rates. Von Bertalanffy 's (1956) equifinality concept, the concept that open systems could reach the same final state from differing initial conditions and pathways, intrigued me. Was it possible for individual campuses to reach the same final state from differing initial conditions and pathways? This research has

convinced me the answer is no. Individual campuses cannot achieve equifinality, because they do not truly act as open systems. Individual campuses may more appropriately be viewed as unique pathways within the MUS. Viewed in this way, measurements of campus successes become more differentiated. Instead of emphasizing universal performance, emphasis is placed on unique strengths, effectiveness, and efficiencies.

One campus may be encouraged to graduate adult students at higher rates than other campuses, another campus may achieve greater minority success, and another may produce more science, technology, engineering, and mathematics graduates. Each of these successes reflects the unique character of the institution and honors the institution's strengths and mission. Each of these successes also contributes to the overall success of the MUS.

It is possible for the BoR, as the central governing body, to achieve higher levels of success without holding campuses to universal performance standards. Universal performance standards cannot be met without increasing state investments and evenly distributing resources. Instead of pitting campuses against one another to achieve universal outcomes, the MUS should acknowledge, resource, and reward campuses for fulfilling unique missions—missions that necessitate different metrics and levels of achievement.

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Appendix A – Enrollment and Graduation Rate Data

Appendix A. List of Tables

Table A1. MUS Two-Year Graduation Data

Montana University System (MUS (2 Yr))
Two-Year Programs

	Method	Cohort		Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	1352	100%	495			36.6%	
	Female	655	48%	240	48%		36.6%	
	Male	697	52%	255	52%		36.6%	
	Minority	101	7%	29	6%		28.7%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	1971	100%	908		16.1%	23.8%	26.3%
	Female	1061	54%	297	33%	16.0%	24.8%	28.0%
	Male	910	46%	221	24%	16.3%	22.7%	24.3%
	Minority	199	10%	34	4%	9.5%	14.5%	17.0%
	Beginning 18- to 24-year olds (1824)							
	Headcount	1095	56%	280		17.3%	23.9%	25.6%
	Female	576	53%	155	55%	16.7%	24.5%	26.9%
	Male	519	47%	125	45%	17.9%	23.1%	24.1%
	Minority	83	8%	13	5%	7.3%	11.5%	13.6%
	Beginning ≥25 year old (≥25)							
	Headcount	846	43%	234		15.2%	24.2%	27.6%
	Female	469	55%	140	60%	15.8%	25.8%	29.9%
	Male	377	45%	94	40%	14.6%	22.3%	25.0%
	Minority	82	10%	20	9%	11.8%	16.7%	19.6%
	Transfer students (TRNS)							
	Headcount	623	32%	173		18.1%	24.8%	27.7%
	Female	379	61%	121	70%	20.3%	28.0%	32.0%
	Male	244	39%	52	30%	14.8%	20.1%	21.3%
	Minority	53	9%	13	8%	12.1%	16.6%	19.6%

Table A2. MUS Four-Year Graduation Data

Montana University System (MUS (4 Yr))
Four-Year Programs

	Method	Cohort		Total Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	4689	100%	755		16.1%	41.0%	
	Female	2271	48%	421	56%	18.5%	44.0%	
	Male	2418	52%	334	44%	13.8%	38.5%	
	Minority	276	6%	30	4%	10.9%	26.1%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	7773	100%	3262		20.6%	39.3%	41.9%
	Female	3837	49%	1673	51%	22.8%	41.0%	43.6%
	Male	3932	51%	1588	49%	18.5%	37.7%	40.4%
	Minority	626	8%	168	5%	13.7%	24.7%	26.8%
	Beginning 18- to 24-year olds (1824)							
	Headcount	6820	88%	2947		20.6%	40.5%	43.2%
	Female	3314	49%	1494	51%	23.1%	42.6%	45.1%
	Male	3506	51%	1453	49%	18.3%	38.5%	41.4%
	Minority	486	7%	139	5%	13.6%	26.2%	28.7%
	Beginning ≥25 year old (≥25)							
	Headcount	842	11%	274		21.1%	30.6%	32.5%
	Female	452	54%	150	55%	21.9%	30.7%	33.1%
	Male	386	46%	123	45%	20.5%	30.9%	31.9%
	Minority	126	15%	24	9%	12.7%	18.3%	19.1%
	Transfer students (TRNS)							
	Headcount	2200	28%	996		33.7%	43.8%	45.3%
	Female	1106	50%	512	51%	35.9%	44.7%	46.3%
	Male	1093	50%	484	49%	31.6%	43.0%	44.3%
	Minority	225	10%	61	6%	18.2%	25.8%	27.1%

Table A3. MSUB COT Graduation Data

Montana State University - Billings College of Technology (MSUB COT)
Two-Year Programs

	Method	Cohort		Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	133	100%	45			33.8%	
	Female	57	43%	13	29%		22.8%	
	Male	76	57%	32	71%		42.1%	
	Minority	11	8%	1	2%		9.1%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	254	100%	93		19.3%	33.5%	36.6%
	Female	121	48%	45	48%	17.4%	33.9%	37.2%
	Male	133	52%	48	52%	21.1%	33.1%	36.1%
	Minority	26	10%	4	4%	7.7%	15.4%	15.4%
	Beginning 18- to 24-year olds (1824)							
	Headcount	138	54%	45		28.0%	41.0%	45.0%
	Female	58	42%	16	36%	7.0%	14.0%	16.0%
	Male	80	58%	29	64%	21.0%	27.0%	29.0%
	Minority	10	7%	0	0%	0.0%	0.0%	0.0%
	Beginning ≥25 year old (≥25)							
	Headcount	112	44%	47		18.8%	38.4%	42.0%
	Female	62	55%	29	62%	22.6%	43.6%	46.8%
	Male	50	45%	18	38%	14.0%	32.0%	36.0%
	Minority	16	14%	4	9%	12.5%	25.0%	25.0%
	Transfer students (TRNS)							
	Headcount	64	25%	32		39.1%	48.5%	50.1%
	Female	35	55%	20	63%	42.9%	54.3%	57.2%
	Male	29	45%	12	38%	34.5%	41.4%	41.4%
	Minority	5	8%	2	6%	40.0%	40.0%	40.0%

Table A4. MSU GF COT Graduation Data

Montana State University-Great Falls College of Technology (MSU GF COT)
Two-Year Programs

	Method	Cohort		Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	136	100%	24			17.6%	
	Female	89	65%	17	71%		19.1%	
	Male	47	35%	7	29%		14.9%	
	Minority	17	13%	2	8%		11.8%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	628	100%	45		3.7%	5.1%	7.2%
	Female	379	60%	30	67%	4.5%	5.8%	7.9%
	Male	249	40%	15	33%	2.4%	4.0%	6.0%
	Minority	82	13%	5	11%	1.2%	2.4%	6.1%
	Beginning 18- to 24-year olds (1824)							
	Headcount	309	49%	24		4.5%	5.8%	7.7%
	Female	200	65%	19	79%	6.5%	7.5%	9.5%
	Male	109	35%	5	21%	0.9%	2.7%	4.5%
	Minority	34	11%	4	17%	2.9%	5.8%	11.7%
	Beginning ≥25 year old (≥25)							
	Headcount	309	49%	21		2.9%	4.5%	6.8%
	Female	172	56%	11	52%	2.3%	4.0%	6.3%
	Male	137	44%	10	48%	3.6%	5.1%	7.3%
	Minority	48	16%	1	5%	0.0%	0.0%	2.1%
	Transfer students (TRNS)							
	Headcount	270	43%	23		5.2%	6.3%	8.5%
	Female	119	44%	15	65%	5.0%	6.3%	9.4%
	Male	111	41%	8	35%	5.4%	6.3%	7.2%
	Minority	34	13%	2	9%	0.0%	2.9%	5.8%

Table A5. MSUN (2 Yr) Graduation Data

Montana State University - Northern (MSUN (2 Yr))
Two-Year Programs

	Method	Cohort		Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	12	100%	2			16.7%	
	Female	3	25%	0	0%		0.0%	
	Male	9	75%	2	100%		22.2%	
	Minority	2	17%	0	0%		0.0%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	33	100%	13		27.3%	36.4%	39.4%
	Female	17	52%	9	69%	47.1%	47.1%	53.0%
	Male	16	48%	4	31%	6.3%	25.1%	25.1%
	Minority	6	18%	1	8%	16.7%	16.7%	16.7%
	Beginning 18- to 24-year olds (1824)							
	Headcount	20	61%	6		20.0%	25.0%	30.0%
	Female	7	35%	4	67%	42.9%	42.9%	57.2%
	Male	13	65%	2	33%	7.7%	15.4%	15.4%
	Minority	3	15%	0	0%	0.0%	0.0%	0.0%
	Beginning ≥25 year old (≥25)							
	Headcount	11	33%	7		45.5%	63.7%	63.7%
	Female	8	73%	5	71%	62.5%	62.5%	62.5%
	Male	3	27%	2	29%	0.0%	66.7%	66.7%
	Minority	3	27%	1	14%	33.3%	33.3%	33.3%
	Transfer students (TRNS)							
	Headcount	16	48%	10		50.0%	62.5%	62.5%
	Female	12	75%	8	80%	66.7%	66.7%	66.7%
	Male	4	25%	2	20%	0.0%	50.0%	50.0%
	Minority	3	19%	1	10%	33.3%	33.3%	33.3%

Table A6. UM TECH COT Graduation Data

Montana Tech College of Technology (UM TECH COT)
Two-Year Programs

	Method	Cohort		Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	91	100%	22			24.2%	
	Female	47	52%	17	77%		36.2%	
	Male	40	44%	5	23%		11.4%	
	Minority	7	8%	2	9%		28.6%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	175	100%	27		10.3%	14.9%	15.5%
	Female	105	60%	18	67%	11.4%	16.2%	17.2%
	Male	70	40%	9	33%	8.6%	12.9%	12.9%
	Minority	8	5%	2	7%	20.0%	0.0%	0.0%
	Beginning 18- to 24-year olds (1824)							
	Headcount	100	57%	14		11.0%	13.0%	14.0%
	Female	57	57%	9	64%	12.3%	14.1%	15.9%
	Male	43	43%	5	36%	9.3%	11.6%	11.6%
	Minority	8	8%	2	14%	25.0%	25.0%	25.0%
	Beginning ≥25 year old (≥25)							
	Headcount	75	43%	13		9.3%	17.3%	17.3%
	Female	48	64%	9	69%	10.4%	18.7%	18.7%
	Male	27	36%	4	31%	7.4%	14.8%	14.8%
	Minority	2	3%	0	0%	0.0%	0.0%	0.0%
	Transfer students (TRNS)							
	Headcount	50	29%	11		16.0%	20.0%	22.0%
	Female	34	68%	3	27%	8.8%	11.7%	14.6%
	Male	11	22%	5	45%	31.3%	37.6%	37.6%
	Minority	1	2%	0	0%	0.0%	0.0%	0.0%

Table A7. UM HLN COT Graduation Data

University of Missoula - Helena College of Technology (UM HLN COT)
Two-Year Programs

	Method	Cohort		Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	162	100%	97			59.9%	
	Female	51	31%	28	29%		54.9%	
	Male	111	69%	69	71%		62.2%	
	Minority	10	6%	6	6%		60.0%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	377	100%	144		28.6%	36.0%	38.1%
	Female	154	41%	56	39%	22.1%	31.8%	36.3%
	Male	223	59%	88	61%	33.2%	39.0%	39.4%
	Minority	29	8%	10	7%	20.7%	34.5%	34.5%
	Beginning 18- to 24-year olds (1824)							
	Headcount	226	60%	80		28.3%	34.9%	38.9%
	Female	88	39%	30	38%	22.7%	32.9%	33.9%
	Male	138	61%	50	63%	31.9%	36.2%	36.2%
	Minority	19	8%	6	8%	21.1%	31.6%	31.6%
	Beginning ≥25 year old (≥25)							
	Headcount	146	39%	63		30.1%	38.3%	43.1%
	Female	62	42%	25	40%	22.6%	30.7%	40.4%
	Male	84	58%	38	60%	35.7%	44.0%	45.2%
	Minority	9	6%	3	5%	22.2%	33.3%	33.3%
	Transfer students (TRNS)							
	Headcount	80	21%	30		22.5%	32.5%	37.5%
	Female	42	53%	18	60%	21.4%	33.3%	42.8%
	Male	38	48%	12	40%	23.7%	31.6%	31.6%
	Minority	7	9%	3	10%	14.3%	42.9%	42.9%

Table A8. UM COT Graduation Data

University of Montana College of Technology (UM COT)
Two-Year Programs

	Method	Cohort		Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	297	100%	120			40.4%	
	Female	142	48%	66	55%		46.5%	
	Male	155	52%	54	45%		34.8%	
	Minority	25	8%	8	7%		32.0%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	495	100%	194		22.0%	35.5%	39.1%
	Female	277	56%	137	71%	27.4%	44.7%	49.4%
	Male	218	44%	57	29%	15.1%	23.8%	26.1%
	Minority	45	9%	11	6%	13.3%	20.0%	24.4%
	Beginning 18- to 24-year olds (1824)							
	Headcount	297	60%	110		22.6%	35.1%	37.1%
	Female	162	55%	76	69%	27.8%	43.8%	46.9%
	Male	135	45%	34	31%	16.3%	24.4%	25.1%
	Minority	22	7%	1	1%	0.0%	4.5%	4.5%
	Beginning ≥25 year old (≥25)							
	Headcount	189	38%	82		22.2%	37.5%	43.3%
	Female	113	60%	60	73%	27.4%	46.9%	53.1%
	Male	76	40%	22	27%	14.5%	23.7%	29.0%
	Minority	23	12%	10	12%	26.1%	34.8%	43.5%
	Transfer students (TRNS)							
	Headcount	140	28%	65		27.1%	42.1%	46.4%
	Female	94	67%	53	82%	34.0%	52.1%	56.4%
	Male	46	33%	12	18%	13.0%	21.7%	26.0%
	Minority	15	11%	4	6%	20.0%	20.0%	26.7%

Table A9. UMW (2 Yr) Graduation Data

University of Montana Western (UMW (2 Yr))
Two-Year Programs

	Method	Cohort		Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	2	100%	0			0.0%	
	Female	1	50%	0	0%		0.0%	
	Male	1	50%	0	0%		0.0%	
	Minority	0	0%	0	0%		0.0%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	9	100%	2		22.2%	22.2%	22.2%
	Female	8	89%	2	100%	25.0%	25.0%	25.0%
	Male	1	11%	0	0%	0.0%	0.0%	0.0%
	Minority	1	11%	1	50%	100.0%	100.0%	100.0%
	Beginning 18- to 24-year olds (1824)							
	Headcount	5	56%	1		20.0%	20.0%	20.0%
	Female	4	80%	1	100%	25.0%	25.0%	25.0%
	Male	1	20%	0	0%	0.0%	0.0%	0.0%
	Minority	0	0%	0	0%	0.0%	0.0%	0.0%
	Beginning ≥25 year old (≥25)							
	Headcount	4	44%	1		25.0%	25.0%	25.0%
	Female	4	100%	1	100%	25.0%	25.0%	25.0%
	Male	0	0%	0	0%	0.0%	0.0%	0.0%
	Minority	1	25%	1	100%	100.0%	100.0%	100.0%
	Transfer students (TRNS)							
	Headcount	3	33%	2		66.7%	66.7%	66.7%
	Female	3	100%	2	100%	66.7%	66.7%	66.7%
	Male	0	0%	0	0%	0.0%	0.0%	0.0%
	Minority	1	33%	1	50%	100.0%	100.0%	100.0%

Table A10. MSUB Graduation Data

Montana State University - Billings (MSUB)
Four-Year Programs

	Method	Cohort		Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	514	100%	148		9.3%	28.8%	
	Female	337	66%	111	75%	9.8%	32.9%	
	Male	177	34%	37	25%	8.5%	20.9%	
	Minority	54	11%	5	3%	3.7%	30.3%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	1107	100%	305		14.2%	25.6%	27.6%
	Female	705	64%	215	70%	15.2%	28.0%	30.6%
	Male	399	36%	89	29%	12.5%	21.5%	22.3%
	Minority	146	13%	22	7%	5.5%	13.0%	15.1%
	Beginning 18- to 24-year olds (1824)							
	Headcount	871	79%	238		12.7%	25.2%	27.3%
	Female	567	65%	173	73%	13.4%	27.9%	30.5%
	Male	304	35%	65	27%	11.5%	20.4%	21.4%
	Minority	102	12%	17	7%	4.9%	13.7%	16.6%
	Beginning ≥25 year old (≥25)							
	Headcount	218	20%	63		20.2%	27.1%	28.9%
	Female	127	58%	40	63%	23.6%	29.1%	31.5%
	Male	88	40%	22	35%	15.9%	25.0%	25.0%
	Minority	42	19%	9	14%	7.1%	11.9%	11.9%
	Transfer students (TRNS)							
	Headcount	380	34%	138		25.3%	35.0%	36.3%
	Female	236	62%	92	67%	27.1%	36.8%	38.9%
	Male	144	38%	46	33%	22.2%	31.9%	31.9%
	Minority	66	17%	12	9%	9.1%	16.7%	18.2%

Table A11. MSU Graduation Data

Montana State University (MSU)
Four-Year Programs

	Method	Cohort		Graduates		Graduation Rates (%)		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	1720	100%	820		17.0%	47.7%	
	Female	731	43%	386	47%	19.7%	52.8%	
	Male	989	58%	434	53%	15.0%	43.9%	
	Minority	54	3%	22	3%	18.5%	40.7%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	2820	100%	1367		22.3%	45.1%	48.4%
	Female	1233	44%	646	47%	26.0%	49.6%	52.4%
	Male	1587	56%	721	53%	19.5%	41.7%	45.4%
	Minority	123	4%	46	3%	21.1%	35.7%	37.3%
	Beginning 18- to 24-year olds (1824)							
	Headcount	2571	91%	1262		22.1%	45.6%	49.0%
	Female	1105	43%	591	47%	25.8%	50.7%	53.5%
	Male	1466	57%	671	53%	19.4%	41.9%	45.8%
	Minority	106	4%	41	3%	21.7%	36.8%	38.7%
	Beginning ≥25 year old (≥25)							
	Headcount	214	8%	91		26.2%	40.7%	42.6%
	Female	109	51%	46	51%	27.5%	39.4%	42.2%
	Male	105	49%	45	49%	24.8%	41.9%	42.9%
	Minority	14	7%	4	4%	21.4%	28.5%	28.5%
	Transfer students (TRNS)							
	Headcount	811	29%	417		37.9%	49.6%	51.4%
	Female	381	47%	206	49%	42.5%	52.2%	54.0%
	Male	430	53%	211	51%	33.7%	47.2%	49.1%
	Minority	42	5%	18	4%	33.3%	40.4%	42.8%

Table A12. MSUN Graduation Data

Montana State University - Northern (MSUN)
Four-Year Programs

	Method	Cohort		Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	165	100%	37		9.7%	22.4%	
	Female	73	44%	15	41%	8.2%	20.5%	
	Male	92	56%	22	59%	10.9%	23.9%	
	Minority	29	18%	4	11%	3.4%	13.8%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	350	100%	77		12.9%	22.3%	22.6%
	Female	172	49%	34	44%	8.7%	19.2%	19.8%
	Male	177	51%	45	58%	16.9%	25.4%	25.4%
	Minority	83	24%	13	17%	6.0%	15.6%	15.6%
	Beginning 18- to 24-year olds (1824)							
	Headcount	258	74%	61		12.0%	23.2%	23.6%
	Female	124	48%	25	41%	7.3%	19.4%	20.2%
	Male	134	52%	36	59%	16.4%	26.8%	26.8%
	Minority	54	21%	9	15%	3.7%	16.7%	16.7%
	Beginning ≥25 year old (≥25)							
	Headcount	89	25%	18		15.7%	20.2%	20.2%
	Female	46	52%	9	50%	13.0%	19.5%	19.5%
	Male	42	47%	9	50%	19.0%	21.4%	21.4%
	Minority	26	29%	4	22%	11.5%	15.3%	15.3%
	Transfer students (TRNS)							
	Headcount	127	36%	43		26.8%	33.9%	33.9%
	Female	62	49%	17	40%	17.7%	27.4%	27.4%
	Male	64	50%	26	60%	35.9%	40.6%	40.6%
	Minority	41	32%	9	21%	12.2%	22.0%	22.0%

Table A13. TECH Graduation Data

Montana Tech (TECH)
Four-Year Programs

	Method	Cohort		Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	271	100%	111		11.8%	41.0%	
	Female	91	34%	25	23%	9.9%	27.5%	
	Male	180	66%	86	77%	12.8%	47.8%	
	Minority	13	5%	3	3%	0.0%	23.1%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	397	100%	169		22.7%	41.1%	42.6%
	Female	149	38%	50	30%	22.1%	30.8%	33.5%
	Male	248	62%	119	70%	23.0%	47.2%	48.0%
	Minority	22	6%	8	5%	13.6%	31.8%	36.3%
	Beginning 18- to 24-year olds (1824)							
	Headcount	336	85%	150		22.0%	43.4%	44.6%
	Female	116	35%	42	28%	24.1%	34.4%	36.1%
	Male	220	65%	108	72%	20.9%	48.2%	49.1%
	Minority	18	5%	5	3%	11.1%	27.8%	27.8%
	Beginning ≥25 year old (≥25)							
	Headcount	54	14%	18		29.6%	31.5%	33.4%
	Female	27	50%	7	39%	18.5%	22.2%	25.9%
	Male	27	50%	11	61%	40.7%	40.7%	40.7%
	Minority	4	7%	3	17%	25.0%	50.0%	75.0%
	Transfer students (TRNS)							
	Headcount	91	23%	46		40.7%	48.4%	50.6%
	Female	46	51%	19	41%	36.6%	41.5%	46.4%
	Male	50	55%	27	59%	44.0%	54.0%	54.0%
	Minority	7	8%	5	11%	28.6%	57.2%	71.5%

Table A14. UM Graduation Data

University of Montana (UM)
Four-Year Programs

	Method	Cohort		Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	1846	100%	753		18.6%	40.8%	
	Female	955	52%	428	57%	22.2%	44.8%	
	Male	891	48%	325	43%	14.8%	36.5%	
	Minority	112	6%	28	4%	13.4%	25.0%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	2822	100%	1251		22.7%	41.6%	44.3%
	Female	1444	51%	676	54%	25.8%	44.4%	46.8%
	Male	1378	49%	575	46%	19.4%	38.6%	41.6%
	Minority	227	8%	71	6%	18.5%	28.6%	31.2%
	Beginning 18- to 24-year olds (1824)							
	Headcount	2536	90%	1150		23.0%	42.6%	45.3%
	Female	1281	51%	616	54%	26.6%	45.7%	48.0%
	Male	1255	49%	534	46%	19.4%	39.5%	42.6%
	Minority	184	7%	59	5%	17.4%	28.8%	32.1%
	Beginning ≥25 year old (≥25)							
	Headcount	244	9%	81		18.9%	30.4%	33.3%
	Female	132	54%	45	56%	19.7%	31.1%	34.1%
	Male	112	46%	36	44%	17.9%	29.5%	32.2%
	Minority	37	15%	8	10%	16.2%	21.6%	21.6%
	Transfer students (TRNS)							
	Headcount	708	25%	322		35.2%	44.2%	45.5%
	Female	343	48%	160	50%	38.8%	45.8%	46.7%
	Male	365	52%	162	50%	31.8%	42.8%	44.4%
	Minority	64	9%	16	5%	21.9%	25.0%	25.0%

Table A15. UMW Graduation Data

University of Montana Western (UMW)
Four-Year Programs

	Method	Cohort		Graduates		Graduation Rates		
		No.	%	No.	%	GR100	GR150	GR200
IPEDS (Fall 2001)	SRK freshmen (IPEDS)							
	Headcount	173	100%	60		13.3%	34.7%	
	Female	84	49%	34	57%	20.2%	40.5%	
	Male	89	51%	26	43%	6.7%	29.2%	
	Minority	14	8%	6	10%	14.3%	42.9%	
Modified Adelman (Academic Year 2001-2002)	Beginning student cohort (BSC)							
	Headcount	277	100%	91		14.8%	30.7%	32.9%
	Female	134	48%	52	57%	20.9%	35.1%	38.8%
	Male	143	52%	39	43%	9.1%	26.6%	27.3%
	Minority	25	9%	8	9%	8.0%	28.0%	32.0%
	Beginning 18- to 24-year olds (1824)							
	Headcount	248	90%	86		15.7%	32.6%	34.6%
	Female	121	49%	47	55%	21.5%	35.5%	38.8%
	Male	127	51%	39	45%	10.2%	29.9%	30.7%
	Minority	22	9%	8	9%	9.1%	31.8%	36.3%
	Beginning ≥25 year old (≥25)							
	Headcount	23	8%	3		8.7%	13.0%	13.0%
	Female	11	48%	3	100%	18.2%	27.3%	27.3%
	Male	12	52%	0	0%	0.0%	0.0%	0.0%
	Minority	3	13%	0	0%	0.0%	0.0%	0.0%
	Transfer students (TRNS)							
	Headcount	83	30%	30		22.9%	34.9%	36.1%
	Female	43	52%	18	60%	27.9%	39.5%	41.8%
	Male	42	51%	12	40%	17.5%	30.0%	30.0%
	Minority	5	6%	1	3%	0.0%	20.0%	20.0%

Appendix B – Research Permissions

Adelman Methodology Permission

Adelman, Cliff <cadelman@ihep.org>

Tue 8/26/2014 1:28 PM
Inbox
To:
Anneliese Ripley;

You forwarded this message on 8/26/2014 1:50 PM.

Bing Maps

Sure, though remember that whatever I did was based on NCES longitudinal studies, which are very different from IPEDS. Regards. . .

From: Anneliese Ripley <Anneliese.Ripley@umwestern.edu>
Sent: Tuesday, August 26, 2014 3:01 PM
To: Adelman, Cliff
Subject: Request permission to use your methodology

Dear Dr. Adelman:

I am a doctoral candidate at the University of Montana and am conducting a cross-case study of graduation rates in the Montana University System. Several years ago I ran across your article *Making Graduation Rates Matter*. I would like to use your methodology and am seeking your permission to compare the graduation rate results from your methodology to IPEDS for the Montana University System.

Thank you for considering my request.

Sincerely, Anneliese Ripley

Anneliese A. Ripley | Interim Assistant Provost and NWCCU Liaison | University of Montana Western | 710 S Atlantic Street | Dillon, MT 59725 | 40

Institutional Review Board Permission

Baker, Paula <Paula.Baker@mso.umt.edu>

Tue 5/13/2014 1:38 PM
Inbox
To:
Anneliese Ripley;
Cc:
paula.baker@umontana.edu;
McCaw, Bill <Bill.McCaw@mso.umt.edu>;
You replied on 5/13/2014 1:45 PM.

Bing Maps

Hello Anneliese,

Thank you for contacting me and describing the type of information you'll be using. No IRB application will be needed for your research, as publically available data do not require IRB review, specifically when no identifiable private information is involved.

Best of luck with your research,

Paula

Paula A. Baker, MA, CIP
Institutional Review Board (IRB) Chair, Manager
Office of the Vice President for Research and Creative Scholarship
University of Montana
(406) 243-6672
paula.baker@umontana.edu

From: Anneliese Ripley [mailto:Anneliese.Ripley@umwestern.edu]
Sent: Tuesday, May 13, 2014 10:58 AM
To: Baker, Paula
Subject: IRB

Dear Paula,

I am currently working on my dissertation and Dr. Bill McCaw is my adviser. Bill asked me to contact you to verify that an IRB proposal is not necessary for my research.

I am conducting a cross-case study of graduation rates in the Montana University System. All of the data has been provided by the Office of the Commissioner of Higher

Education. The data represent institutional-level data. No student identifiers have been provided.

I am also researching public documents (Board of Regent reports, college catalogs, U.S. census reports, etc.). None of these sources provide student specific information; however, I will be looking at campus specific demographics (gender, age, and minority percentages) relative to graduation rates.

Please provide your thoughts on whether an IRB proposal is necessary. I am happy to address and further questions that you might have.

Thank you, Anneliese

Anneliese A. Ripley | Interim Assistant Provost and NWCCU Liaison | University of Montana Western | 710 S Atlantic Street | Dillon, MT 59725 | 406-683-7309