IMPROVEMENT IN TEACHING: THE IMPACT OF A FORMATIVE ASSESSMENT STRATEGY ON TEACHING INTENTIONS AND STRATEGIES

by

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DISSERTATION APPROVAL

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ABSTRACT

An abstract of the dissertation of Julie Ford Hood for the degree of Doctor of Education in Educational Leadership presented September 2009.

Title: Improvement in Teaching: The Impact of a Formative Assessment Strategy on Teaching Intentions and Strategies

Postsecondary faculty face certain change in their classrooms as expectations for improved student achievement and increased accountability for learning become more explicit. To improve learning for increasingly diverse student populations, instructors would benefit from guidance regarding augmentation of current teaching practices with more effective teaching strategies to accommodate more learners. Without formal pedagogical training, most postsecondary faculty primarily adopt the behaviorist or teacher centered teaching approaches they experienced as students, rather than a more comprehensive student centered approach, which would benefit more students.

This research showed adult learners can effectively promote student centered teaching approaches by articulating their learning needs on Reflection Cards at midterm. Reflection Cards, or student comments about current teaching and learning needs, provide an opportunity for students to engage in their learning while helping

instructors identify specific teaching strategies to improve learning. Although assessment by students had no significant impact on predominant teaching approaches of a group of faculty as measured by the Approaches to Teaching Inventory (ATI-R), trends indicated progression toward more student centered teaching approaches by individual instructors.

Overall, students expressed Reflection Cards improved teaching practices, with at least 70% of students in 71% of classes in this study indicating a positive change. Forty-three percent of instructors stated they modified teaching practices midterm after considering assessment by students. Changes in instruction included improved communication regarding intentions of assignments, reduced content to improve comprehension of critical material, decreased lecture, increased group work, and improved classroom management.

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CHAPTER I

INTRODUCTION

Dr. Abby spent Sunday afternoon preparing for Monday's lecture on the anatomy of the kidney. She had been teaching Anatomy and Physiology for 12 years, and knew this was a difficult topic for students to understand. As she sipped her tea, she reflected her Anatomy and Physiology course was difficult in general, and was pleased she had so much expertise in the subject she could pass on to students, who would apply their knowledge to real-life situations later. She smiled as she continued to update materials she would use tomorrow.

Monday morning, Dr. Abby was in her classroom early. She started the computer and projected her newly revised power point slides onto the screen. Dr. Abby briefly reflected on how lucky she was to have had such good role models for teaching; many of her own professors were very organized lecturers. As she looked over her lecture notes, students filtered into the classroom, chatting about weekend events. These community college students were mostly "mature" students, with families and jobs, so discussions centered on those topics.

When the clock struck 9:00, she began her lecture. As she spoke, she imagined herself as her own favorite professor had been: authoritative, knowledgeable, and anxious to fill the minds of her students with important facts about the human body. The colorful power point slides Dr. Abby prepared flashed in front of the students,

while they dutifully took notes. Dr. Abby enthusiastically delivered her carefully planned lecture, pointing out relevant parts of each slide. At the end of the hour-long lecture, Dr. Abby stacked her notes, organizing them in a neat pile, while reminding her students to prepare for the exam they would be taking later that week. She shut down the computer, picked up her notes and tea mug, and headed to her office to prepare the exam.

Dr. Abby stopped by her mailbox on her way. As she sorted through the mail, she noted a colorful newsletter. It was about assessing student learning—again! Dr. Abby frowned, tired of the relentless assessment campaign launched by administration. She understood the accreditation visit was scheduled for next spring, and the new standards required documentation of students learning. That seemed ridiculous to Dr. Abby. Of course her students are learning! She is known to be an excellent lecturer. If they were not learning, they were not working hard enough, which was not her problem. She wondered when this newest assault on teachers would disappear, as so many other teaching fads had. This particular assault seemed to be lasting longer than others, she noted, as she folded the newsletter in half.

As she walked back to her office, she passed a colleague's classroom. Inside, she saw students sitting in groups of four, talking to each other and gesturing around paperwork on the tables. She paused by the open door. Mr. King smiled at Dr. Abby as he wandered among the groups, observing what each was doing. He stopped near one group and listened to their discussion for several minutes, smiling as he observed. A group of students in the corner raised their hands, and Mr. King walked to their

table. Dr. Abby watched as he answered their questions with more questions. Two of the students got up and went to a nearby computer. Shortly, they returned to the table and explained what they found.

Dr. Abby continued on toward her office, wondering how Mr. King could expect students to learn without lecturing. She briefly wondered what those students thought about Mr. King's teaching style. She remembered reading in an assessment newsletter that "active learning," is important for community college students. Dr. Abby could not imagine wasting time with student activities in her Anatomy and Physiology course; there was just too much information to allow that to happen. "How could students know what they needed to learn and how to do it?" she wondered. She unlocked her office door, put the assessment newsletter in her recycle box, and sat at her desk, beginning work on Thursday's exam.

Background

Postsecondary faculty like Dr. Abby, whether they realize it or not, face certain change in their classrooms as expectations for improved student achievement and increased accountability for learning become more explicit. Contemporary learning theorists recommend new pedagogical strategies to improve student learning for more diverse student populations (Knowles, 1970; Mezirow, 1996; Piaget, 1974). Accreditors and the public demand evidence of student learning during their years in college, and confirmation of what they can do when they graduate (American Council of Trustees and Alumni, 2007). These are not easy transformations for most faculty in higher education. Although they are highly trained professionals, postsecondary

faculty training is specific to discipline, not pedagogical strategies or assessment of student learning (Ottewill & MacFarlane, 2004; Sperling, 2003; Stiggins, 2002; Vermunt &Vermetten, 2004; Wimshurst, Wortley, Bates & Allard, 2006; Young & Irving, 2005).

Like Dr. Abby, instructors in higher education are frequently similar or identical to instructors of 20 years ago. Most faculty rely predominantly on their experiences as students to develop their own pedagogical styles (Yorke, 2003). More common, authoritative faculty deliver large amounts of content to passive students, who later memorize details for an exam (Hansen & Stephens, 2000).

Assessment strategies used by faculty are also rooted in past experience rather than specific training (Hubball & Burt, 2006; Popham, 2006; Sperling, 2003; Stiggins, 2002; Young & Irving, 2005). What most faculty and administrators in higher education know about measuring student learning "harks back to those days when as students themselves, they were on the receiving end of classroom and standardized tests" (Popham, 2006, p. 84). Traditional assessment strategies most often provide quantitative measures of the "amount of teaching which has been absorbed" at the end of a unit or course (Boud, 1995). Assessment of student learning, such as a grade on an exam, is "summative" and provides evidence of the "status of learning" (Stiggins, 2002, p. 761). Although summative assessment of student learning is important in the process of education, researchers contend it is less likely to lead to improved student learning than formative assessment, or assessment for learning, in which the

assessment "evidence is actually used to adapt the teaching to meet student needs" (Black & Wiliam, 1998, p. 140).

Accrediting agencies require higher education evaluations document evidence of student achievement, as traditional assessment strategies provide, but also mandate assessment activities "lead to the improvement of teaching and learning" (Northwest Commission on Colleges and Universities [NWCCU], 1988). The NWCCU's criteria for assessment of student learning and teaching are described below:

> 2.B.1 The institution's processes for assessing its educational programs are clearly defined, encompass all of its offerings, are conducted on a regular basis, and are integrated into the overall planning and evaluation plan. These processes are consistent with the institution's assessment plan as required by Policy 2.2 Educational Assessment. While key constituents are involved in the process, the faculty have a central role in planning and evaluating the educational programs.
>
> 2.B.2 The institution identifies and publishes the expected learning outcomes for each of its degree and certificate programs. Through regular and systematic assessment, it demonstrates that students who complete their programs, no matter where or how they are offered, have achieved these outcomes.
>
> 2.B.3 The institution provides evidence that its assessment activities lead to the improvement of teaching and learning.

Failure to meet established criteria, although voluntary, may limit an institution's ability to receive federal funds for teaching, research and student financial aid. It is believed evidence from this high stakes assessment of student learning provides quality assurance for stakeholders, and will lead to improved teaching and learning, the ultimate goal of assessment (Aloi, Gardner, & Lusher, 2003; Palomba & Banta, 1999).

Statement of the Problem

Providing evidence of student learning, as well as documented improvement in teaching and learning, are accreditation mandates. Although frequently used to document learning, traditional summative assessment strategies are not generally used to improve teaching and learning. A form of assessment that can be used to improve teaching and learning, student evaluations of faculty are most often completed at the end of a semester, when suggested modifications in teaching practices have no impact on learning for current students. More emphasis needs to be placed on formative assessment for improved teaching and learning. "If we are to balance the two, we must make a much stronger investment in assessment for learning" (Stiggins, 2002, p. 761). Although highly motivated to help students learn, postsecondary faculty have little training to augment their current pedagogical or assessment strategies to improve teaching and learning. Mandated improvement of teaching and learning is difficult without guidance.

Prior to the 1980s, the quality of teaching and academic achievement in higher education was rarely questioned. Almost everyone, including faculty and accreditors, "shared a rather complacent approach to academic quality, assuming as long as the proper resources were in place and the people using them were faithful stewards, good learning (or at least acceptable learning) would follow" (Wergin, 2005, p. 30). But several national reports in the 1980s, including "A Nation at Risk: The Imperative for Educational Reform" (National Commission on Excellence in Education, 1983), "Transforming the State Role in Improving Undergraduate Education: Time for a

Different View" (Boyer et al., 1986), and "Time for Results" (National Governors' Association, 1986) documented a lack of confidence in the quality of higher education. Collectively, these reported concerns about academic achievement resulted in a call for accountability for student learning across the country.

At the same time, education researchers postulated new learning theories, inviting education reform. Behaviorism (Skinner, 1953), the prevailing learning theory when many current faculty were students, gave way to a new learning model—constructivism (Piaget, 1974; Vygotsky, 1934/1962).

Traditionally, higher education institutions have operated within a "teaching paradigm," consistent with the behaviorist learning theory, in which a teacher's primary task is to deliver instruction and transfer knowledge from instructor to student (Marrone & Tarr, 2005). Faculty are primarily lecturers, and work independently of students. In this paradigm, faculty goals tend to be focused on what they will teach, rather than what students will learn (Angelo, 1999). The responsibility for producing learning is primarily the teacher's. In the teaching paradigm, it may even be assumed that learners are incapable of knowing what to learn. In fact, the teacher-learner relationship, known as "pedagogy," translates literally to "leading of children," implying substantial dependence for learning on the teacher (Hase & Kenyon, 2000; Knowles, 1970).

Considering new constructivist theories about improving learning, professors Barr and Tagg (1995) proposed a shift in higher education philosophy from the traditional "teaching centered" paradigm in which teachers are knowledgeable

authorities (as Dr. Abby saw herself) filling "empty vessel" students, to a "learning centered" paradigm in which students are an integral part of the learning process. Of particular interest to postsecondary educators, Knowles (1970) and Mezirow (1996) studied adult learning behaviors. Consistent with the constructivist theory, adult learners benefit from being responsible for their own learning, and are less likely to learn in an environment in which they are passive recipients of knowledge. "The learning paradigm ends the lecture's privileged position, honoring in its place whatever approaches serve best to prompt learning of particular knowledge by particular students" (Barr & Tagg, 1995, p. 12).

The goal of the learning paradigm is to facilitate student discovery and produce learning. Faculty are primarily designers of learning methods and learning environments, emphasizing improvement in the quality of teaching, to achieve success for a diverse population of students (Kelly, 2003). Schools are transformed from "teaching factories" to "learning communities" in which students and faculty work collaboratively toward shared learning goals (Angelo, 1999).

To improve the quality of teaching and learning, assessment is critical. "Assessment is an ongoing process aimed at understanding and improving student learning" (Angelo, 1995, p. 7). Formative assessment, directed at improving learning through feedback, helps students, but also helps the teacher to reflect on the adequacy of the learning opportunities being provided (Black & Wiliam, 1998; Guskey, 2003; Harlen, 2005; Stiggins, 2002; Yorke, 2003). Used effectively, assessment is not just summarizing learning, but helping learning (Harlen, 2005). Modifications in the

learning environment should be made if assessments show learning is not taking place at the level expected (Shupe, 2007).

The purpose of this research was to examine how an easily implemented formative assessment strategy regarding student learning needs influenced faculty conceptions of and approaches to teaching, and stimulated transition from primarily teaching centered approaches toward more learner centered intentions and strategies.

The Research Questions

1. What are the predominant teaching approaches currently used by a selected group of faculty?
2. How does formative assessment by students impact predominant teaching approaches used by a selected group of faculty?
3. What is the impact of formative assessment by students ("Reflection Cards") on individual teaching approaches?
    a. How does student assessment of the learning environment affect teaching strategies?
    b. How do student perceptions of the learning environment affect instructor intentions?
    c. How do students' observations of teaching strategies align with instructor intentions?
    d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of the impact of formative assessment?

Significance of this Study

These research questions investigated practical assessment strategies for improved teaching. Recent national reports called for more accountability for academic achievement in higher education. Simultaneously, education researchers proposed new learning theories to improve teaching and learning. Unfortunately, pedagogical and assessment strategies used by faculty are based primarily on their experiences as students, rather than specific knowledge of how students learn (Sperling, 2003; Young & Irving, 2005). Instructor beliefs about teaching and learning are crucial determinants of classroom practices. Using formative assessment to identify pedagogical and assessment strategies students considered beneficial to their learning informed faculty of how students perceived their teaching and learning. Faculty reflection of student assessment impacted pedagogical and assessment strategies and lead to improved academic achievement for more diverse student populations.

CHAPTER II

REVIEW OF THE LITERATURE

Dr. Abby, like all teachers, wants her students to learn. She works hard to prepare thoughtful, organized lectures to transfer extensive and important knowledge to eager students. She reflects for a moment on Mr. King's classroom, where the students are clearly engaged in their learning. She is not certain about Mr. King's pedagogical strategies, or how well his students learn. But as she considers how well most of her students did on exams, she thinks of James, a student who sits quietly in the back of her classroom. He comes to class every day, but he cannot seem to pass her exams. In fact, this is the second time she has had him as a student in this course. "Why is James failing my class?" she wonders aloud.

Students like James should benefit from a change in learning opportunities in college. Accountability and accreditation standards for higher education in the United States have recently undergone a dramatic metamorphosis, with a new emphasis on student learning. "Students and their learning should become the focus of everything that we do" (Cross, 2005, p. 2).

For most of the past century, educational quality was primarily measured by the availability of resources, graduation rates and faculty credentials (Haworth & Conrad, 1996; Wergin, 2005). Knowledge or skills students acquired while at the institution were not scrutinized. Traditionally in higher education, "a degree is

awarded when a student has received a specified amount of instruction," not when they have learned what was expected (Barr & Tagg, 1995, p. 19). Barr and Tagg analogized using inputs to measure educational quality as similar to filling hospital beds being the purpose of medical care. New standards address the question "what are students learning?" and emphasize improvement in learning outcomes for more students with a wider range of starting points and preparation (Buckridge & Guest, 2007; Hansen & Stephens, 2000).

Educational Reform

Assessing and improving learning emerged as a concern when recent national reports indicated a need for an educational overhaul, ensuring high quality education for all students—"old and young alike, affluent and poor, majority and minority" (National Commission on Excellence in Education, 1983, p. 1). Dr. Abby's profound question "Why is James failing?" echoed concerns articulated in several national reports, including the influential report by the National Commission on Excellence in Education entitled "A Nation at Risk" (National Commission on Excellence in Education, 1983). This report examined "the widespread public perception that something is seriously remiss in our educational system" (p. 1). Educational reform, focused on improved learning, is necessary to maintain America's competitive edge in world markets since "learning is the indispensable investment required for success in the 'information age' we are entering" (p. 2). Traditional educational theories and practices do not ensure acquisition of the highly dynamic knowledge and skills required by a diverse student population in higher education. Advancement in the

Information Age necessitates improved learning opportunities for a greater number of students in postsecondary institutions (Buckridge & Guest, 2007; Hansen & Stephens, 2000; Johnson, 2006).

A Historical View of Education

Traditional American teaching and learning practices originated in the late 19th and early 20th centuries as the country progressed from an agricultural to an industrial society (Tyack & Hansot, 1982). Corporate needs informed the educational system, which "was phenomenally successful throughout much of the twentieth century, as America transitioned from 97% employment in agriculture in 1900 to 3% in 2000" (Johnson, 2006, p. 99). During the Industrial Revolution, compliance in the workplace was highly valued (Johnson, 2006).

Learning theories emphasizing compliance developed concurrently with the Industrial Revolution. In the early to middle twentieth century, Skinner (1953), a psychologist, and other theorists promoted behaviorism, proposing that learning—manifested by behavior change—resulted from appropriate use of rewards or consequences. Behaviorism encouraged compliance in education, analogous to compliance in the workplace. The teacher, much like the supervisor at work, directed activities and provided rewards or consequences for students. Teachers were seen as authorities, transmitting known facts to passive students; students had little or no influence on teacher actions.

The behaviorist "teacher-centered approach places control for learning in the hands of the teacher" (Brown, 2003, p. 50) while students are expected primarily to

comply with instructions and absorb information. Behaviorists theorize "knowledge exists independently of the knower" (Biggs, 1996, p. 347), and learning is coming to understand existing facts. "Ultimately, there are answers to every question, and scholarship consists of knowing the answer or knowing how to find out" (Cross, 2005, p. 5). Supporters of the behaviorist theory, or those with a teacher-focused approach to teaching, center their attention primarily only on what they do (their forward planning, good management skills, use of an armory of teaching competencies, ability to use information and communication technology). Their intentions are to transmit information related to the curriculum and assume this will be sufficient for student learning. They explain differences in outcomes of learning as being due to differing student abilities or variations in teacher competence in organizing and presenting subject matter (Ramsden, Prosser, Trigwell, & Martin, 2007, p. 141).

The behaviorist theory influenced teaching and learning over the past century. Recent research indicates this teacher centered approach is still the dominant theory in use in higher education (Conti, 2004). Although "the fairly passive lecture-discussion format where faculty talk and most students listen, is contrary to almost every principle of an optimal student learning setting" (Guskin, 1997, p. 6), lecture still predominates instructional strategies in higher education (Brown, 2003; Buckridge & Guest, 2007; Hansen & Stephens, 2000). A recent survey found 50.5% of faculty primarily use lecture, while 15.4% mostly use applied activities, and only 6.1% use group work as their main teaching strategy (Goubeaud & Wenfan, 2004). Other studies demonstrated teacher preference for behaviorist teaching styles. Spoon and

Schell (1998) surveyed 12 adult basic education instructors and found a "moderate preference" for a teacher centered approach by both teachers and learners. Barrett, Bower, and Donovan (2007) surveyed 292 community college instructors teaching online courses. The data demonstrated a strong preference for a "teacher centered approach" for online instructors. Kraska and Harris (2007) found a "strong preference" for a teaching centered approach among 65 instructors enrolled in the Reserve Officer Training Corps instructor course at Maxwell Air Force base.

Criticisms of Behaviorism

Behaviorism has been criticized as being an overly reductionist "information processing" surface approach to learning that fails to consider characteristics of the learner or the social environment influencing learning (Askham, 2008; Liu & Matthews, 2005). The "minimalist pedagogy" of behavioristic practices perpetuates existing dominant social structures, has a "negative or obstructive impact" on adult learning, and leaves "no room for discovery, autonomy or connection" (Askham, 2008, p. 89). Successful learners in the Information Age are not simply receptors of knowledge, but are self-directed, proactive, entrepreneurial, and problem-solving (Johnson, 2006). Current cultural and political trends favor empowerment of students in a more democratic classroom, not directed compliance (Hansen & Stephens, 2000). A mismatch between educational practices and corporate and societal needs led to revised teaching prescriptions. Constructivism is the preferred approach to teaching in the Information Age.

Contemporary learning theorists, in contrast with behaviorists and positivists, suggest knowledge is variable, constructed "within the cognitive structure of every individual…while being dependent on experiences in the learning environment and on social interactions" (Bostock, 1998, p. 225). Constructivists posit all knowledge is temporary, based on interpretations of information rather than existing facts (Proulx, 2006). Indeed, in constructivism, "facts are facts because there is widespread agreement, not because there is some ultimate truth to the fact" (Savery & Duffy, 2001). Constructivists advocate development of students' individual "internal conceptual frameworks" (Andrew, 2007, p. 160) in an educational environment providing personal control, authentic learning situations and social interaction (Bostock, 1998).

> Teachers using this approach assume that students build their own knowledge; the lecturer's task is to challenge students' existing ideas through questions, problems, discussion and presentation. This approach embraces a mastery of teaching techniques, including those associated with presentation and transmission, but goes beyond technique. Teachers adopting this approach explain the differences in students' outcomes of learning through relations between students and context (including the role of the teacher) rather than the differences being due, in the main, to the actions of the teacher. (Ramsden et al., 2007, p. 141)

Learner Centered Environment—Research and Theory

In 1990, The American Psychological Association (APA) integrated contemporary constructivist theories of education with psychological research and theories to produce 12 fundamental principles providing a framework for education reform. The APA established a research-validated definition for "learner centered," a constructivist term describing a dual focus on individual learners--their experiences,

interests and capabilities—and on the best available knowledge about learning (McCombs, 2001). In 1997, the 12 principles were revised into 14 Learner Centered Psychological Principles, listed and described in Table 1. The principles are separated into four domains affecting learning: Cognitive and Metacognitive Factors, Motivational and Affective Factors, Developmental and Social Factors, and Individual Differences Factors (McCombs, 2001, p. 187).

Table 1

The Learner Centered Psychological Principles

Cognitive and Metacognitive Factors	
Principle 1: Nature of the learning process	The learning of complex subject matter is most effective when it is an intentional process of constructing meaning from information and experience.
Principle 2: Goals of the learning process	The successful learner, over time and with support and instructional guidance, can create meaningful, coherent representations of knowledge.
Principle 3: Construction of knowledge	The successful learner can link new information with existing knowledge in meaningful ways.
Principle 4: Strategic thinking	The successful learner can create and use a repertoire of thinking and reasoning strategies to achieve complex learning goals.
Principle 5: Thinking about thinking	Higher order strategies for selecting and monitoring mental operations facilitate creative and critical thinking.
Principle 6: Context of learning	Learning is influenced by environmental factors, including culture, technology, and instructional practices.
Motivational and Affective Factors	
Principle 7: Motivational and emotional influences on learning	What and how much is learned is influenced by the learner's motivation. Motivation to learn, in turn, is influenced by the individual's emotional states, beliefs, interests and goals, and habits of thinking.

Table 1 continued

Principle 8: Intrinsic motivation to learn	The learner's creativity, higher-order thinking, and natural curiosity all contribute to motivation to learn. Intrinsic motivation is stimulated by tasks of optimal novelty and difficulty, relevant to personal interests, and providing for personal choice and control.
Principle 9: Effects of motivation on effort	Acquisition of complex knowledge and skills requires extended learner effort and guided practice. Without learners' motivation to learn the willingness to exert this effort is unlikely without coercion.
Developmental and Social Factors	
Principle 10: Developmental influence on learning	As individuals develop, they encounter different opportunities and experience different constraints for learning. Learning is most effective when differential development within and across physical, intellectual, emotional, and social domains is taking into account.
Principle 11: Social influences on learning	Learning is influenced by social interactions, interpersonal relations, and communication with others.
Individual Differences Factors	
Principle 12: Individual differences in learning	Learners' different strategies, approaches, and capabilities for learning are a function of prior experience and heredity.
Principle 13: Learning and diversity	Learning is most effective when differences in learners' linguistic, cultural, and social backgrounds are taken into account.
Principle 14: Standards and assessment	Setting appropriately high and challenging standards and assessing the learner and learning progress—including diagnostic, process, and outcome assessment—are integral parts of the learning process.

Theory to Practice

Another frequently cited list of seven principles of learning providing a similar, but modified framework for educational reform was established by Chickering and Gamson in 1987. Consistent with the 14 APA Learner Psychological Practices, Chickering and Gamson's principles are based on current research of student learning and development, and encourage diverse approaches to teaching.

Good practice in undergraduate education:

1. Encourages contacts between students and faculty.
2. Develops reciprocity and cooperation among students.
3. Uses active learning techniques.
4. Gives prompt feedback.
5. Emphasizes time on task.
6. Communicates high expectations.
7. Respects diverse talents and ways of learning. (Chickering & Gamson, 1987, p. 2)

A third set of Principles of Learning, developed by Ewell (1997), based on current brain research about the learning process, promotes reform of established teaching and learning theories and strategies. Each of these principles plays a role in developing competent, independently thinking students who are empowered to gather and construct knowledge for themselves.

1. The learner is not a "receptacle" of knowledge but rather creates his or her learning actively and uniquely.
2. Learning is about "meaning making" for an individual learner by establishing and reworking patterns, relationships, and connections.
3. Every student can learn—and does learn—all the time—with us or despite us.
4. Direct individual experiences decisively shape individual understandings.
5. Learning occurs when the learner is "ready" to learn.
6. Learning occurs best in the context of a compelling "presenting problem."

7. The results of learning atrophy if they are not exercised, while frequent feedback multiplies the already-strong learning effects of practice.

8. Learning occurs best in a cultural and interpersonal context that supplies a great deal of enjoyable interaction and considerable levels of individual personal support. (Ewell, 1997, ¶22)

All three sets of learning principles promote values currently desired in the rapidly changing Information Age. Improving student learning is dependent on applying these principles, rather than maintaining traditional teaching beliefs and practices.

Constructivist Practice

Although constructivism is a learning theory, not a teaching prescription, what is learned cannot be separated from how it is learned (Biggs, 1996; Buckridge & Guest, 2007; Proulx, 2006; Savery & Duffy, 2001). A bridge between theoretical principles of constructivism and the practice of teaching is critical. Constructivists, while disagreeing on some theoretical points, agree "that the learner is active, that knowledge cannot be handed down, and that a learner's pre-existing understandings and purposes are relevant to what that learner constructs" (Mackenzie, 2008, p. 75). Recent research and new learning theories led to recommendations for teachers "to spend less time lecturing, drilling students on basic facts, and rote learning," (Andrew, 2007, p. 157).

Faculty Orientation

Transition from behaviorist-dominated instruction toward constructivist practices is difficult. Because of their experiences as students, beliefs and practices of

most current higher education faculty are rooted in behaviorist theory (Conti, 2004; Sperling, 2003). Moving away from behaviorism involves challenging well-established beliefs about student learning. Emphasizing learning rather than teaching challenges basic assumptions about the roles of teachers and learners (Hansen & Stephens, 2000). Most faculty in higher education in the United States are not specifically trained in approaches to learning, pedagogy or assessment strategies (Ottewill & MacFarlane, 2004; Sperling, 2003; Stiggins, 2002; Vermunt & Vermetten, 2004; Wimshurst et al., 2006; Young & Irving, 2005). Using only past experience as a guide, they are "accustomed to coming at teaching through a 'learning portal'" (Sperling, 2003, p. 596). College and university faculty have expertise in discipline specific knowledge, rather than learning theory (Yorke, 2003).

Optimally, improvement of student learning includes an understanding of approaches to learning, pedagogic strategies and assessment strategies. Developing the most responsive and integrated curricula and maximizing student learning experiences is dependent on being able to assess the effectiveness of specific practices. There is a growing recognition of the need for university and college teachers to understand learning theory, leading to improved academic achievement. New faculty in some parts of the world, including Canada and British Columbia, are now required to complete a certificate in higher education focused on "research based curricula and pedagogical practices in higher education" to improve their instructional effectiveness (Hubball & Burt, 2006, p. 327). In the United States, The American Association of Higher Education's Carnegie Teaching Academy program provides "a new lens

through which to consider effective teaching…through the creation of a dynamic link between teaching and learning research and classroom teaching" (Sperling, 2003, p. 593). Although critical to improved student learning, mandating participation in such programs are unlikely, with limited time and funding opportunities. Understanding how students learn, and adapting pedagogical strategies to improve learning, must be obtained in a more efficient, cost effective manner.

While faculty limitations on improving student learning are problematic, student expectations impede improved learning environments as well. Considering most instructors still transmit information to passive students, faculty and students consider this behavioristic practice the norm. Instructors who require students to be actively involved in the learning process and take responsibility for their own learning are labeled "unfair" and "difficult." Passive note-taking and silent absorption of information are considered "the appropriate way to learn" by many college students (Hansen & Stephens, 2000, p. 42).

Importantly, research indicates a difference in students' approaches to studying, depending on the style of teaching they are exposed to. In a study by Trigwell, Prosser, Ramsden, and Martin (1998) of 55 first year courses involving 408 teachers and 8,829 students, it was found that students adopted a more "surface" approach to study with the teacher centered approach to teaching. It was also found that a "deep" approach to study was associated with learner centered approach to teaching. "Students' conceptions of learning are found to relate to the approaches they

adopt and to their subsequent outcomes of learning" (Trigwell & Prosser, 2004, p. 410).

Instruction to Learning

High quality student achievement is at the heart of what all faculty hope to accomplish. An innovative proposal to improve student achievement compares traditional teaching practices to constructivist practices, establishing a framework from which faculty could make a paradigm shift. In 1995, Dr. Robert Barr, a Research Director, and Mr. John Tagg, an Associate Professor of English, addressed the shift from behaviorism to constructivism in an article recommending a cultural change, from an "instruction paradigm" to a "learning paradigm." Table 2 contrasts key elements of the instructional paradigm to those in the learning paradigm, and provides a snapshot of an essential cultural change in higher education.

Table 2

Comparing Educational Paradigms

The Instructional Paradigm	The Learning Paradigm
Mission and Purpose	
• Provide/deliver instruction • Transfer knowledge from faculty to students • Offer courses and programs • Improve the quality of instruction • Achieve access for diverse students	• Produce learning • Elicit student discovery of knowledge • Create powerful learning environments • Improve the quality of learning • Achieve success for diverse students
Criteria for Success	
• Inputs, resources • Quality of entering students • Curriculum development, expansion • Quantity and quality of resources • Enrollment, revenue growth • Quality of faculty, instruction	• Learning and student success outcomes • Quality of exiting students • Learning technologies development, expansion • Quantity and quality of outcomes • Aggregate learning growth, efficiency • Quality of students, learning

Table 2 continued

Teaching/Learning Structures	
• Atomistic; parts prior to whole • Time held constant, learning varies • 50 minute lecture, 3 unit course • classes start/end at same time • one teacher, one classroom • Independent disciplines, departments • Covering material • End-of-course assessment • Grading within classes by instructors • Private assessment • Degree equals accumulated credit hours	• Holistic; whole prior to parts • Learning held constant; time varies • Learning environments • Environment ready when student is • Whatever learning experience works • Cross discipline/department collaboration • Specified learning results • Pre/during/post assessments • External evaluations of learning • Public assessment • Degree equals demonstrated knowledge and skills
Learning Theory	
• Knowledge exists "out there" • Knowledge comes in "chunks" and "bits" delivered • Learning is cumulative and linear • Fits the storehouse of knowledge metaphor • Learning is teacher centered and controlled • "Live" teacher, "live" students required • The classroom and learning are competitive and individualistic • Talent and ability are rare	• Knowledge exists in each person's mind and is shaped by individual experiences • Knowledge is constructed, created, and "gotten" by instructors • Learning is nesting and interacting of frameworks • Fits learning how to ride a bicycle metaphor • Learning is student centered and controlled • "Active" learner required, but not "live" teacher • Learning environments and learning are cooperative, collaborative and supportive • Talent and ability are abundant
Nature of Roles	
• Faculty are primarily lecturers • Faculty and students act independently • Teachers classify and sort students • Staff serve/support faculty and the process of instruction • Any expert can teach	• Faculty are primarily designers of learning methods and environments • Faculty and students work in teams with each other and other staff • Teachers develop every student's talents & abilities • All staff are educators who produce student learning and success • Empowering learning is challenging and complex

Source: Kelly (2003, p. 3)

The learner centered approach addresses needed societal changes in "work, knowledge and citizenship while serving a greater number of students with diverse backgrounds and educational objectives" (Schuyler, 1998, p. 2). Rather than expecting students to conform to rigid, traditional learning environments, individual learning

styles are acknowledged and accommodated. Learning and motivation are improved for a greater number of students "by meeting students' needs for belonging, control and competence" (McCombs, 2001, p. 192). With more comprehensive approaches to teaching, learning, and assessment, more diverse students will realize academic success. Educator Paulo Freire (1970), in *Pedagogy of the Oppressed*, rejected the behaviorist view of students as empty vessels, to be filled with knowledge by teachers. He advocated a mutual educational system, where dialogue between teachers and students leads to improved achievement (Guerrero, 2007). Barr and Tagg's (1995) learner centered approach parallels much of Freire's critical pedagogy, suggesting students are responsible for their own learning, empowering them to approach learning in the most beneficial way. Freire encouraged students to "act as agents of their own education" while Barr and Tagg's framework "provides a complementary approach to creating a learning environment that posits the same idea, student as agent" (Guerrero, 2007, p. 103). Contemporary societal needs and corporate needs are addressed in the framework proposed by Barr and Tagg; diverse student populations become self-directed, problem-solving, empowered learners.

Student Evaluation Influence on Teaching

Student input about learning experiences is fundamental to the learning paradigm. According to Barr and Tagg's framework, the "learner centered view begins by examining how the inner workings of a particular program enhance or diminish student learning experiences and outcomes" (Haworth & Conrad, 1996, p. 50). Student input about their learning is readily available. "Every student who writes a paper, takes

a test, asks a question, participates in a student activity as a leader or follower, or who comes to our office hours for conversation or help, has a lesson to teach us about how students learn" (Cross, 2005, p. 11).

Data about student learning may be gathered casually, including observations of student responses to lessons, class discussions, and personal conversations. Assessments of student learning are common among learner centered faculty. While formative assessment of student learning is common, formative evaluation of how the learning environment impacts learning is less common. Formative assessment of student experiences allows instructors to know how well a course is meeting its objectives on an ongoing basis, and gives students a chance to influence their own learning while the course is in session (Costello, Weldon, & Brunner, 2002; Penny & Coe, 2004). Course adjustments made midterm, based on student input, "may provide students with a greater sense of control or being taken seriously in the class" (Costello et al., 2002, p. 24). Student evaluations "are more useful, accurate and valid than other measures of teaching performance and have the added benefit of being a direct measure of consumer satisfaction" (Ballantyne, Borthwick, & Packer, 2000, p. 222).

A meta-analysis of midterm student evaluations of teaching and learning showed a positive effect on teaching effectiveness (Cohen, 1980). Findings from 22 comparisons of the effectiveness of student-rating evaluations were analyzed. "On the average, feedback had a modest but significant effect on improving instruction. Instructors receiving midsemester feedback average .16 of a rating point higher on end-of-semester overall ratings than did instructors receiving no midsemester

feedback. This corresponds to a gain of over one-third of a standard-deviation unit, or a percentile gain of 15 points" (Cohen, 1980, p. 321). The positive effect is even larger when the student evaluations are augmented by individual consultation with education experts, who provide pedagogical and assessment strategy suggestions, related to student comments (Ahmadi & Cotton, 1998; Cohen, 1980).

Although highly effective, individual consultation is expensive and time consuming, and may not be practical, or even desired, in all higher education settings. More often, professional development workshops, seminars, self-help materials and student focus groups are used to educate faculty about student learning, even though these have not shown levels of improvement of teaching comparable to individual consultation (Penny & Coe, 2004). These opportunities are not specific to current student perceptions of the learning environment, so have less impact on how faculty perceive their own practices. A comparison of student and instructor perceptions is valuable. "Enormous benefits" may be derived by instructors completing the same rating instrument their students complete by encouraging reflection of strengths, weaknesses and overall teaching effectiveness (Penny & Coe, 2004). Such reflection "has the potential to lead to meaningful change and long term improvement" (Penny & Coe, 2004, p. 246).

Student Evaluations: Valuable?

Although student evaluations of teaching and learning are critical for improving learning, most often students evaluate teaching at the end of the term. Traditional summative evaluations completed at the end of the course cannot improve

the learning environment for those students completing the evaluation, and are usually not used for informing instruction (Costello et al., 2002; Harlen, 2005; Shepard, 2000; Stiggins, 2002).

Some argue student input is useless for other reasons. Kember, Leung, and Kwan (2002) found no evidence their student feedback questionnaire resulted in improved teaching. Only four out of 25 departments using student feedback questionnaires had significant changes to any of the six dimensions rated, and three of these significant changes were negative changes. Other researchers question the validity of student perceptions of teaching (Apodaca & Grad, 2005; Sproule, 2002) or the reliability of instruments used to evaluate teaching (Spooren, Mortelmans, & Denekens, 2007). Use of student evaluations for teaching is common, despite controversies surrounding their use. Approximately 86% of 600 liberal arts colleges surveyed in the 1990s consistently used student evaluations of teaching (Ahmadi & Cotton, 1998).

One of the problems with improving teaching effectiveness with student evaluations is the lack of a well-established definition of "quality teaching" which makes measuring and drawing conclusions about teaching and learning difficult (Ahmadi & Cotton, 1998). Further, the design of evaluation instruments in higher education should consider the specific conceptual framework most effective for adult learning—learning centered. The typical teacher evaluation instruments are teacher centered, assessing transmissive models of instruction, rendering evaluations less instructive for improving student learning (Apodaca & Grad, 2005, p. 726)

Despite these criticisms, educational, social and psychological research indicates student learning improves with formative assessment (Black & Wiliam, 1998; Guskey, 2003; Stiggins, 2002; Vermunt & Vermetten, 2004). Researchers argue using effective assessment tools, at appropriate times has an impact on teaching and learning. Data from both assessment of learning and assessment for learning improves student learning, but more emphasis needs to be placed on formative assessment, for changes that are in time for current students.

Learning Centered Classroom Assessment Techniques

Most educators and researchers generally agree on a few basic principles of good practice for teaching and learning: active learning, frequent feedback on performance, and frequent student-faculty contact (Chickering & Gamson, 1987). Classroom assessment techniques, by design and measured results, promote these principles. Classroom assessment techniques or "CATs" (Angelo & Cross, 1993) are used to improve learning by encouraging student participation and creating a feedback loop between faculty and students. They are formative assessment strategies, applied during the term in which students will benefit from modifications in the learning environment. CATs primarily help instructors gain feedback on how well students have learned, but may also improve student motivation, foster students' critical thinking skills, and empower students by giving them a voice in their own learning (Goldstein, 2007). A number of studies in various disciplines have shown CATs "lowered classroom barriers between teachers and students, raised students' levels of trust, increased students' cooperation and collaboration, and communicated to students

that instructors care about their opinions and ideas" (Goldstein, 2007, p. 78). In one study regarding the use of CATs across three disciplines (Eisenbach, Golich, & Curry, 1998), students were encouraged to provide instructors with specific comments about their learning. One CAT used in this study was a "Pre/Post Self-Confidence Survey" in which instructors chose 10 terms or ideas they would be teaching about, and asked "How confident do you feel that you could explain the following concepts to your friends or your parents?" prior to and after a lesson. Student comments about the CAT included: "I liked the pre and post surveys because it gave the course structure and showed what I learned over the semester," and "I really like the pre and post test. Although the pre test was embarrassing, I was happy to fill out the post," and "This CAT makes you more aware of these terms as you come across them in your readings" (Eisenbach et al., 1998, p. 63).

Use of the "Minute Paper" in which instructors asked "What information that we have covered today could have practical application for you outside the classroom?" elicited these responses: "The minute paper allowed the class to participate in the lecture and allowed you to clarify tough questions, [and] I felt as though I learned the material, rather than simply being familiar with it," and "When you feel you have a 'dumb' question, this helps" (Eisenbach et al., 1998, p. 64).

According to Steadman (1998), instructors using CATs are motivated to modify pedagogical and assessment strategies for students who will benefit. Steadman surveyed nine community college instructors regarding their purpose for using CATs in their classrooms. The five most frequently mentioned purposes for CATs use

included: (a) To obtain feedback on the effectiveness of and student satisfaction with teaching and classroom activities, (b) To improve teaching, (c) To monitor students' learning, (d) To improve students' learning (in terms of retention of learning skills), and (e) To improve communication and collaboration with students (p. 26).

Angelo and Cross (1993) provided a comprehensive set of CATs for use in college classrooms in their book *Classroom Assessment Techniques, a Handbook for College Teachers*. With a list of assessment strategies from "One Minute Papers" to "Pre/Post Self Confidence Surveys," faculty may choose the CAT most likely to benefit their style and needs. Understanding the relationship between CATs and learning theories helps instructors choose and design the most appropriate strategies for their classroom (Steadman & Svinicki, 1998). Student input is important in cognitive learning theory, which, like constructivism, "describes learning as a building of connections between a learner's prior knowledge and experience and the new information or skill that is being learned" (Steadman & Svinicki, 1998, p. 13). Table 3 provides examples of specific CATs and their connections to cognitive theory and learning principles of constructivism.

One concern faculty voice about implementation of CATs is their impact on content coverage. Although many CATs take as little as 1 minute of class time to implement, Angelo and Cross (1993) acknowledge CATs increase preparation time by instructors, and reduce the amount of content covered primarily because "the assessments had convinced them of the need to review, revisit or re-teach important material not learned well enough" (p. 378).

Table 3

Commonly Used Classroom Assessment Techniques and Their Connection to Cognitive Theory

Classroom Assessment Technique (CAT)	Connection to Cognitive Theory
Minute Paper	Metacognition—comprehension monitoring Rehearsal of key ideas Organization of knowledge Identifying main points
Muddiest Point	Metacognition—comprehension monitoring
Categorizing Grid	Organization of knowledge Identifying critical attributes of concepts
Directed Paraphrasing	Elaboration—putting things in learners own words Meaningful connections
Diagnostic Learning Logs	Metacognition—awareness of strategies, evaluation of strategy use
Concept Maps	Organization of knowledge Identification of concepts and key ideas Elaboration—making connections
Memory Matrix	Rehearsal of key words

Source: Steadman and Svinicki (1998, p. 15)

Although Angelo and Cross (1993) have recommended students' responses to CATs be anonymous and ungraded, allowing more candid responses to the assessment, other researchers use both names and grades to improve return rates and individualize instructional responses. Goldstein (2007), in a 3-year study of the use of CATs in Statistics and Psychology, an introductory undergraduate course, used anonymous, ungraded CAT strategies for 2 years, then in a third year, required student identification, and assigned 5% of the course grade to completion of CATs. His research showed in the third year he had a significantly higher response rate and a more positive response to the question "Completing the learning assessment instruments helped me earn a better grade in the course than I would have had we not

completed them" (Goldstein, 2007, p. 80). Although it is not completely clear why students gave a more positive response, the APA learning principles suggest an emphasis on individuals is important for improved learning.

A Specific CAT: Reaction Cards

An exploratory study at a small public liberal arts university by Costello et al. (2002) examined faculty and student perceptions of formative assessment by use of "Reaction Cards" in 10 classes across seven disciplines. The purpose of the study was to examine students' perceptions of immediate, frequent, formative assessment.

Students wrote remarks about each class on index cards each day for a semester. Faculty independently decided on what to have students comment; some chose open-ended questions, some chose questions related to course content, some chose specific questions about regarding learning outcomes for the course. Instructors explained the use of the cards to their students, requesting feedback on the cards after each class session. Student surveys were anonymous; responses were collected and tallied by researchers.

Faculty read and responded to the Reaction Cards in writing each day. At mid and end of semester, students were asked for negative and positive reflections about the use of the Reaction Cards. One hundred ninety-five students completed surveys at midsemester; 184 responded at the end of the semester.

At midsemester, 131 of the student comments were positive, while only 18 were negative. Eighty-five of the positive comments reflected improved communication; 39 indicated improvement in the class. Student comments included

"Makes me feel closer to the instructor," and "Shows the instructor is open to our needs" (Costello et al., 2002, p. 27). Students also felt more personally involved in the course – "Students feel more a part of what is going on and can reflect what has gone on during the class" (p. 28). Student comments reflected evidence of change made by the instructor as a result of what was written on the cards.

Similarly, faculty responses were primarily positive at midsemester. Four of seven instructors reported improved communication, and all but one instructor cited at least one difference in their classes due to the use of the cards.

End of semester student comments were still mostly positive (166), but negative comments increased (105). Positive comments were still focused on improved communication, but the negative comments indicated filling out the cards became "burdensome and tedious" (Costello et al., 2002, p. 30). Instructor comments were generally positive at the end of the semester, but also indicated a desire to use the cards less frequently. "Overall, the results of this study show that although there were drawbacks to using the cards daily throughout the entire semester, there were some specific benefits to using the cards as a formative evaluation method" (p. 31).

Supporting assessment of learners as individuals, Cross (2005) stated improving learning involves understanding what goes on in the mind of the learner. Unfortunately "studies of individual differences have almost disappeared from the research scene" (p. 10), leading to failure to recognize and address individual differences. Obtaining individual student input about their learning is learning

centered, and may help instructors move to a more learning centered culture as they respond to student comments.

Although instructors may have knowledge about learning centered practices and their potential effects on learning, their beliefs about student learning have more impact on teaching practices than their knowledge (Kagan, 1992). Beliefs are considered the "best indicators of the decisions individuals make throughout their lives" (Pajares, 1992, p. 307) and have a more critical impact on action than knowledge (Richardson, 2003). Bandura (1997) indicates beliefs are critical predictors of use of pedagogical strategies in a classroom.

A study of four teacher educators at a state university in the Rocky Mountain region found although they believe in and use more constructivist strategies than other higher education faculty, they inconsistently applied these practices as they worked with future elementary teachers (Andrew, 2007). The study concluded although they teach constructivist theory and its benefits, many teacher educators have "lived their entire academic life—from kindergarten through college—in non-constructivist classrooms" and believe they should teach in a style consistent with their experiences as learners (Andrew, 2007, p. 157). Beliefs can be modified by experience, however.

> Beliefs are created through a process of enculturation and social construction; they can be shaped through an intense experience, or a series of events. In addition, change in teachers' beliefs may follow rather than precede teaching practices, and by helping teachers adopt new practices that are successful, the beliefs associated with these practices may also change. (Park & Ertmer, 2007, p. 258)

Teachers' beliefs can be changed "through practices that emphasize reflection on one's personal beliefs, hands-on experiences, and engagement in authentic problems …" (Park & Ertmer, 2007, p. 249). Engaging preservice teachers in a constructivist teaching practice, problem based learning, improved their ability to implement constructivist methods in a one-credit course. Use of a specific, easily used pedagogical strategy as a catalyst helped preservice teachers "recognize different perspectives" and encouraged them to "elaborate, defend or modify their current beliefs about classroom practices" (Park & Ertmer, 2007, p. 250). Research involving middle school teachers similarly showed experiences during teacher preservice education and early teaching assignments strongly impacted teachers' beliefs about teaching and learning (Fulton & Torney-Purta, 2000).

Long-Term Effects of Student Evaluations on Higher Education Culture

Barr and Tagg's (1995) conceptual framework encouraged the development of a learning centered culture for optimal student achievement. A cultural shift, from a teaching culture to a learning culture, involves changes in practices and belief systems, of both students and instructors. One long-term, evidence-based study of student evaluations demonstrated student feedback not only improves teaching and learning, but impacts higher education culture, as well.

A 5-year study by Barrie, Ginns, and Prosser (2005) posited "the experiences of students are primary in determining the quality of the outcomes of their learning" (p. 645). The study defined "quality" teaching by student perceptions of expected

approaches to learning. This definition of quality has been explored by other researchers (Struyven, Dochy, & Janssens, 2002; Vermunt & Vermetten, 2004) Students adopt either a "surface" or "deep" approach to learning, depending on prior studying experiences and perceptions of current expectations for learning. Students agreeing with statements like "The sheer volume of work to be got through in this degree means it can't all be thoroughly comprehended" or "To do well in this degree all you really need is a good memory" (Barrie et al., 2005, p. 643) adopted a surface approach to learning with little interest in integrating topics covered or understanding the topic holistically. Students adopting a deeper approach to learning agreed with statements such as "The staff makes a real effort to understand difficulties I may be having with my work [and] I have a clear idea of where I am going and what is expected of me in this degree course" (Barrie et al., 2005, p. 643). Students who adopt a deep approach to learning have better learning outcomes (Barrie et al., 2005). The premise of the 5-year study was "student evaluation of teaching would be expected to have substantial effects on the way staff approach their teaching and structure the teaching and learning context" (Barrie et al., 2005, p. 644) and ultimately improvement in learning outcomes.

Data regarding students' experiences of teaching and learning were collected annually. Although the surveys provided indirect evidence of student learning, there is a substantial body of evidence linking variables measured in these surveys to accomplishment of learning outcomes (Barrie et al., 2005). The data were used to

inform faculty wide initiatives to improve teaching and learning. The goal of the study was

> to facilitate a change in the teaching and learning culture of the university to one which was characterized by evidence based approaches to teaching and learning which are consistent with a student focused perspective. Such a change in the teaching and learning culture of the university should, in time, lead to an improvement in the quality of the student learning experience as measured by the student surveys. (Barrie et al., 2005, p. 647)

The results of the study showed an improved culture of teaching and learning, in which students adopted more "deep" learning approaches. Student assessments have a pivotal role in impacting teaching, learning and higher education culture.

After decades of traditional behavioristic practices and beliefs, moving from a teaching paradigm to a learning paradigm is a monumental change in educational culture. Although learning theories have evolved, providing a framework for improved teaching and learning, pedagogical and assessment strategies in higher education remain mostly unchanged. Accreditation policies mandate documentation of improved teaching and learning, but institutional leaders who go beyond simple accountability, and "understand the larger vision," using assessment data to "develop the institution's capability to attend to student learning," have the potential to reshape higher education culture (Shupe, 2007, p. 56). Leaders encouraging student assessment of teaching and learning, and encouraging faculty reflection of the impact of their beliefs and practices on student learning is successful in reshaping educational culture.

After nearly a decade of research on teachers' beliefs, practices and their impact on student learning and motivation, McCombs (2002) stated:

> Change in teacher beliefs and practices to those that positively influence student motivation, learning and development is facilitated by helping teachers become more aware of areas where changes are most needed—in terms of student perceptions and learning outcomes—in a respectful guided reflection process that allows teachers to take personal responsibility for identifying areas of change. (p. 185)

To impact teacher beliefs and practices positively, McCombs (2002) recommended exploration of models of teacher change that include student views and perceptions, especially while encouraging positive student-teacher relationships and learning partnerships. As a result of his research, a doctoral student studying learning centered teaching in an online environment recommended providing assistance to teachers to change beliefs and practices. "Teachers who would like to adopt useful beliefs about teaching and learning will need guidance not only in identifying current beliefs held, but also in changing those beliefs that limit their teaching effectiveness" (King, 2000, p. 59).

This research provided the "respectful guided reflection" needed to change beliefs and practices to improve teaching effectiveness and student learning. This researcher hypothesized use of Reflection Cards, completed over 3 weeks in the middle of the term would inform and influence instructor beliefs and practices, in a cost-effective, minimally invasive manner. Further, she hypothesized student assessments and instructor reflections would lead to a change in teacher beliefs and practices, from primarily teaching centered to more learning centered. Ultimately, this would generate movement toward a learning culture and, most critically, improved academic achievement for a diverse learning population.

The following questions guided this research:

1. What are the predominant teaching approaches currently used by a selected group of faculty?
2. How does formative assessment by students impact predominant teaching approaches used by a selected group of faculty?
3. What is the impact of formative assessment by students ("Reflection Cards") on individual teaching approaches?
    a. How does student assessment of the learning environment affect teaching strategies?
    b. How do student perceptions of the learning environment affect instructor intentions?
    c. How do students' observations of teaching strategies align with instructor intentions?
    d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of the impact of formative assessment?

CHAPTER III

METHODOLOGY

> Encouraging teachers to pay attention to students' ways of thinking and to facilitate students' realization that there are different ways of thinking may be the most important pedagogical implications of a phenomenographic way of learning. (Marton, 1988, p. 47)

Faculty in higher education are considered experts in their disciplines, but generally have little or no formal education about instructional practices to enhance student learning (Young & Irving, 2005). Typically, faculty approaches to teaching are rooted in their experiences as students and practices as educators (Yorke, 2003). Teaching strategies are frequently teaching centered, or behaviorist in nature, reflecting teachers' experiences as students (Sperling, 2003). The primary intention of a teaching centered strategy is to transmit information, with little consideration of prior knowledge of students. In this strategy, students are not expected to be active in the teaching or learning process; they are expected to learn by receiving transmitted information.

Contemporary learning theorists suggest learning centered environments, based on constructivist practices, are more effective for improving academic achievement of all students (Askham, 2008). In a learning centered strategy, the primary intention is to promote construction of knowledge and develop students' individual internal conceptual frameworks in an environment where students are active participants in the teaching and learning process (Trigwell & Prosser, 2004).

Understanding students' prior knowledge and how they learn is essential in a learning centered approach to teaching.

Raising faculty awareness of their teaching beliefs, intentions and strategies, as well as reflecting on students' approaches to learning may challenge and change teachers' conceptions of teaching, as well as their teaching strategies (Trigwell & Prosser, 2004). Data from survey results may improve teaching quality and enhance student learning. "An important part of what may be needed to change actual teaching and perceptions of teaching is knowledge of what the teachers themselves see as their own approaches to teaching, and how these approaches are experienced by students" (Trigwell & Prosser, 2004, p. 411). Ultimately, faculty knowledge about teaching and learning approaches may lead to more learner centered practices, and improved learning by all students. This research examined how an easily implemented student assessment strategy regarding learning needs influenced faculty conceptions of and approaches to teaching, stimulating transition from primarily teaching centered approaches toward more learner centered intentions and strategies.

The following questions guided this research:

1. What are the predominant teaching approaches currently used by a selected group of faculty?
2. How does formative assessment by students impact predominant teaching approaches used by a selected group of faculty?
3. What is the impact of formative assessment by students ("Reflection Cards") on individual teaching approaches?

a. How does student assessment of the learning environment affect teaching strategies?
b. How do student perceptions of the learning environment affect instructor intentions?
c. How do students' observations of teaching strategies align with instructor intentions?
d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of the impact of formative assessment?

Research Design

The design of this research was mixed methods, having both quantitative and qualitative components. Mixing research methods provides structure for examining trends in teaching approaches on a broad, quantifiable scale, as well as for probing individual teacher beliefs, intentions and strategies in a rich, detailed way. Examining beliefs, intentions and strategies is accomplished most effectively using both quantitative and qualitative methods. The value of combining methods in a study is based on

> the assumption that collecting diverse types of data best provides an understanding of a research problem. The study begins with a broad survey in order to generalize results to a population and then focuses, in a second phase, on detailed, qualitative open-ended interviews to collect detailed views from participants. (Creswell, 2003, p. 21)

To obtain both quantitative and qualitative data, a variety of research methods were employed, including surveys, written formative assessments, and interviews. Multiple sources of data reduce researcher bias, providing a means for triangulating data (Creswell, 2003). In the initial phase of research, participating faculty completed a closed-ended survey, generating quantitative group and individual data regarding faculty approaches to teaching. Next, faculty introduced a formative assessment strategy called Reflection Cards, which students used to assess the teaching and learning environment. These were completed by students once a week for three weeks. Finally, after completion of 3 weeks of formative assessment of teaching and learning by students, both students and faculty generated qualitative data. Students completed a final Reflection Card, describing their perceptions of the overall effect of Reflection Cards on teaching and learning. Faculty were interviewed individually, regarding impact on their beliefs, intentions and strategies, as well as reflections of the assessment process. Faculty repeated the initial survey, providing quantitative data regarding the impact of student assessment on approaches to teaching.

Instrumentation: Quantitative Data

The revised Approaches to Teaching Inventory (ATI-R) was the primary quantitative data collection instrument used in this study. Initially developed by Trigwell and Prosser in 1994 (Trigwell & Prosser, 2004), and most recently revised in 2004 (Trigwell, Prosser, & Ginns, 2005), it is a valid and reliable self-assessment tool to determine predominance of teaching centered or learning centered beliefs, intentions and strategies. Initially, the Approaches to Teaching Inventory (ATI), was

developed specifically to study relationships between variations in science teaching and science learning, using the qualitative approach of phenomenography (Trigwell & Prosser, 2004). Phenomenography "derives from a nondualist perspective, where the meaning of a phenomenon is seen as being constituted in the relation between an individual and the phenomenon" (Trigwell & Prosser, 2004, p. 410), and is described fully in the qualitative methods section.

In developing the ATI, Trigwell and Prosser found through comprehensive individual interviews, five distinctly different ways of experiencing the phenomenon of teaching were revealed. Results of the interviews were analyzed and categorized into discrete sets of descriptions (Trigwell & Prosser, 2004). The process of analyzing transcripts of interviews of 24 science teachers generated five categories of approaches to teaching, ranging from a primary focus on information transmission to a primary focus on conceptual change. The initial inventory had 104 statements, later revised to 39 statements. Further research and refinement of questions lead to the most recent revision of the initial ATI instrument in 2004 (ATI-R).

> Following a principal components analysis with varimax rotation and a test of alpha reliability, it was reduced to a 22 item version, with five subscales. The principal components analysis of the five subscales produced results consistent with the theoretical model underlying the development of the inventory and with the congruence of the relationship between intention and strategy found in the research from which it derived. (Trigwell & Prosser, 2004, pp. 415-416)

The ATI is a valid and reliable relational instrument for measuring "key aspects of the variation in the ways teachers see and approach their teaching" (Trigwell & Prosser, 2004, p. 421). Scale reliabilities (Cronbach's alphas) for the

ITTF and CCSF scales on a sample of 656 cases drawn from more than 10 studies in more than 15 countries are .73 and .75 respectively. These results suggest the inventory has statistical validity (Trigwell & Prosser, 2004).

The five qualitatively different approaches to teaching in a hierarchical continuum from teaching centered (focus on information transmission) to learning centered (focus on conceptual change) are categorized in Table 4.

Table 4

Five Categories of Approaches to Teaching

Approach A	Teacher-focused strategy with the intention of transmitting information to students. The focus of the transmission in this approach is on facts and skills. The prior knowledge of students is not considered to be important and it is assumed that students do not need to be active in the teaching process—they will learn by receiving the transmitted material.
Approach B	Teacher-focused strategy with the intention that students acquire the concepts of the discipline.
Approach C	A teacher/student interaction strategy with the intention that students acquire the concepts of the discipline.
Approach D	A student-focused strategy aimed at students developing their conceptions.
Approach E	A student-focused strategy aimed at students changing their conceptions. This approach is one in which teachers adopt a student-focused strategy to help their students change their worldviews or conceptions of the phenomena they are studying. Like Approach D, students are seen to have to construct their own knowledge, and so the teacher has to focus on what the students are doing in the teaching-learning situation. A student-focused strategy is assumed to be necessary because it is the students who have to reconstruct their knowledge to produce a new worldview or conception. The teacher understands that he/she cannot transmit a new worldview or conception to the students.

Source: Trigwell and Prosser (2004, p. 413)

The approaches from A to E are parts of a hierarchically inclusive set. Approach B includes elements of approach A; approach C includes elements of A and B; and Approach E includes elements of A, B, C, and D. Because Approach E includes elements of all other approaches, it is “considered to be a more sophisticated

or complete approach than the more limiting" transmission of information Approach A (Trigwell et al., 2005, p. 352). The ATI-R defines approach A as an Information transfer/Teacher-focused scale (ITTF). Approach E is defined as Conceptual Change/Student-focused scale (CCSF).

The survey consists of 22 closed-ended questions with five-point response choices, ranging from "only rarely true" to "almost always true." Of the 22 items, high scores on numbers 1, 2, 4, 6, 9, 10, 11, 12, 16, 19, and 22 indicate a more Teacher-focused (ITTF) approach. High scores on numbers 3, 5, 7, 8, 13, 14, 15, 17, 18, 20, and 21 indicate a more Student-focused (CCSF) approach. Scores may place teaching approaches at either extreme (Approach A or Approach E) or anywhere in between (Approaches B, C, or D).

Trigwell and Prosser (2004) indicated the inventory was developed using a relational perspective. The approach used by a teacher in one context may be different than the approach used in a different context. Inventory scores are contextual and should be considered only for the specific course being evaluated.

> We have not published norms, nor will we, as we have gone to some lengths in writing on the research behind this inventory, that responses to it are relational and are specific to the context in which they are collected. Teachers who adopt one approach in one context may not adopt the same one in a different context. (K. Trigwell, personal communication, July 5, 2008)

The ATI-R was administered to all faculty volunteer participants the first or second week of the term, establishing an initial approach to teaching score. During Weeks 10-11, the end of the term, faculty repeated the ATI-R, generating quantitative data describing any changes in teaching approaches.

"Formative assessment is a planned process in which assessment-elicited evidence of students' status is used by teachers to adjust their ongoing instructional procedures" to improve student learning (Popham, 2008, p. 6). Assessment strategies used to improve teaching and learning vary widely, but use of "Reflection Cards" by students gave instructors direct feedback about specific instructional techniques that affected student learning. Formative feedback about teaching strategies from students in a specific course "should help instructors gain insights about their teaching and student learning while the course is in session, and enable them to make ongoing changes" (Costello et al., 2002, p. 23). Reflection Cards allowed students to articulate pedagogical and assessment strategies used by the participating instructor that may have enhanced or limited their learning.

The cards were preprinted with the questions:

1. Things that are helping me learn are…

2. Things that are not helpful to my learning are…

3. It would help me to learn better if…

The Reflection Card assessment procedure included an explanation to students by instructors that the instructor was interested in feedback about what may help students learn in the course. The assessment process was done in class, in a maximum of 5 minutes. Beginning at week three of the 11-week term, instructors provided each student with one four by six inch index card, during one class session per week for three weeks. The researcher collected Reflection Cards and typed all responses verbatim. Instructors reviewed and reflected on student assessments, and were

strongly encouraged to respond to students about the assessments in the class period following their collection.

Quantitative data collection methods are summarized in Table 5.

Table 5

Quantitative Data Collection Methods

Data	Source	Timeline
Faculty Teaching Approaches ATI Survey-Initial	Trigwell & Prosser, 2004	Week 1-2
Faculty Teaching Approaches ATI Survey-Final	Trigwell & Prosser, 2004	Week 10-11

Instrumentation: Qualitative Data

Following 3 weeks of formative assessment by students, the final Reflection Card was preprinted with two closed-ended questions and an open-ended question:

1. I believe the Reflection Cards affected teaching strategies used in this class…
2. I believe the Reflection Cards affected the way the teacher treated us as learners…
3. Overall, I believe filling out the Reflection Cards…

Data from the final Reflection Card reflected student perceptions of modified teaching practices following the formative assessment activity, as well as provided student reflections of the impact of filling out Reflection Cards on their learning environment. This activity took no more than 5 minutes of class time. Data from the final Reflection Cards was organized and categorized according to trends. The

procedure used to categorize student comments reflected the phenomenological method used by Trigwell and Prosser (2004) to categorize teacher responses for the ATI-R instrument. Students in a specific classroom at the same time were experiencing teaching and learning as a common phenomenon. This phenomenon was experienced in many different ways, and was grouped in distinct categories of responses to the questions. The categorized data were then quantified for comparison with other quantitative and qualitative data.

Phenomenography

Developed from empirical studies of learning in higher education, the word "phenomenography" was coined in 1979 by Swedish researchers (Marton, 1981). Phenomenography is distinguished from other social science research methods, including psychology and phenomenology, by emphasizing relationships between people and phenomena, as well as establishing hierarchical relationships among various interpretations of phenomena. Phenomenography "occupies space" between philosophies of traditional social sciences such as psychology and phenomenology, and that of scientific realism (Marton, 1988, p. 32). Psychologists, for example, are interested in understanding how people "perceive and conceptualize the world" (Marton, 1988, p. 32), with little concern regarding the specific content or phenomena being considered. Phenomenologists, when investigating peoples' experience of phenomena emphasizing the meaning of the phenomena rather than the people, or the phenomena itself (Marton, 1981). "Phenomenography is not concerned solely with the phenomena that are experienced and thought about, or with the human beings who are

experiencing or thinking about the phenomena....Phenomenography is concerned with the *relations* that exist between human beings and the world around them" (Marton, 1988, p. 31) Figure 1 describes the relationship between the researcher and the object of study.

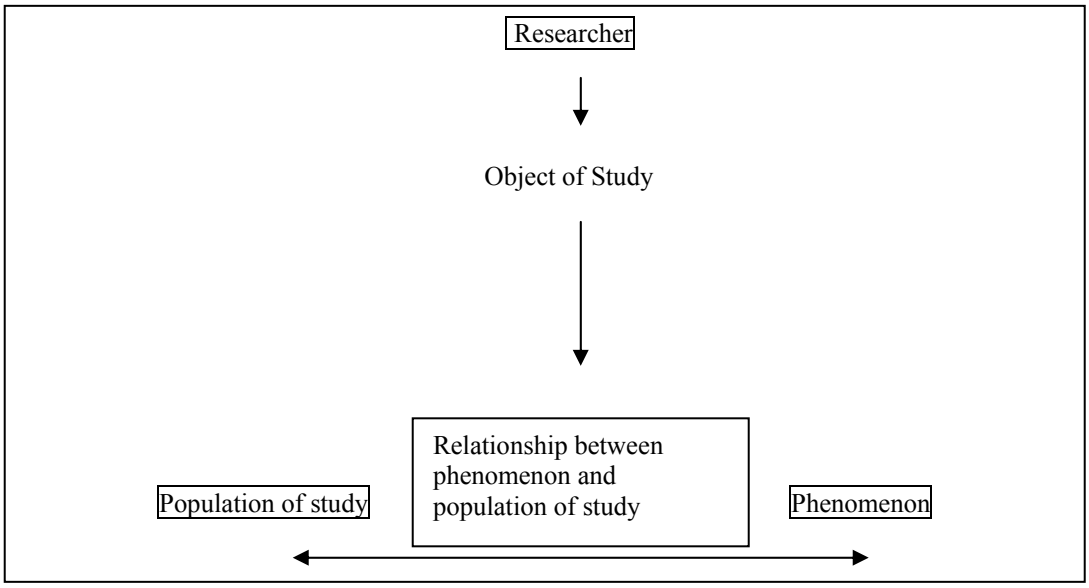

Figure 1. Object of study in phenomenography. Adapted from Stamouli and Huggard (2007).

Another concept critical to phenomenography is categorization of interpretations of phenomena, considering similarities and differences in meanings, as well as relatedness between categories. Researchers found when examining understandings of various phenomena, "each phenomenon, concept or principle can be understood in a limited number of qualitatively different ways" (Marton, 1988, p. 31). Further, "each category is a potential part of a larger structure in which the category is related to other categories of description. It is a goal of phenomenography to discover the structural framework within which various categories of understanding exist"

(p. 34). Interviews documenting understandings of phenomena provided data for categorization.

Interviews of Faculty

Individual interviews, the primary research tool used in phenomenography, emphasizing interactive dialogue, and facilitates organization of experiences into discrete categories relative to other participants' experiences. Interview questions are few and broad in scope, allowing for extensive exploration of the subjects' experiences (Marton, 1994). In this study, individual interviews of faculty, using semi-structured, open-ended questions at the end of the term following implementation of Reflection Cards provided insights regarding the impact of the Reflection Cards on faculty beliefs, intentions and strategies.

Because the research design for this study involved interviews with 14 individuals, to maintain consistency in the interview all participants addressed the same basic questions. A semi-structured format provided a general framework for the interviews but allowed flexibility necessary to pursue important issues that surfaced during the interviews.

The interviews were in-person, taking approximately 15-20 minutes per interview. The researcher took notes during the interview, and asked whether recording the interview is acceptable to each faculty member. All interviews were recorded using a digital voice recorder and later transcribed. Verbatim transcripts of the interview recordings were completed within 2 weeks of the interviews and shared with participants to verify accuracy of meaning and intent. This process of member

checking is important in reducing researcher bias, as well as increased reliability of the data (Creswell, 2003). Qualitative data collection methods are summarized in Table 6.

Table 6

Qualitative Data Collection Methods

Data	Source	Timeline
Student Reflection Card Comments	Researcher Designed	Weeks 3, 4, 5
Student Final Reflection Card Survey	Researcher Designed	Week 6
Individual Faculty Interviews	Researcher Designed	Weeks 10-11

The study was conducted over 9 months, beginning in the fall of the 2008-2009 school year. Data collection was conducted over an 11-week period within the research schedule (see Table 3).

Research Site Information

The community college (referred to as BCC) in this research had a population of 15,775 total students, with 7,090 enrolled in credit courses and 9,186 in non-credit courses. Fifty-five percent of courses offered were lower division/transfer courses, 27% were professional technical courses and 14% were developmental. The college employed 89 full-time, 28 adjunct (teaching over more than half time, but not full-time) and 89 part-time (teaching less than half time) faculty members. Approximately 38% of full-time faculty held Ph.D. or other terminal degrees.

The average age of students at BCC was 28 years with 56% female. Because the region where the college was located was primarily white, student demographics reflected the region:

- 84% white,
- 4.5% Hispanic
- 3% Native American
- 1.3% Asian/Pacific Islander
- .4% African American.

Eighty-three percent of students applying to BCC tested into at least one remedial course in math or writing. Approximately 39% of certificate/degree seeking students received financial aid.

Department Demographics

In order to gather detailed qualitative data, the researcher limited the number of potential subjects. Rather than recruiting all 89 full-time faculty members to participate, this research study was limited to two departments. These departments were chosen, in part, because of potential differences in teaching and assessment intentions and strategies. Teachers use strategies reflecting epistemological assumptions of their specific disciplines. “Surveys of teachers at institutions of higher education in the United States have found that beliefs about teaching vary markedly across disciplines…and in turn have a direct influence on their teaching intentions” (Norton, Richardson, Hartley, Newstead , & Mayes, 2005, p. 554). In particular, science and social science teachers have been compared with respect to teaching beliefs and intentions. Science teachers scored significantly lower than social science teachers on surveys regarding beliefs and intentions about interactive teaching, but

higher on beliefs and intentions regarding training for jobs (Norton et al., 2005). These different perspectives have impacted teaching and assessment strategies, as well as responses to formative assessment.

All full-time faculty in the Social Science and Science departments at BCC were invited to participate in the study. These departments included a wide variety of disciplines. The Social Science department housed three professional technical programs:

- Addictions studies,
- Criminal justice,
- Early childhood education

and eight transfer programs:

- Anthropology
- Economics
- Education
- Geography
- History
- Political science
- Psychology
- Sociology.

The Science Department housed five transfer programs:

- Biology
- Chemistry
- Engineering
- Geology
- Physics

Faculty Participant Selection

A printed invitation explaining the study was sent to all full-time Social Science and Science faculty members' campus mailboxes, followed by an email

encouraging participation in the study. The researcher attended department meetings within a week of the email to answer questions about the study. All volunteers were accepted as participants in the study. Six Social Science (40% of eligible full-time faculty) and eight Science (73% of eligible full-time faculty) faculty accepted the initial invitation to participate. Each signed informed consent forms, indicating their willingness to participate. No faculty member was excluded on the basis of gender, race, color, or other demographic characteristics.

Student Participant Selection

All students enrolled in the courses of the volunteering faculty were invited to participate in the study. Their instructor provided detailed information (provided by the researcher) regarding expectations of participants. Most students were familiar with end-of-term faculty evaluations, since each faculty member was evaluated at least once a year. Midterm evaluation, particularly in a learner centered format, was new to most students. All students who participated in the study signed a consent form in class, and returned it to their instructor. The instructor gave these to the researcher. No student was excluded on the basis of gender, race, color, or other demographic characteristics.

Researcher Role

The researcher was a full-time faculty member at the college and participated in this study as a participant observer. She had been at the college for more than 20 years, first as a part-time instructor in the Science Department before being employed in a tenure-track full-time Science position in 2001. In 2007, the Vice President for

Instruction appointed her to a 2-year position as Assessment Specialist, a half time faculty position. The Assessment Specialist generated and provided staff development regarding assessment of General Education Outcomes, and provided assistance to individuals and departments regarding assessment procedures. She worked with the faculty in Social Sciences and Science on course and department assessment projects during the 2007-2008 school year, so was known to each of them as a colleague with an interest in and knowledge of assessment strategies. As a faculty member of the Science department, and a colleague of all potential participants, it is important to note that the researcher was careful to avoid persuasion to participate. Faculty were "invited" to participate in a letter and email, and the researcher attended department meetings to answer questions about the research, but any further contact about the research was left up to the faculty volunteering to participate. The researcher had no supervisory role with respect to any of the participants.

Procedures

Permission to conduct this study was obtained from the Vice President of Instruction for BCC. In addition, the researcher gained approval for the study through the Institutional Review Board for the Use of Human Subjects in Research at Lewis and Clark College.

Research began the first week of Spring term, 2009, with faculty participants completing the initial ATI-R survey. Table 7 describes the weekly schedule throughout the term.

Table 7

Research Schedule by Week in Term

Week	Participant	Activity
Week 1-2	Faculty	Complete ATI-R survey about Teaching Approaches
	Students	Sign and return Consent Forms
Week 3	Students	Complete Reflection Cards, "Week 1"
	Faculty	Review and respond to Reflection Cards
Week 4	Students	Complete Reflection Cards, "Week 2"
	Faculty	Review and respond to Reflection Cards
Week 5	Students	Complete Reflection Cards, "Week 3"
	Faculty	Review and respond to Reflection Cards
Week 6	Students	Complete Final Reflection Cards
	Faculty	Review and respond to Final Reflection Cards
Weeks 10-11	Faculty	Repeat ATI-R Survey; Individual Interviews

(Spring Term, March-June, 2009)

Data Analysis

Quantitative Data

The researcher entered data from the ATI-R surveys and into GraphPad (2009) Prism and VassarStats (Lowry, 1998), both online statistical computation sites. Because the data were non-parametric, a Wilcoxon signed rank test was applied to determine the statistical significance of the effect of student formative assessments on overall ATI-R survey scores of the group of faculty.

Qualitative Data

The researcher analyzed transcripts of semi-structured faculty interviews for similarities and differences in responses, grouping them into a limited number of qualitatively different categories. Each category was evaluated for its critical attributes, and distinguishing features between categories were established. The response categories were compared with descriptions of learner centered or teacher centered approaches to learning in the ATI-R instrument, consistent with phenomenologic analysis. Relevant individual responses were documented to preserve meaning, context and depth of qualitative research. Other qualitative analyses were applied as the data evolved.

Table 8 demonstrates the relationship between the American Psychological Association learner centered psychological principles and the research questions and strategies used in this research.

Limitations

1. High participation level in a prior assessment project may indicate the Social Science faculty are more likely to be receptive to learner centered teaching strategies than BCC faculty as a whole. This was considered when data were evaluated.

2. The researcher is known to participants in the study as a colleague. It is possible participants may be influenced to answer questions in the interview process in a manner they feel the researcher expects. This was considered when data were evaluated.

Table 8

Relationship between the American Psychological Association Learner Centered Psychological Principles and Research Questions/Strategies

Learner centered principles	**Research questions addressing principle**	**Research strategy:** ATI Survey: Changes in student focused statements before and after assessment (listed by number on survey)	**Research strategy:** Faculty interview responses (listed by number on interview form)
1. The learning of complex subject matter is most effective when it is an intentional process of constructing meaning from information and experience.	1. What are the predominant teaching approaches currently used by a select group of faculty? 2. How does formative assessment by students impact predominant teaching approaches used by a selected group of faculty? 3. What is the impact of formative assessment by students on individual teaching approaches? a. How does student assessment of the learning environment affect teaching strategies? b. How do student perceptions of the learning environment affect instructor intentions? c. How do students' observations of teaching strategies align with instructor intentions? d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of formative assessment?	17. I see teaching as helping students develop new ways of thinking in this subject.	4. Considering your responses on the survey, did the feedback from your students change your intentions for student learning about what you should provide for your students or not? 6. Considering the responses from your students on the final Reflection Card, do you think they considered the cards helpful in their learning or not?

Table 8 continued

2. The successful learner, over time and with support and instructional guidance, can create meaningful, coherent representations of knowledge.	3. What is the impact of formative assessment by students on individual teaching approaches? a. How does student assessment of the learning environment affect teaching strategies? b. How do student perceptions of the learning environment affect instructor intentions? c. How do students' observations of teaching strategies align with instructor intentions? d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of formative assessment?	3. In my interactions with students in this subject I try to develop a conversation with them about the topics we are studying.	4. Considering your responses on the survey, did the feedback from your students change your intentions for student learning about what your should provide for your students or not? 6. Considering the responses from your students on the final Reflection Card, do you think they considered the cards helpful in their learning or not?
3. The successful learner can link new information with existing knowledge in meaningful ways.	3. What is the impact of formative assessment by students on individual teaching approaches? a. How does student assessment of the learning environment affect teaching strategies? b. How do student perceptions of the learning environment affect instructor intentions? c. How do students' observations of teaching strategies align with instructor intentions? d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of formative assessment?	17. I see teaching as helping students develop new ways of thinking in this subject.	3. Considering your responses on the survey, did the feedback from your students change how you think about teaching or learning or not?

Table 8 continued

4. The successful learner can create and use a repertoire of thinking and reasoning strategies to achieve complex learning goals.	3. What is the impact of formative assessment by students on individual teaching approaches? a. How does student assessment of the learning environment affect teaching strategies? b. How do student perceptions of the learning environment affect instructor intentions?	8. In teaching sessions for this subject, I deliberately provoke debate and discussion.	3. Considering your responses on the survey, did the feedback from your students change how you think about teaching or learning or not? 4. Considering your responses on the survey, did the feedback from your students change your intentions for student learning about what you should provide for students or not? 5. Did the feedback from your students change your teaching practices or not? 6. Considering the responses from your students on the final Reflection Card, do you think they considered the cards helpful in their learning or not?
5. Higher order strategies for selecting and monitoring mental operations facilitate creative and critical thinking.	1. What are the predominant teaching approaches currently used by a select group of faculty? 2. How does formative assessment by students impact predominant teaching approaches used by a selected group of faculty? 3. What is the impact of formative assessment by students on individual teaching approaches?	8. In teaching sessions for this subject, I deliberately provoke debate and discussion.	3. Considering your responses on the survey, did the feedback from your students change how you think about teaching or learning or not? 4. Considering your responses on the survey, did the feedback from your students change your intentions for student learning about what you should provide for students or not? 5. Did the feedback from your students change your teaching practices or not? 6. Considering the responses from your students on the final Reflection Card, do you think they considered the cards helpful in their learning or not?

Table 8 continued

6. Learning is influenced by environmental factors, including culture, technology, and instructional practices.	3. What is the impact of formative assessment by students on individual teaching approaches? a. How does student assessment of the learning environment affect teaching strategies? b. How do student perceptions of the learning environment affect instructor intentions? c. How do students' observations of teaching strategies align with instructor intentions?	21. Teaching in this subject should include helping students find their own learning resources.	3. Considering your responses on the survey, did the feedback from your students change how you think about teaching or learning or not? 4. Considering your responses on the survey, did the feedback from your students change your intentions for student learning about what you should provide for students or not? 5. Did the feedback from your students change your teaching practices or not? 6. Considering the responses from your students on the final Reflection Card, do you think they considered the cards helpful in their learning or not?
7. What and how much is learned is influenced by the learner's motivation. Motivation to learn, in turn, is influenced by the individual's emotional states, beliefs, interests and goals, and habits of thinking.	3. What is the impact of formative assessment by students on individual teaching approaches? a. How does student assessment of the learning environment affect teaching strategies? b. How do student perceptions of the learning environment affect instructor intentions? c. How do students' observations of teaching strategies align with instructor intentions? d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of formative assessment?		6. Considering the responses from your students on the final Reflection Card, do you think they considered the cards helpful in their learning or not?

Table 8 continued

8. The learner's creativity, higher-order thinking, and natural curiosity all contribute to motivation to learn. Intrinsic motivation is stimulated by tasks of optimal novelty and difficulty, relevant to personal interests, and providing for personal choice and control.	3. What is the impact of formative assessment by students on individual teaching approaches? a. How does student assessment of the learning environment affect teaching strategies? b. How do student perceptions of the learning environment affect instructor intentions? c. How do students' observations of teaching strategies align with instructor intentions? d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of formative assessment?	18. In teaching this subject it is important for me to monitor students' changed understanding of the subject matter. 20. Teaching in this subject should help students question their own understanding of the subject matter.	5. Did the feedback from your students change your teaching practices or not? 6. Considering the responses from your students on the final Reflection Card, do you think they considered the cards helpful in their learning or not?
9. Acquisition of complex knowledge and skills requires extended learner effort and guided practice. Without learners' motivation to learn the willingness to exert this effort is unlikely without coercion.	3. What is the impact of formative assessment by students on individual teaching approaches? a. How does student assessment of the learning environment affect teaching strategies? b. How do student perceptions of the learning environment affect instructor intentions? c. How do students' observations of teaching strategies align with instructor intentions? d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of formative assessment?	3. In my interactions with students in this subject I try to develop a conversation with them about the topics we are studying. 14. It is better for students in this subject to generate their own notes rather than copy mine.	6. Considering the responses from your students on the final Reflection Card, do you think they considered the cards helpful in their learning or not?

Table 8 continued

10. As individuals develop, they encounter different opportunities and experience different constraints for learning. Learning is most effective when differential development within and across physical, intellectual, emotional, and social domains is taking into account.	3. What is the impact of formative assessment by students on individual teaching approaches? a. How does student assessment of the learning environment affect teaching strategies? b. How do student perceptions of the learning environment affect instructor intentions? c. How do students' observations of teaching strategies align with instructor intentions? d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of formative assessment?	13. I make available opportunities for students in this subject to discuss their changing understanding of the subject.	3. Considering your responses on the survey, did the feedback from your students change how you think about teaching or learning or not? 4. Considering your responses on the survey, did the feedback from your students change your intentions for student learning about what you should provide for students or not? 5. Did the feedback from your students change your teaching practices or not? 6. Considering the responses from your students on the final Reflection Card, do you think they considered the cards helpful in their learning or not?
11. Learning is influenced by social interactions, interpersonal relations, and communication with others.	3. What is the impact of formative assessment by students on individual teaching approaches? a. How does student assessment of the learning environment affect teaching strategies? b. How do student perceptions of the learning environment affect instructor intentions? c. How do students' observations of teaching strategies align with instructor intentions? d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of formative assessment?	5. I set aside some teaching time so that the students can discuss, among themselves, key concepts and ideas in this subject.	3. Considering your responses on the survey, did the feedback from your students change how you think about teaching or learning or not? 4. Considering your responses on the survey, did the feedback from your students change your intentions for student learning about what you should provide for students or not? 5. Did the feedback from your students change your teaching practices or not? 6. Considering the responses from your students on the final Reflection Card, do you think they considered the cards helpful in their learning or not?

Table 8 continued

12. Learners' different strategies, approaches, and capabilities for learning are a function of prior experience and heredity.	3. What is the impact of formative assessment by students on individual teaching approaches? a. How does student assessment of the learning environment affect teaching strategies? b. How do student perceptions of the learning environment affect instructor intentions? c. How do students' observations of teaching strategies align with instructor intentions? d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of formative assessment?	7. I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop.	4. Considering your responses on the survey, did the feedback from your students change your intentions for student learning about what you should provide for your students or not? 5. Did the feedback from your students change your teaching practices or not? 6. Considering the responses from your students on the final Reflection Card, do you think they considered the cards helpful in their learning or not?
13. Learning is most effective when differences in learners' linguistic, cultural, and social backgrounds are taken into account.	3. What is the impact of formative assessment by students on individual teaching approaches? a. How does student assessment of the learning environment affect teaching strategies? b. How do student perceptions of the learning environment affect instructor intentions? c. How do students' observations of teaching strategies align with instructor intentions? d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of formative assessment?	15. A lot of teaching time in this subject should be used to question students' ideas.	6. Considering the responses from your students on the final Reflection Card, do you think they considered the cards helpful in their learning or not?

Table 8 continued

14. Setting appropriately high and challenging standards and assessing the learner and learning progress—including diagnostic, process, and outcome assessment—are integral parts of the learning process.	1. What are the predominant teaching approaches currently used by a select group of faculty? 2. How does formative assessment by students impact predominant teaching approaches used by a selected group of faculty? 3. What is the impact of formative assessment by students on individual teaching approaches? a. How does student assessment of the learning environment affect teaching strategies? b. How do student perceptions of the learning environment affect instructor intentions? c. How do students' observations of teaching strategies align with instructor intentions? d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of formative assessment?	7. I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop.	5. Did the feedback from your students change your teaching practices or not?

CHAPTER IV

RESEARCH FINDINGS

The purpose of this study was to examine the impact of formative assessment by students on teachers' intentions and strategies at a community college in the Pacific Northwest. Frequently, student assessment of teaching is done at the end of the term, when instructors are unable to change strategies to improve learning for the students doing the assessing. End of term student evaluations at the community college involved in this study are considered particularly important. Faculty promotions and tenure are highly influenced by the evaluations, but student learning may not be as strongly influenced, since the assessments are done at the end of a term when changes in teaching strategies to improve learning are too late. Although instructors in higher education hope to improve student learning, some guidance regarding more effective teaching strategies for improved learning is needed. This study evaluated a midterm formative assessment strategy, aimed at improving teaching through direct suggestions from current students.

The study use mixed methodology, including both quantitative data in the form of survey results, and qualitative data in the form of interviews. Changes in Approaches to Teaching Inventory (ATI-R) surveys provided quantitative data regarding teacher intentions and strategies before and after assessment by students. Qualitative data regarding the impact of assessment by students were generated from

individual interviews with faculty, as well as from comments regarding teaching approaches provided by students on Reflection Cards. The study was divided into four major research questions, each of which was the basis for a section in this chapter. Table 9 lists the research questions and the source of data gathered to answer each question.

Table 9

Research Questions and Sources of Data

Research Question	Source of Data
What are the predominant teaching approaches currently used by a selected group of faculty?	ATI-R Survey administered before student assessment
How does formative assessment by students impact predominant teaching approaches used by a selected group of faculty?	ATI-R survey administered after student assessment, compared to survey administered prior to student assessment.
What is the impact of formative assessment by students on individual teaching approaches?	Individual interviews with faculty, following student assessment. Interview questions: 1. What is your overall impression of the use of reflection cards? 2. Did the feedback from your students change how you think about teaching or learning or not? 3. Did the feedback from your students change your teaching practices or not? 4. Will you use reflection cards in future courses or not?
What are student perceptions of impact of reflection cards on teaching approaches	Student comments on Final Reflection Cards. Questions on Card: 1. Overall I believe the Reflection Cards… 2. I believe the Reflection Cards affected teaching strategies used in this class…. 3. I believe the Reflection Cards affected the way the teacher treated us as learners….

Demographics

Fourteen faculty members from two departments at BCC, six from Social Science and eight from Science, were volunteer participants in the study. These

volunteers represented a respective 40% of Social Science and 73% of Science response rate of the full-time faculty in the departments invited to participate. Table 10 below describes demographic data gathered about the instructors and their class sizes at the beginning of the study.

Table 10

Instructor Demographics

Instructor Pseudonyms	Years Teaching (Includes all part- and full-time teaching)	Academic Discipline	Level of Course in Study (100 = freshman level/200 = sophomore level)	Class Size at Week 3
Allen	19	Social Science	100	34
Bob	10	Social Science	100	45
Chris	8	Social Science	200	15
Deby	13	Social Science	100	32
Eric	8	Social Science	200	35
Frank	16	Social Science	200	41
Gary	13	Science	200	48
Hank	4	Science	100	25
Isabelle	34	Science	200	16
Jackie	27	Science	100	26
Karen	13	Science	200	24
Lew	25	Science	200	24
Mary	17	Science	200	55
Nancy	29	Science	200	28
Total Number of Students				448

Approaches to Teaching Inventory Survey Items

The Approaches to Teaching Inventory Survey consisted of 22 valid and reliable statements, 11 statements associated with teacher centered approaches to teaching and 11 associated with student centered approaches to teaching. As described in chapter 3, the instrument used a five-point Likert scale, ranging from "only rarely" to "almost always" as responses to 22 statements. Directions on the survey indicated instructors were to consider only the specific course used in the study, since teaching approaches in different subjects or contexts may vary. Points totaled from instructor responses on the Likert scale determined the instructors' strongest approach to teaching. Instructors with a higher total point value for 11 teaching centered statements were considered teacher centered in their approach to teaching, while those with higher total values for 11 student centered statements were considered student centered. Higher point values indicated stronger associations with teaching approaches. The survey questions and their intended focus are noted in Table 11.

Table 11

ATI-R Survey Question Focus

Question Number	Survey Question	Scale: Teacher Centered or Student Centered
1	In this subject students should focus their study on what I provide them.	Teacher
2	It is important that this subject should be completely described in terms of specific objectives that relate to formal assessment items.	Teacher
4	It is important to present a lot of facts to students so that they know what they have to learn for this subject.	Teacher

Table 11 continued

6	In this subject I concentrate on covering the information that might be available from key texts and readings.	Teacher
9	I structure my teaching in this subject to help students to pass the formal assessment items.	Teacher
10	I think an important reason for running teaching sessions in this subject is to give students a good set of notes.	Teacher
11	In this subject, I provide the student with the information they will need to pass the formal assessments.	Teacher
12	I should know the answers to any questions that students may put to me during this subject.	Teacher
16	In this subject my teaching focuses on the good presentation of information to students.	Teacher
19	My teaching in this subject focuses on delivering what I know to the students.	Teacher
22	I present material to enable students to build up an information base in this subject.	Teacher
3	In my interactions with students in this subject I try to develop a conversation with them about the topics we are studying.	Student
5	I set aside some teaching time so that the students can discuss, among themselves, key concepts and ideas in this subject.	Student
7	I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop.	Student
8	In teaching sessions for this subject, I deliberately provoke discussion and debate.	Student
13	I make available opportunities for students in this subject to discuss their changing understanding of the subject.	Student
14	It is better for students in this subject to generate their own notes rather than copy mine.	Student
15	A lot of teaching time in this subject should be used to question students' ideas.	Student
17	I see teaching as helping student develop new ways of thinking in this subject.	Student
18	In teaching this subject it is important for me to monitor students' changed understandings of the subject matter.	Student
20	Teaching in this subject should help students question their own understanding of the subject matter.	Student
21	Teaching in this subject should include helping students find their own learning resources.	Student

First Research Question

What are the predominant teaching approaches currently used by a selected group of faculty?

This section of the chapter details quantitative group results of the Approaches to Teaching survey. All of the research participants took the ATI-R survey at the beginning of Spring term (March), prior to distribution of Reflection Cards, to determine approaches to teaching before student assessment. Data for only 13 of the 14 participants were used to calculate the survey results, since 1 participant left 10 of the 22 questions unanswered on the initial survey.

More than half of the scores indicated instructor approaches to teaching were moderately to strongly student centered, but all had elements of both teacher and student centeredness. Trigwell et al. (2005) described five approaches to teaching in a hierarchical format. Characteristics of a highly teacher centered approach center on transmission of facts and skills (information transfer, teacher focused or ITTF), while a highly student centered approach is characterized by a priority of changing students' worldviews (conceptual change, student focused or CCSF). Between these approaches are three categories including elements of each of the extreme approaches, in hierarchically inclusive levels. At the primary level of the hierarchy, extremely teacher centered approaches do not include student centered strategies. Extremely student centered approaches include elements of the teacher centered approach, but more student centered than teacher centered strategies.

A description of the scores of respondents and the percent of the highest score possible for each approach to teaching is in Table 12. For this study, the researcher categorized ATI-R scores as follows: A score of at least 80% of total possible points in a category was considered by the researcher to be a "strong" focus on that particular

teaching approach. Scores with differences of five points or fewer between the categories was considered to be a "mild" focus on the approach with a higher score. Scores with differences of more than five points between the categories but without a total score of 80% or higher were considered by the researcher to be "moderately" focused on the approach with a higher score.

Table 12

ATI-R Approach to Teaching Scores Before Reflection Cards

Instructor	Before Cards Score Teacher Centered Questions (% of highest possible score)	Before Cards Student Centered Questions (% of highest possible score)	Primary Approach to Teaching (80% score = strong approach)
Allen	37 (67%)	49 (89%)	Strongly student centered
Bob	47 (85%)	34 (62%)	Strongly teacher centered
Chris	29 (53%)	51 (93%)	Strongly student centered
Eric	49 (89%)	38 (69%)	Strongly teacher centered
Frank	38 (69%)	39 (71%)	Mildly student centered
Gary	24 (44%)	44 (80%)	Strongly student centered
Hank	35 (64%)	40 (73%)	Moderately student centered
Isabelle	43 (78%)	41 (75%)	Mildly teacher centered
Jackie	35 (64%)	49 (89%)	Strongly student centered
Karen	27 (49%)	55 (100%)	Strongly student centered
Lew	46 (84%)	33 (60%)	Strongly teacher centered
Mary	26 (47%)	53 (96%)	Strongly student centered
Nancy	42 (76%)	43 (78%)	Mildly student centered

Group Results

According to their responses, approximately half of the participants had a "strongly" student centered approach (six participants or 46%), and approximately one fourth (three participants or 23%) were strongly teacher centered in their approaches to teaching. About one third (four participants or 31%) of the participants had aspects of both teacher and student centeredness, with no strong association with either. Strongly student centered instructors included instructors Allen, Chris, Gary, Jackie, Karen, Mary. Strongly teacher centered instructors included Bob, Eric, Lew.

Response values indicate frequency of intentions and strategies from a low score of "only rarely" to a high of "almost always." Responses by participants with a student centered approach had higher point values than those with a teacher centered approach, indicating student centered intentions and strategies are employed more often by instructors with a student centered approach than teacher centered intentions and strategies are employed by instructors with a teacher centered approach. The median response score for a teacher centered approach was 37 points out of the highest possible score of 55 points. The median response score for a student centered approach was 43 out of a high of 55 points. The highest score for teacher centered approaches was 49 out of 55, while the highest score for student centered approaches was 55 out of 55. Table 13 describes the pattern of responses before Reflection Cards.

Table 13

Pattern of Responses for Approaches to Teaching Before Reflection Cards

	Before Cards Responses to Teacher Centered Approach to Teaching	Before Cards Responses to Student Centered Approach to Teaching
Number of participants	13	13
Minimum Score	24	33
25th percentile score	28	38.5
Median score	37	43
75th percentile	44.5	50
Number of participants scoring 44 or more points or 80% of total points (strongly associated with teaching approach)	3 (23% of respondents)	6 (46% of respondents)
Maximum score	49	55
Mean	36.77	43.77
Standard Deviation	8.408	7.120
Standard error	2.332	1.975
Lower 95% CL of mean	31.69	39.47
Upper 95% CL of mean	41.85	48.07

Figure 2 shows the distribution of approaches to teaching indicated by before Reflection Cards, clearly reflecting a higher proportion of participants with a stronger student centered approach.

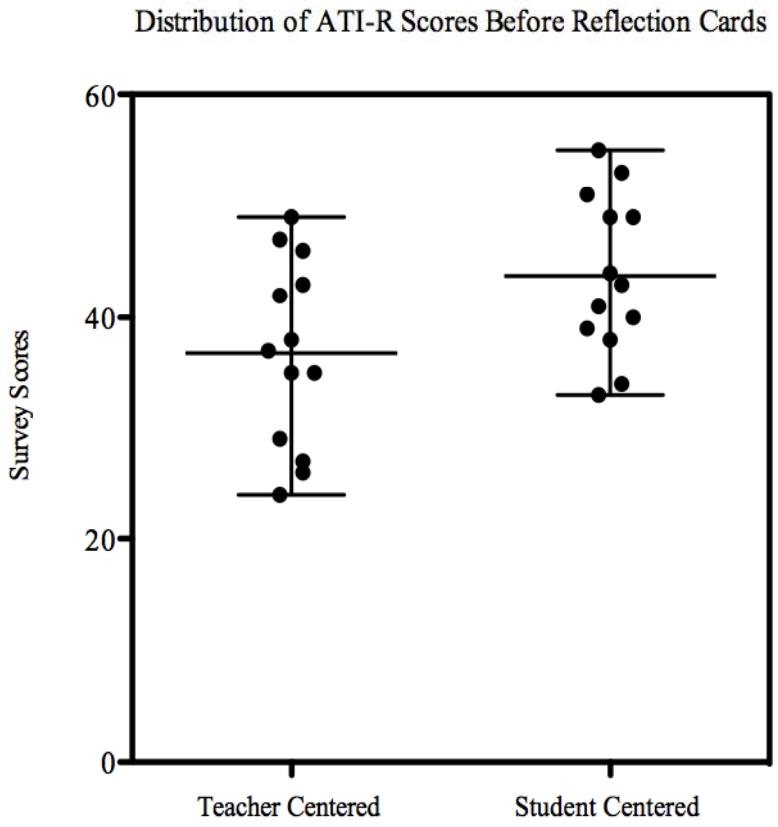

Figure 2. Distribution of ATI-R teacher centered and student centered scores before reflection cards.

Summary

This section of the chapter described the primary approaches to teaching by a selected group of faculty prior to formative assessment by students. Of 13 faculty completing the survey, 6 (46%) were strongly student centered, 3 (23%) were strongly teacher centered and 4 (31%) had aspects of both teacher and student centeredness with no strong association with either approach.

Second Research Question

How does formative assessment by students impact predominant teaching approaches used by a selected group of faculty?

This section of the chapter describes quantitative results of the Approaches to Teaching survey of the group of participating faculty, after formative assessment by students and compares survey scores before assessment with survey scores after assessment. All 14 instructors distributed Reflection Cards once per week, beginning at week three, for 3 weeks. Students completed reflection cards, and their comments were collected, typed and given to instructors each week. Instructors were strongly advised to discuss their observations of the comments with students each week, to ensure students were aware they were being read. No other instructions were given to instructors regarding what to do with student feedback.

At the end of Spring Term (May and June), instructors were asked to complete the ATI-R survey a second time, following assessment by students. Survey scores on the teacher centered approach after assessment were more widely distributed than scores on the teacher centered approach before assessment, with high scores higher and low scores lower after assessment. Student centered approach scores were similarly distributed before assessment by students and after, but high and low scores were each slightly lower on the after assessment survey. Figure 3 shows the ATI-R survey scores before and after assessment.

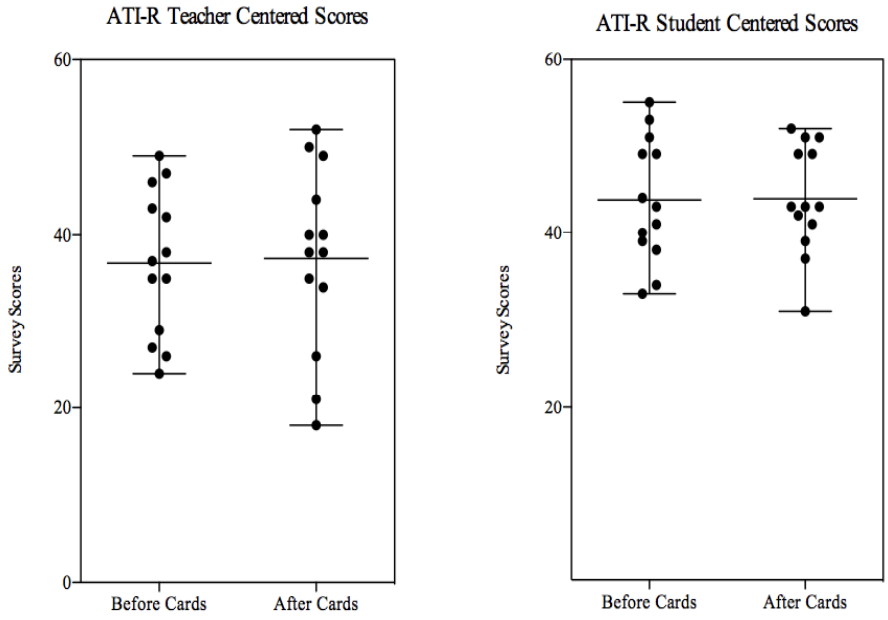

Figure 3. ATI-R survey scores before and after reflection cards.

Differences in survey scores for approaches from before assessment to after assessment primarily showed less frequent use of teacher centered approaches (score ranges before assessment were 24-49; score ranges after assessment were 18-52) while student centered survey scores after assessment were more tightly grouped than survey scores before assessment, with a very slight decrease in frequency of use of student centered approaches (score ranges before assessment were 33-55; score ranges after assessment were 31-52). A comparison of survey score distribution for teacher centered and student centered responses after assessment are shown in Figure 4.

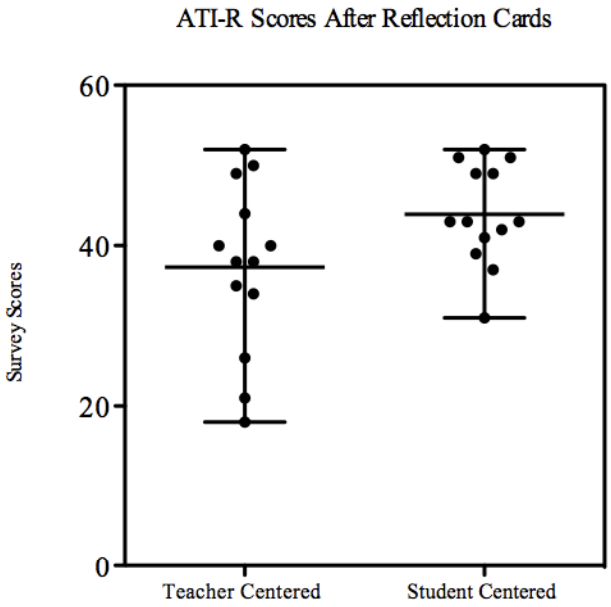

Figure 4. Distribution of ATI-R teacher centered and student centered scores after reflection cards.

The total change in survey scores from before assessment to after assessment showed a slight but insignificant increase in the teacher centered approach, but overall scores were still higher for the student centered approach. The median score for the teacher centered approach increased by only one point, from 37 to 38 points, while the student centered approach remained the same at 43 points.

Table 14 provides comparison of ATI-R results before and after assessment.

Table 14

Comparison of ATI-R Results Before and After Reflection Cards

	Before Cards Responses to Teacher Centered Approach to Teaching	After Cards Responses to Teacher Centered Approach to Teaching	Before Cards Responses to Student Centered Approach to Teaching	After Cards Responses to Student Centered Approach to Teaching
Number of participants	13	13	13	13
Minimum Score	24	18	33	31
25th percentile score	28	30	38.5	40
Median score	37	38	43	43
75th percentile	44.5	46.5	50	50
Number of participants scoring 44 or more points or 80% of total points (strongly associated with teaching approach)	3 (23% of respondents)	4 (31% of respondents)	6 (46% of respondents)	5 (38% of respondents)
Maximum score	49	52	55	52
Mean	36.77	37.31	43.77	43.92
Standard Deviation	8.408	10.63	7.120	6.264
Standard error	2.332	2.949	1.975	1.737
Lower 95% CL of mean	31.69	30.88	39.47	40.14
Upper 95% CL of mean	41.85	43.73	48.07	47.71

Changes in scores for many respondents were small. One third of respondents' overall after assessment survey scores changed less than 5% (three points) from before assessment survey scores, but two respondents had major changes, each with a 20% change. The resulting scores impacted only one instructor's overall approach to teaching. This instructor, previously teacher centered, became strong in both teaching

and student approaches to teaching. The other instructor with a 20% change in score did not have a change in teaching approach, remaining strongly student centered.

The number of participants responding as “strongly” teacher centered increased from three to four participants. However, more participants used teacher centered approaches less often, with lowest over all teaching centered scores dropping lower than they were prior to student comments. The instructor with the lowest initial score of 26 points scored 18 points after assessment, and a second instructor’s low initial score of 27 points dropped to 21 points.

Two of three strongly teacher centered instructors increased student centered approach scores on the ATI-R. One instructor, who had the highest teaching centered score of all instructors prior to assessment by students, decreased his teaching centered score by 9%, while increasing his student centered score by 20%. The second strongly teacher centered instructor increased his student centered score by 16%, while increasing his teaching centered score by 4%.

The number of respondents scoring “strongly” on the student centered approach decreased from six to five, but the less frequent use of student centered approach scores decreased only slightly with the lowest score dropping from 33 to 31 points. One instructor had very high student centered scores both before and after assessment, and increased her after assessment teaching centered score by 20%. Because her teaching centered score was so low initially, the increase of 20% had no impact on her overall primarily student centered approach.

Changes in scores are shown in Table 15.

Table 15

Comparison of Teacher Centered Approach Scores Before and After Reflection Cards with Student Centered Approach Scores Before and After Reflection Cards

Instructor	Before Cards Teacher Centered Score	After Cards Teacher Centered Score	Points + or - change	Before Cards Student Centered Score	After Cards Student Centered Score	Points + or - change
Allen**	37	34	-3	49	49	0
Bob*	47	49	+2	34	43	+9
Chris**	29	40	+11	51	51	0
Eric*	49	44	-5	38	49	+11
Frank	38	40	+2	39	39	0
Gary**	24	26	+2	44	43	-1
Hank	35	35	0	40	37	-3
Isabelle	43	52	+9	41	42	+1
Jackie**	35	38	+3	49	43	-6
Karen**	27	21	-6	55	52	-3
Lew*	46	50	+4	33	31	-2
Mary**	26	18	-8	53	51	-2
Nancy	42	38	-4	43	41	-2
Total change			+7			+2

* strongly teacher centered before Reflection Cards
** strongly student centered before Reflection Cards

Overall, the changes in survey scores from before assessment to after assessment survey were not significant when calculated using Wilcoxon signed rank test for non parametric data (GraphPad, 2009). The sum of signed ranks (W) was -2 with a *p* value of 0.4843 for changes in scores from before assessment to after assessment for the teacher centered approach, and $W = 14$, *p* value of 0.2530 for changes in scores for the student centered approach.

Summary: Impact of Reflection Cards on Teaching Approach

Student responses on Reflection Cards had little impact on overall predominant teaching approaches of a selected group of faculty. With the exception of one instructor, all approaches remained the same before and after assessment. Two thirds (four out of six) of the strongly student centered instructors maintained their strong status. One third of instructors who were strongly student centered on the survey before assessment were still student centered on the survey after assessment, but mildly. One individual initially scoring moderately teacher centered became strongly teacher centered. Another strongly teacher centered instructor became both strongly teacher centered and strongly student centered, with a decrease of 9% of teacher centered and increase of 20% of student centered scores. Two strongly teacher centered instructors maintained their strongly teacher centered status, even with one increasing student centered score by 16%. Changes in before assessment and after assessment survey results of instructors with “strong” scores are highlighted in Table 16.

Table 16

Comparison of Scores of Strong Approaches to Teaching Before and After Reflection Cards

Student Centered Instructors		
	Before Assessment ATI-R Results	After Assessment ATI-R Results
Allen	Strongly student centered	No change
Chris	Strongly student centered	No change
Gary	Strongly student centered	Mildly student centered
Jackie	Strongly student centered	Mildly student centered
Karen	Strongly student centered	No change
Mary	Strongly student centered	No change
Teacher Centered Instructors		
Bob	Strongly teacher centered	No change
Eric	Strongly teacher centered	Strongly teacher and strongly student centered
Lew	Strongly teacher centered	No change
Isabelle	Mildly teacher centered	Strongly teacher centered

Student Comments and Rate of Return of Reflection Cards

Although detailed evaluation of specific student comments during weeks one through three was not a part of this study, it is important to examine certain points about them. A pertinent consideration was the rate of return of Reflection Cards. Return rates from week to week were relatively consistent for each instructor, but

varied widely between instructors. The lowest return rate among all instructors was 6% of total students in a class, the highest return rate was 98%, with averages of 63% for week one (283 Cards total returned), 50% for week two (225 cards returned), 47% for week three (212 cards returned), and 60% for week four (270 cards returned). Highest rates of return, more than 60% each week, were for Bob, Jackie, Karen, and Mary. The lowest rate of return, less than 30% each week, was for Deby; all other instructors had a minimum of 41% return for least one week. Of those with the highest return rates, Jackie, Karen and Mary had strongly student centered approaches to teaching, while Bob was strongly teacher centered. Deby did not complete the pre assessment survey, so had no identified approach to teaching prior to student assessment.

Instructors with highest consistent return rates had notable written and verbal comments from students acknowledging the instructor's willingness to consider student assessment during the first 3 weeks. A comment on Karen's cards described a student's perspective: "Things that are helping me learn are knowing that my feedback was thought about by my instructor and her effort to address the concerns raised by the cards." Mary received a written comment during week three, "I have found that the slightly slower pace of the class has made it easier to understand things." A student in Jackie's course told the researcher the instructor was very enthusiastic about the Reflection Cards and was impressed with changes made in class because of student comments. Frank, although not among instructors with highest return rates, was the only other instructor with a comment specific to his attention to student assessment

during weeks one through three: “He’s already making the changes to help the class learn better.”

Throughout the first 3 weeks, many comments on Reflection Cards were consistent across courses. Five themes were nearly universal among courses, although student opinions about those themes varied. One hundred percent of the instructors had comments from students regarding lecture or group work. Student comments ranged from appreciating lecture: “Things that are helping me learn are lecture and well prepared power points,” to recommendations to reduce lecture: “It would help me learn better if we had less lecture and more group work or discussion.” Twelve of the 14 instructors had comments about distracting behaviors of other students in class, including “Things that are not helpful to my learning are other students texting, facebooking, YouTubing, shopping online during class.” Eleven of the 14 instructors received comments about visual aids and/or power points in their class, such as “Power points and video clips are great” and “Same power point background for too many weeks-need to vary.” Thirteen of 14 instructors had student comments regarding their own responsibilities as learners, such as: It would help me learn better “if I didn’t procrastinate” and “if I worked less” and “if I showed up on time.” Ten of 14 instructors received comments regarding assigned reading in the course, including “I need articles that match the concepts in this class” and “I don’t like the textbook-it is too wordy.”

Although themes and student comments were remarkably similar across courses, instructor reactions to the opinions and use of student assessment were varied. Instructor comments are noted in the next section.

Third Research Question

What is the impact of formative assessment by students on individual teaching approaches?

The next section of this chapter describes the impact of assessment by students on individual teaching approaches, emphasizing qualitative responses. Qualitative data provide insight and support for quantitative data obtained from ATI-R before and after assessment surveys, which simply categorized instructors as primarily teacher or student centered. To obtain qualitative data regarding the impact of assessment by students on teaching approach, each participant was interviewed individually. The interviews were semi-structured, with four prepared questions:

1. What is your overall impression of the use of reflection cards?
2. Did the feedback from your students change how you think about teaching and learning or not?
3. Did the feedback from your students change your teaching practices or not?
4. Will you use Reflection Cards in future courses or not?

The number of structured questions was minimal and the structure of questions was open-ended to encourage participants to verbalize undirected thoughts or feelings they had regarding the entire experience. Each participant agreed to a

digital recording of the interview. The interviews were transcribed, and within 2 weeks copies of the individual interviews were emailed to participants for review. One instructor changed three statements on the transcript; others were accepted as they were originally transcribed. Transcribed comments were read and sorted several times, and ultimately categorized based on patterns and themes that emerged, as is the process involved in phenomenography.

Responses to the question were diverse, ranging from assessment by students being "not valuable" to "very helpful." To align data with approaches to teaching described by Trigwell and Prosser (2004), phenomenography was used to analyze and categorize responses of participants' experiences with assessment by students. Trigwell and Prosser organized teaching approaches in hierarchical categories, the highest level category containing aspects of more basic level categories. Careful analysis of transcripts revealed five discrete themes described and categorized in Table 17. Participant responses in the most teacher centered category described student assessment in this study as "not useful," while responses in the most student centered category characterized assessment by students as "very useful." Table 17 shows parallels between Trigwell and Prosser's approaches to teaching and this researcher's categories of responses to student assessment.

Table 17

Five Categories of Approaches to Teaching Compared with Themes Regarding Usefulness of Student Feedback

Teacher Centered or Student Centered Approach	Trigwell & Prosser's Description of Approach	Researcher's Categories with Instructor Comments about Student Feedback
Approach A Teacher Centered	Teacher-focused strategy with the intention of transmitting information to students. The focus of the transmission in this approach is on facts and skills. The prior knowledge of students is not considered to be important and it is assumed that students do not need to be active in the teaching process—they will learn by receiving the transmitted material.	Not useful. Students are not capable of giving information about improving teaching/learning; Students only described how to help themselves, not how I can help them learn.
Approach B	Teacher-focused strategy with the intention that students acquire the concepts of the discipline.	Minimally useful. Students say opposing things (some want more lecture, some want less lecture), so it is impossible to help them; Student comments may be affected by mood.
Approach C	A teacher/student interaction strategy with the intention that students acquire the concepts of the discipline.	Moderately useful. Questions on Reflection Cards are not specific enough to be helpful; Students say opposing things, but they are all individuals.
Approach D	A student-focused strategy aimed at students developing their conceptions.	Mostly useful. Helped me communicate to my students why I do certain things; With more time I could have changed more.
Approach E Student Centered	A student-focused strategy aimed at students changing their conceptions. This approach is one in which teachers adopt a student-focused strategy to help their students change their worldviews or conceptions of the phenomena they are studying. Like Approach D, students are seen to have to construct their own knowledge, and so the teacher has to focus on what the students are doing in the teaching-learning situation. A student-focused strategy is assumed to be necessary because it is the students who have to reconstruct their knowledge to produce a new worldview or conception. The teacher understands that he/she cannot transmit a new worldview or conception to the students.	Very useful. I changed the amount of material to help them understand what they wanted to know better; How could I not change how I teach when I have this feedback? Empowering-gave students a space to think about how they learn and their own part in that.

Source: Trigwell and Prosser (2004, p. 413)

Additionally, student comments from the fourth week of Reflection Cards contributed qualitative data regarding instructor practices, from a perspective other than the instructor. Quantitative data from surveys along with qualitative data from individual interviews and written student comments were important for triangulation of data, and provided a deeper understanding of reactions to Reflection Cards and teaching approaches by both instructors and students. The rest of this chapter is divided into sections corresponding to interview questions and their responses.

Interview Question One

What is your overall impression of the use of Reflection Cards?

After asking an opening question regarding participant's years of teaching, the researcher asked each participant "What is your overall impression of the use of Reflection Cards?" This open-ended question began a dialogue about the experience of assessment by students through the instructor's eyes. Most participants shared their experiences enthusiastically, including considerable detail in their answers. The researcher encouraged this by asking probing questions in response to expressed comments.

Analysis of comments regarding instructors' perceptions of assessment by students revealed that no specific approach to teaching was associated with a particular experience. Strongly teacher centered instructors prioritize transmission of information, without consideration of previous student knowledge. It could be assumed, then, that assessment by students would be of little value to teacher centered instructors, and responses would be primarily in the most basic categories. However,

half (two of four) of the strongly teacher centered instructors rated assessment by students in the highest two categories. Half of the strongly teacher centered instructors responded assessment by students was not useful. Most of the strongly student centered instructors primarily considered student feedback useful (four of five were in the highest three categories), which correlates with expectations of student centered instructors focusing on "what students are doing in the teaching-learning situation" (Trigwell & Prosser, 2004, p. 413). Table 18 shows the approach to teaching with instructor perception of usefulness of assessment by students.

Table 18

Instructor Perception of Usefulness of Assessment by Students with Approach to Teaching

Category: Usefulness of Student Feedback	Description: Instructor Comments	Instructors (Teacher/Student Centered at End of Term)
Not useful	Students are not capable of giving information about improving teaching/learning; Students only described how to help themselves, not how I can help them learn.	Lew (strongly teacher centered) Eric (strongly teacher and strongly student centered) Deby (no quantitative data)
Minimally useful	Students say opposing things (some want more lecture, some want less lecture), so it is impossible to help them; Student comments may be affected by mood.	Nancy (mildly student centered) Frank (mildly student centered)
Moderately useful; could be better	Questions on Reflection Cards are not specific enough to be helpful; Students say opposing things, but they are all individuals	Allen (strongly student centered) Chris (strongly student centered)
Mostly useful	Helped me communicate to my students why I do certain things; With more time I could have changed more.	Bob (strongly teacher centered) Hank (moderately student centered) Jackie (mildly student centered)
Very useful	I changed the amount of material to help them understand what they wanted to know better; How could I not change how I teach when I have this feedback? Empowering-gave students a space to think about how they learn and their own part in that.	Isabelle (strongly teacher centered) Karen (strongly student centered) Mary (strongly student centered)

The researcher encouraged detailed responses to interview questions, since phenomenography involves rooting out individual experiences of a common phenomenon, as well as defining similarities and differences in those experiences.

Three common themes emerged across instructor responses to the question "What is your overall impression of the use of Reflection Cards?" Themes included: (a) acknowledging a need for improved communication, (b) recognizing conflicting student responses, and (c) determining value of broad questions. The three themes did not fit neatly into distinct approaches to teaching, but each answer represented a slightly different perspective and a deeper understanding of the impact of student assessment on these instructors' teaching intentions and strategies. The themes and individual instructor comments were examined in detail.

Acknowledging a Need for Improved Communication

Both teacher centered and student centered instructors discovered student comments revealed a need for improved communication, particularly regarding instructors' intentions for learning or the relevance of assignments. Hank, a moderately student centered instructor, appreciated student comments questioning the value of specific assignments in class. After reading Reflection Cards, he found discussing comments with students critical to help their understanding of his intentions of the assignment.

> From my perspective, one thing that I thought was really valuable was…having a discussion with them about why I do some things, and that's something I hadn't thought about before.…I did describe to them why I was doing this and what my goal was…so that was really beneficial.

Although he generally considered assessment by students "not useful," Eric, both strongly student and strongly teacher centered, was similarly affected by student comments. He described "a few things that I thought were interesting. One was where they were all talking about trying to connect things…trying to figure out how everything was connected in class. So I…explained to them how I had set the class up so that they could connect them."

Karen, strongly student centered, also considered communicating with students about assignments an important result of assessment by students. Students in her class were unclear about whether they had met objectives for assignments, since she did not mark them with grades. She explained how she assessed their assignments, and what her standards were. "I didn't so much change what I was doing for them, but it changed the way that I shared with them what I was doing for them...It changed the way that they and I communicated about what was going on."

Recognizing Conflicting Student Responses

Several instructors noted student requests for specific teaching methods were conflicting. Teaching and learning strategies helpful for one student may not be helpful to others. Allen reflected other instructors' concerns about divergent recommendations for improved teaching, but noted it "shouldn't be surprising because people are individuals."

Hank found it "challenging" to determine what to do with contradictory information from students. "Some students would like certain things and other students would dislike the same exact thing." He noted it might be difficult to "pick

out exactly, from that, what I was going to do differently," but "overall I learned some stuff, so it was good." Gary said he would prefer to discuss conflicting comments with individual students involved, but "it would be a little difficult because they were anonymous." Asking students individually "what would work better for you?" would be Gary's preferred approach to conflicting responses by students.

Frank and Jackie noted conflicting recommendations for improved teaching as well, so discussed the issue with their students, letting them know they considered the comments. Jackie stated "What I think they [Reflection Cards] did for me, which I had not previously been able to do, was to assure my students that I am listening to them." She also said "It's not about giving them what they want; it's about hearing what they are feeling. So it was a very active listening tool. It made the relationship between me and the students a lot better which is key in this setting."

On the other hand, Eric described student requests for specific teaching methods as "nitpicking." His frustration with the feedback was apparent in the statement "It's so personalized and you can't cater to everybody." Eric emailed the researcher after the first week of collecting Reflection Cards, commenting "I am concerned this might develop into a 'have it my way' class where students expect me to cater to their individual preferences rather than being content that I reach the happy medium." Eric was both strongly teacher centered and strongly student centered.

Determining the Value of Broad Questions on Reflection Cards

Questions on Reflection Cards weeks one through three were broadly articulated:

- "Things that are helping me learn are…,"
- "Things that are not helpful to my learning are…," and
- "It would help my learning if…"

Instructors had varying perspectives regarding the non specific nature of the questions. Deby was unable to find value in the general questions. She stated the questions on reflection cards were "a little too vague to be useful, and I wasn't exactly sure about the purpose." Allen and Eric also thought more specific, directed questions would be helpful.

In contrast, Karen initially had concerns about the value of general questions on the cards but changed her opinion when her students gave constructive suggestions to improve teaching and learning strategies.

> I was very surprised how you didn't have to try to get the students to provide you a targeted answer…Instead, it was really, really broad. What works, what doesn't work? And they were repetitive, too. In the second week, I still learned something from it.

Mary similarly was skeptical about the relevance of information he would obtain from the general questions, but changed her perspective. "I was thinking 'yeah, maybe I'll hear something, maybe I won't.' In a way I was really surprised at what I heard."

Jackie considered the general statements an effective way to begin an open dialogue about teaching and learning. "I think the parts that were probably most valuable to me that I never knew were so easy to get, were to start the conversation, to say, 'what would help you?'" She noted "Being sensitive and aware of what's holding them back is what I really historically had a difficult time getting my hands on. And this was so easy with this thing."

Karen described an additional benefit of broadly asked questions rather than specifically targeted ones. “The other thing that I think was kind of remarkable about it was that it gave the students a space to think about how they learn and their own part in that. So what are they doing to work with the system as it is designed?” She noted it was “empowering” for the students “which is really nice.”

Other instructors considered the general comments unproductive. Lew was concerned “students don’t have a lot to say. They sometimes talked about what they felt they could do better, rather than what I could be doing better.” Nancy had concerns about the subjectivity of responses from students, and considered it unreliable guidance for improved teaching. “I think a lot of it has to do with how the students feel that day, how much sleep they got the night before, how well they ate breakfast, whether they had a fight with their spouse, whether the class before that sucked or was great.” She further noted “my understanding of being an instructor is you gotta count on at least 10% of the class not even liking you. And so you just have to accept that.” Eric similarly considered a certain proportion of student evaluations unreliable. “Take the top 10%, the bottom 10% and toss them out. Because people are going to love you, people are going to hate you; you should look in the middle.”

Summary of Interview Question One

In response to the question “what is your overall impression of the use of reflection cards,” most instructors (8 of 14) considered Reflection Cards moderately to very useful, while 6 of the 14 instructors considered them only minimally useful or not useful. Three themes emerged as the researcher sorted instructor responses to the

open-ended question: (a) acknowledging a need for improved communication, (b) recognizing inconsistent student responses, and (c) determining the value of the use of broad questions on reflection cards.

Interview Questions Two and Three

Did the feedback from Reflection Cards change how you think about teaching in any way or not?

Did the feedback from your student change your teaching practices in any way or not?

Responses to the two interview questions, "Did the feedback from your students change how you think about teaching in any way?" and "Did the feedback from your students change your teaching practices in any way?" frequently overlapped, so were combined in this section. Most instructors responded assessment by students had little or no impact on the way they think about teaching (9 of 14) or their teaching practices (8 of 14). Instructor responses did not correspond to distinct teaching approaches.

When asked whether student feedback changed teaching practices at all, Chris, strongly student centered, reflected other instructors' responses. "It didn't change mine, because the things they were commenting on were already planned." Frank discussed difficulty changing a course description midterm. "It's just kind of hard to get structured on your syllabus." Most comments referred to difficulty changing practice because of conflicting student recommendations and not enough time to change what was planned for the term.

Conversely, nearly half (6 of 14) instructors stated they changed teaching practices midterm, after considering assessment by students. Isabelle, strongly teacher centered, stated student comments changed the way she thought about teaching as well as her teaching practices "a little bit. There were a few things where I tried to clarify and make sure…they were understanding." Ultimately she reduced the amount of content covered in the course because "I felt that they really needed to spend more time" learning critical content that was not well understood.

Hank, moderately student centered, said assessment by students reinforced his vision regarding teaching intentions and practices. "I'm sort of working towards this ideal of teaching that I think I want to have, and I feel like I am certainly far from that, but the comments and questions sort of felt like they were probing and making me want to go to that same place." Mary reiterated Hank's perception. "It was actually surprising for me, it provoked some things, that I thought I would already do, but it made them more apparent. So I actually went further in ways that I like to believe I do, because of the cards." She also acknowledged the changes she made were specific to her current students, not necessarily changes she would make in teaching practices in the future. "No, I will just understand my students a little better in this particular way."

Allen, strongly student centered, changed teaching practices because of student comments. He increased the interactivity in the course "because some of the comments were 'oh, some small group work would be nice'…, so it made me think about it and make sure it was interactive enough."

Isabelle, strongly teacher centered, not only modified teaching practices, but changed classroom management strategies to improve learning. "Lots of their

comments were about things that I was not aware of, occurring in this class, like all the cell phone stuff. I never heard any cell phones going off." Bob, also strongly teacher centered, was concerned about classroom management as well. He and his students discussed student comments and negotiated acceptable student behaviors in class. He stated assessment by students was "extremely important to me. When I looked at what helped them learn and what detracts from them, we actually had conversations regarding those cards. I was shocked at some of the things that they had put down for negative impact on their learning." He also noted it is critical to determine "what is going on that is destructive, what's going on that I can keep? What do I need to change?"

Summary of Interview Questions Two and Three

Most instructors (8 of 14) responded assessment by students had no impact on teaching practices, citing difficulties changing lessons midterm, as well as conflicting or useless information from students. Six of 14 thought student comments affected their practices, including improved classroom management, changes in curricula and classroom activities.

Fourth Research Question

What are student perceptions of the impact of Reflection Cards on teaching approaches?

This section of the chapter details quantitative and qualitative results of assessment by students from students' perspectives. Data generated by student responses on Reflection Cards was used to corroborate instructors' responses regarding impact of assessment by students on teaching approaches. Students

completed a final Reflection Card during Week Four, indicating perceptions of changes in teaching practices and summarizing impressions of the use of Reflection Cards. Questions on the final Reflection Card were:

- I believe the Reflection Cards affected teaching strategies used in this class…
- I believe the Reflection Cards affected the way the teacher treated us as learners….
- Overall, I believe the Reflection Cards…

Students ranked the first question regarding perceived changes in teaching practices using a Likert scale ranging from one to five. A score of one indicated very negative changes in teaching practices, three indicated no change, five indicated very positive changes in teaching practices. Students were encouraged to add comments to more completely describe scores. The researcher tabulated total responses from each point on the Likert scale of one to five.

Response rates during week four were between 22% and 92% of students registered in class, with an average 60% of the class responding. Overall, students expressed the Reflection Cards improved teaching practices, with at least 70% of students in 10 of 14 classes indicating a positive change. All student scores ranged from a neutral (score of three) to a very positive (score of five) impact of Reflection Cards on teaching practices with a majority of students responding with a score of four. Table 19 shows response rates and distribution of student scores for the final Reflection Cards distributed during week four.

Table 19

Student Responses on Final Reflection Cards

Instructor	Responses Number / Return Rate Percentage	Effect on Teaching Strategies - Percentage of Student Responses		
		5 Very positively	4	3 Not at all
Allen	11 / 41%	27%	45%	27%
Bob	27 / 60%	7	55	34
Chris	4 / 33%	25	50	25
Deby	7 / 22%	29	57	14
Eric	14 / 40%	13	57	30
Frank	29 / 75%	21	55	24
Gary	33 / 85%	9	42	48
Hank	13 / 52%	38	54	7
Isabelle	11 / 75%	9	64	27
Jackie	24 / 92%	33	58	8
Karen	22 / 92%	9	41	50
Lew	12 / 46%	0	16	83
Mary	40 / 72%	22	53	25
Nancy	17 / 61%	18	72	18

Overall, instructors with a teacher centered approach had a lower percentage of students indicating positive changes in teaching practices than instructors with a student centered approach. An average of 57% (range 16-73%) of students scored teacher centered instructors' changes in teaching practices four or five on the Likert scale, while 74% (range 50-93%) of students scored student centered instructors' changes in teaching practices four or five. Table 20 shows student responses regarding their perceptions of changes in teaching practices.

Table 20

Student Responses Regarding Changes in Teaching Practices

Instructor	Teacher or Student Centered	Percentage Positive Changes
Allen	Strongly student	73
Chris	Strongly student	75
Frank	Mildly student	76
Gary	Mildly student	52
Hank	Moderately student	93
Jackie	Mildly student	92
Karen	Strongly student	50
Mary	Strongly student	75
Nancy	Mildly student	82
		74% average range 50-93%
Bob	Strongly teacher	66
Isabelle	Strongly teacher	73
Lew	Strongly teacher	16
Eric	Strongly teacher and strongly student	71
		57% average range 16-73%

Although most students indicated improvement in teaching practices as a result of student assessment, a high proportion (over 30%) of students in Bob's, Gary's, Lew's and Karen's classes described no change. Of these instructors, Bob and Lew had teacher centered approaches to teaching, while Gary and Karen had student centered approaches to teaching.

Lew had the highest response in the no change category with 83% of his students suggesting Reflection Cards had no impact on teaching practices. Detailed comments from Lew's students included statements such as "The cards did not have much of an impact on the way the teacher taught" and "I think my teacher has stuck with his already effective strategies." In a conversation Lew had with the researcher prior to volunteering for the study, Lew worried the researcher would not expect to see much change in his teaching based on student feedback, since his lessons were "scripted."

Although five instructors had a relatively high proportion of students indicating no change in teaching practices, two instructors had approximately one third of their students noticing "very positive" changes in teaching practices. Over 30% of students in Hank's and Jackie's classes scored changes in teaching practices at the highest level on the scale. These instructors also had the lowest percentage of students scoring no change; only 7% of Hank's students and 8% of Jackie's students indicated Reflection Cards had no impact on teaching practices. These instructors had scores indicated they had only mildly to moderately student centered approaches to teaching.

Written comments from Hank's students verified his changes: "The instructor listened to the feedback and tried to implement the needs of the class" and "the teacher thought more about how students learn and was willing to implement suggestions." Students in Jackie's class also acknowledged her willingness to modify her teaching practices. "She would discuss things to do differently, going by what students had requested" and "She was willing to implement any way of learning that would be more beneficial for someone. The Reflection Cards were a great way of evaluating where the students are in the learning process and assessing what works and what doesn't."

Student comments on the final Reflection Card enriched the researcher's understanding of student assessment. As with student comments during weeks one through three, comments generated by all three questions on the Final Reflection Card during week four had common themes across instructors. The cards were analyzed and sorted into four discrete categories: (a) the cards were pointless, waste of time, repetitive, did not affect teaching; (b) already have a good teacher, but cards could be useful; (c) valuable, improved class discussions, good way to communicate between students and teachers; (d) reflection cards were valuable, teachers addressed problems students were having, helped students recognize and improve their own learning issues. All but two instructors (Chris and Deby) had one identifiable dominant theme with the highest proportions of comments. Table 21 describes themes, categories, instructor and dominant themes for specific instructors.

Table 21

Final Reflection Card Summary

Theme of Comments	Instructor with this Dominant Theme	Percentage of Total Comments on Theme
Reflection cards were pointless, repetitive, had no effect on teaching practices	Lew Gary	62% 19%
Instructor is already good; had little value; can see that Reflection Cards could have some value sometimes	Karen*	29%
Reflection Cards were valuable; improved communication in class; had some impact on teaching strategies, at least temporarily	Nancy Allen*	37% 57%
Reflection Cards were valuable; improved teaching practices as suggested by students; helped students improve own learning.	Bob* Eric Frank Hank* Isabelle* Jackie Mary*	26% 50% 49% 45% 45% 44% 49%

*Instructor believed teaching practices were impacted by student assessment.

Student scores and comments on the final Reflection Card were used to corroborate instructor comments regarding changes in teaching practices, in an effort to triangulate data. Table 21 indicates instructors who believed student assessment impacted their teaching practices, as described in interviews denoted by an asterisk next to their names. Six instructors thought student assessment had impact on their teaching practices. Four of those (Bob, Hank, Isabelle, Mary) were ranked in the highest possible category by students, and one (Allen) was in the third highest category, indicating common perceived valuable impact on teaching practices. Only

one, Karen, believed she had modified teaching practices, but student responses indicated she had not. Two instructors (Lew and Gary), ranked in the most basic category of "no change," were in agreement with students regarding their placement. Three instructors ranked in the highest possible category by students did not describe a change in teaching practices.

Overall, most students expressed the Reflection Cards improved teaching practices. In general, students and instructors were in agreement regarding the impact of assessment by students on teaching practices, but when perceptions differed, in all cases but one, students believed their assessment had more impact on teaching practices than instructors thought. Approach to teaching does not appear to be associated with instructor or student perception of changes in practice.

One question on the Final Reflection Card asked for students' perceptions of the way they were treated as learners, as a result of the use of the cards. Answers were rated on a Likert Scale from one to five, with one being very negatively, three was neither negative or positive, five being very positively. All students answers ranked on the scale from three to five, indicating no negative consequences of the cards. The most frequent scores were three and four, half of 14 instructors received mostly fours (average 65% of students in these courses scored instructors with four) and half were mostly threes (average 46% of students in these courses scored instructors with three). Most comments were similar to: "My teacher has always treated us fairly." There were no discrete divisions between teaching approaches.

Interview Question Four

Will you use reflection cards future courses or not?

This section returns to results of the instructor interview. It describes instructor opinion regarding future use of Reflection Cards in their course. The last instructor interview question "Do you think you will use Reflection Cards in the future?" was important to determine instructor perception of the ease of implementation of assessment by students, as well as the value of this process for future assessment projects. Thirteen of the 14 participants responded positively stating they either already use something similar, or they would be willing to start something similar to the Reflection Cards. Hank said "It was nice to get feedback along and during the course of the term. We always get the feedback at the end of the term, and by then it's almost pretty much done…but for this particular set of students and this class it was nice to try to…adjust and change, mix some things up and see how they responded to that." Deby, Eric and Allen said they would use them if they were trying something new, but would make the questions more specific, such as "This is what I want this article to do; did it do it? Were you able to see the point in doing that?" Chris uses her own version of cards, with questions such as "What do you love?" "What's not working?" "What's driving you crazy that I don't know about?" Only one instructor responded negatively to this question. Lew stated he was not inclined to use them again, considering he did not receive information he considered valuable.

Summary

The findings of this study indicate students believe the use of student Reflection Cards had an influential positive impact on teaching practices. In 71% of classes (10 of 14), at least 70% of the reporting students indicated positive changes in teaching practices as a result of their assessment. No students indicated a negative impact on teaching practices.

Although approach to teaching was not significantly impacted by the use of student Reflection Cards, almost half of instructors (6 of 14) thought student assessment had an impact on teaching practices. Fewer instructors thought they made changes in teaching practices than students perceived.

Giving students an opportunity to suggest ways of helping them learn has a positive impact on teaching practices, as well as student perceptions of their instructors' willingness to listen to suggestions.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Dr. Abby spent much of her career as a community college professor transmitting valuable Anatomy and Physiology content to her amenable students. She enjoyed preparing comprehensive lectures along with detailed visual aids to ensure the best possible teaching. But even with all of the skill and fastidious concern she brought to her lectures, she knew James was having difficulties learning. She wondered how she might help him learn, but had no ideas beyond improving her lectures and visual aids.

Curious about Mr. King's teaching strategies, she walked across the hall to his office. With genuine concern, she asked what he did about students who were failing his class. Mr. King, pulling a chair out for Dr. Abby, said he had a variety of techniques for determining what might help his students learn, but he had recently tried Refection Cards, which not only empowered students regarding their own learning, but also gave him specific ideas about how to improve teaching and learning.

Discussion

Dr. Abby's approach to teaching reflects the approach of many instructors in higher education. Without formal pedagogical training, most postsecondary faculty primarily adopt the behaviorist, or teacher centered, teaching approaches they experienced as students. A familiar, efficient way to transmit information from

instructor to student, lecture continues to be the predominant teaching strategy in higher education. Importantly, teacher centered approaches, including high reliance on lecture do not promote learning for all students, or encourage crucial skills required for employment where utilizing and interpreting information is regarded as being essential.

Moving away from teacher centered approaches toward student centered approaches with a wider range of teaching and learning strategies promotes self directed learning and is more likely to result in deep learning and construction of worldviews consistent with expectations and mandates of stakeholders.

Accrediting agencies, students, employers, and others demand improvement in teaching and student learning. Although highly motivated to improve student learning, postsecondary faculty have little training regarding how to augment their current pedagogical strategies to improve teaching and learning. The goal of this research was to determine the impact of an easily implemented formative assessment by students regarding teaching intentions and strategies in use, providing instructors with guidance on how to improve student learning.

The questions that guided this study were:

1. What are the predominant teaching approaches currently used by a selected group of faculty?
2. How does formative assessment by students impact predominant teaching approaches used by a selected group of faculty?

3. What is the impact of formative assessment by students ("Reflection Cards") on individual teaching approaches?
    a. How does student assessment of the learning environment affect teaching strategies?
    b. How do student perceptions of the learning environment affect instructor intentions?
    c. How do students' observations of teaching strategies align with instructor intentions?
    d. How do student perceptions of the impact of formative assessment compare with instructor perceptions of the impact of formative assessment?

This chapter discusses key findings of this study, as well as recommendations for practice, leadership and further research. Following is a list of the most noteworthy findings of this study:

- Fifty-four percent of faculty scored moderately to strongly student centered on Approach to Teaching (ATI-R) Inventory.
- Formative assessment by students had little impact on overall predominant teaching approaches of faculty.
- Trends on ATI-R Inventory indicated more faculty used teacher centered approaches less often following assessment by students; two of three strongly teacher centered faculty increased student centered ATI-R scores by 16 and 20% after assessment by students.
- Eighty percent of student centered and 50% of teacher centered instructors considered student comments mostly or very useful

- Forty-three percent of instructors indicated student Reflection Cards had an impact on teaching practices.
- In 71% of classes, at least 70% of students reported positive changes in teaching practices as a result of their comments on Reflection Cards.
- Ninety-three percent of instructors stated they would use Reflection Cards or a similar formative assessment by students in future courses.

This chapter is divided into sections of the most noteworthy key findings, providing a discussion of each research question posed.

Discussion of Key Findings

Fifty-four percent of faculty scored moderately to strongly student centered on Approach to Teaching (ATI-R) Inventory.

Recent research indicated the teacher centered approach is still the dominant theory in use in higher education (Conti, 2004). Lecture, a highly utilized strategy in the teacher centered approach, still dominates instructional strategies in higher education with more than half of faculty primarily using lecture while less than one quarter use applied activities and group work as their main teaching strategies (Barrett et al., 2007; Brown, 2003; Buckridge & Guest, 2007; Goubeaud & Wenfan, 2004; Guskin, 1997; Hansen & Stephens, 2000; Kraska & Harris, 2007; Spoon & Schell, 1998).

Interestingly, although previous research indicated teaching centered approaches and lecture predominate at postsecondary institutions, 46% of the participants of this study were strongly student centered, 7% were moderately student centered, while only 23% were strongly teacher centered. All but one of the remaining

participants were primarily student centered, but not as strongly. The discrepancy in research results may be explained in a variety of ways.

First, teachers' intentions and strategies may indeed be evolving from teaching centered approaches to more student centered approaches as a result of increased pressure for assessment of student learning. Recent mandates from accrediting agencies to document improved teaching and learning may have promoted modifications in teaching intentions and strategies, resulting in a higher proportion of instructors with primarily student centered teaching approaches than in previous studies.

However, it is possible this study does not reflect an evolution of teaching approaches across higher education. One possible explanation for differences in research results is that all participants were volunteers, eligible as full-time faculty in the departments of Science and Social Science. It is possible they volunteered because they were student centered and were interested in student feedback, influencing results. However, a good sample size from each department suggested a wide range of participants, increasing credibility of results, with 40% (six) of all eligible full-time faculty in social science and 73% (eight) of all eligible full-time faculty in science volunteering to participate.

Another consideration regarding differences in research results might be sample selection. This study included only community college instructors, whose primary responsibility was instruction. Results of previous research including 4-year institutions where both teaching and research were expected of instructors might yield

results that differ from those at a community college. With dual demands of teaching and research, faculty at 4-year institutions might spend less time evaluating and modifying teaching strategies, especially if rewards were more significant for outstanding research than exemplary teaching. A higher proportion of community college instructors, then, would be more inclined to demonstrate student centered approaches to teaching than would their counterparts at 4-year institutions.

Another possible explanation is the possibility of a mismatch between survey results and actual teaching approaches. Because of accreditation mandates, the emphasis of recent faculty development curriculum has been improved teaching and learning, increasing awareness of student centered practice. Some participants in this study may have completed the ATI-R survey from the student centered perspective, mistakenly believing they had adopted that approach to teaching. The survey measured perceptions of intentions and strategies, not actual observations of intentions and strategies, so differences between self-reported survey results and actual practice are possible. However, the ATI-R has strong validity and reliability indicators, so this is the least likely explanation for potentially conflicting research regarding the predominance teacher centered approach to teaching and dominance of lecture as a teaching method.

Results of this study also conflict with an unrelated study regarding expected teaching approaches among academic departments. full-time faculty in Social Science and Science were selected for this study in part because of previously identified differences in teaching intentions of those disciplines.

In a previous comparison of science and social science instructors' teaching beliefs and intentions, science instructors scored significantly lower than social science instructors on a survey regarding interactive teaching (Norton et al., 2005). Although the surveys from previous research and this study had different focal points, inferences about teaching approaches can be made. Because their interactive teaching scores were lower in previous research, science instructors' approaches to teaching were likely more teaching centered than social science instructors.

In this study, science department instructors scored higher on student centered intentions and strategies than did social science instructors, suggesting a higher rate of interactive teaching strategies used by faculty in the science department than in the social science department. Two of five social science instructors (40%) and four of seven (57%) science instructors scored strongly student centered on the before assessment ATI-R survey, while two of five (40%) of social science and one of seven (14%) of science instructors were strongly teacher centered.

In summary, in contrast to previous research describing mostly teacher centered faculty, this study revealed a high proportion of faculty with strongly student centered approaches to teaching, and a lower proportion of faculty with strongly teacher centered approaches to teaching.

Formative student assessment had little impact on predominant teaching approaches of faculty.

Beginning the third week of the term, once a week for three weeks students in participating instructors' courses completed Reflection Cards preprinted with:

- Things that are helping me learn are…
- Things that are not helpful to my learning are….and
- It would help my learning if….

Response rates were good, with an average of 53% return for weeks one through three. Student comments throughout the 3 weeks were consistent across courses, including five general themes with statements about: (a) lecture or group work, (b) distracting behaviors of other students, (c) visual aids, (d) student responsibilities for learning, and (e) assigned reading.

Overall, assessment by students had no significant impact on predominant teaching approaches of a selected group of faculty, as measured quantitatively by the ATI-R survey. With the exception of one instructor, all teaching approaches remained the same before and after assessment by students. The exceptional instructor initially scored as a strongly teacher centered instructor, but on the after assessment survey scored as both strongly teacher and strongly student centered.

Although a meta-analysis of midterm student evaluations showed a positive impact on teaching effectiveness (Cohen, 1980), one earlier study showed student feedback did not improve teaching. Only 4 of 25 departments using student response questionnaires resulted in significant changes to any of the dimensions rated (Kember et al., 2002). However, qualitative evaluations in this study showed important trends, indicating changes in teaching intentions and strategies.

Trends on ATI-R Inventory indicated more faculty used teacher centered approaches less often following assessment by students; two of three strongly teacher

centered faculty increased student centered ATI-R scores by 16 and 20% after assessment by students.

Although there was no significant quantitative change in overall teaching approaches in this group of faculty demonstrated on the ATI-R survey, some important trends were discernable. Despite an increase from three to four participants responding as strongly teacher centered, after assessment survey results showed less frequent use of teacher centered approaches to teaching. Overall scores for student centered approaches before and after assessment remained higher than scores of teacher centered approaches. Survey scores after assessment showed most student centered scores were high, ranging from 31 to 51, while individual scores for teacher centered approaches varied from very low to high, ranging from 18 to 52, indicating more frequent use of student centered approaches to teaching overall. These data are not completely surprising, considering most instructors had a more student centered approach to teaching before assessment.

Notably, two of three strongly teacher centered instructors had important increases in student centered approach scores on the ATI-R. One instructor, who had the highest teaching centered score of all instructors prior to assessment by students, decreased his teaching centered score by 9%, while increasing his student centered score by 20%. This instructor stated in his interview that assessment by students was not valuable, but used students' comments to communicate how assignments, lecture and reading were "connected." He also was frustrated during the first three weeks of student assessment, concerned about his inability to "cater to everybody." Although he

was frustrated and articulated the assessment was not valuable, his teaching intentions and strategies were changed from strongly teaching centered to strongly teaching centered and strongly student centered.

The second strongly teacher centered instructor increased his student centered score by 16%, while also increasing his teacher centered score by 4%. He indicated in his interview assessment by students was very valuable and made some important modifications, primarily in classroom management, as a result of their feedback.

One instructor with a very high student centered score on the ATI-R both before and after assessment by students increased her teacher centered score by 20% following assessment. However, her teacher centered score was so low before assessment, the increase in score did not change her status as a highly student centered instructor.

To discuss the lack of significant impact on overall teaching approaches, it is important to recognize the constructivist, student centered process as it applies to this research. In this study, instructors were learners. According to the American Psychological Association (APA), one important factor in learning is motivation, which impacts what and how much is learned. Motivation is influenced by an individual's beliefs, goals and relevance of the task to personal interests (McCombs, 2001). To have the most impact on teaching intentions and strategies in this study, instructors needed to be motivated to evaluate and modify their teaching approaches according to student needs. Although participants in this study were volunteers, it was

unlikely they were motivated to volunteer because of determination to modify teaching approaches. They were unaware teaching approaches were being measured.

However, the researcher anticipated student comments alone would motivate change in teaching intentions and strategies, since students have strong potential for accurately assessing their learning environment and guiding instruction. People are motivated to change when feedback is specific and personally meaningful (Marzano 2003), as when instructors' own students suggest improvements. A key feature of using formative student comments to improve teaching is being motivated by student recommendations to improve learning. In fact, there were important but subtle changes in teaching intentions and strategies as a result of assessment by students. Most modifications did not impact overall faculty approaches to teaching, but affected individual intentions and strategies in smaller ways, described in interviews.

Another APA student centered principle important in learning denotes the successful learner linking new information with existing knowledge. Authentic learning involves a process challenging existing ideas (Ramsden et al., 2007) while developing individual "internal conceptual frameworks" (Andrew, 2007, p. 160). Importantly, a "learner's pre-existing understandings and purposes are relevant to what the learner constructs" (Mackenzie, 2008, p. 75). Because of their experiences as students, beliefs and practices of most current faculty are strongly rooted in behaviorism (Sperling, 2003), with little exposure to other learning theories. It was not surprising, then, that over the course of one term assessment by students had no

significant impact on modifying predominant teaching approaches of a selected group of faculty.

In summary, assessment by students did not significantly impact overall predominant teaching approaches of faculty as measured quantitatively on the ATI-R survey, but trends indicated a decrease in overall frequency of teacher centered intentions and strategies and an important increase in student centered intentions and strategies by two of three strongly teacher centered instructors. The study was limited to one term, and considering optimal conditions for authentic learning, it is possible over time more substantial changes in predominant approaches to teaching would occur.

Eighty percent of student centered and 50% of teacher centered instructors considered assessment by students mostly or very useful.

To obtain qualitative data regarding the impact of assessment by students on individual teaching approaches, each participant was interviewed individually, following student assessment. The interviews were semi-structured, with five prepared questions. The questions were open-ended to elicit a wide range of responses. The researcher asked probing questions following initial responses, encouraging deeper consideration of experiences.

Through interviews with instructors, it was clear to the researcher the instructors with highest response rates and positive comments about the value of Reflection cards were very enthusiastic about assessment by students, while instructors who had lower response rates and less positive comments about the value

of the Reflection cards were not as enthusiastic. Interestingly, after reading student comments, all instructors were strongly encouraged to convey to students they had read them, in any manner they chose. Three strongly student centered instructors and one strongly teacher centered instructor described follow up with students regarding their comments as lengthy class discussions, while one strongly teaching centered instructor noted a lack of time to talk to their students about their comments on Reflection Cards.

Although it is not possible to determine whether instructor enthusiasm promoted or was a result of positive feedback, it was clear there was a relationship between the two factors in this study.

Instructors with the highest consistent response rates were primarily student centered. They received notable comments from students about being willing to consider suggestions, including "Things that are helping me learn are knowing that my feedback was thought about by my instructor and her effort to address the concerns raised by the cards."

In response to the first interview question "What is your overall impression of the use of Reflection Cards?" participant opinions were diverse. Comments regarding usefulness of student assessment were categorized into five discrete themes, ranging from "not useful" to "very useful." Surprisingly, analysis of comments regarding instructors' perceptions of assessment by students revealed teaching approach was not entirely associated with a specific opinion. Predictably, most strongly student centered instructors (four of five) considered student feed back useful, while half of strongly

teacher centered instructors (two of four) did not consider student feedback useful. Not expected, however, was that half of strongly teacher centered instructors considered student feedback mostly or very useful.

Most strongly student centered instructors clearly acknowledged the value of student opinions. Even with conflicting comments from students, instructors understood the benefit of hearing students' perspectives as they articulated what would help them learn. These instructors also appreciated the benefit of empowering students to "think about how they learn and their own part in that." This is consistent with descriptions of student centered approaches to teaching and learning (McCombs, 2001; Trigwell & Prosser, 2004).

Unpredictably, half of the strongly teacher centered instructors also acknowledged the value of student expression of needs, a recognition inconsistent with the teacher centered "assumption that students do not need to be active in the teaching process" (Trigwell & Prosser, 2004, p. 413). These instructors were surprised at the importance of student observations with regard to classroom management in particular. In contrast, and more expectedly, half of the strongly teacher centered instructors considered students incapable of giving information to improve teaching and learning, and stated student comments regarding their own learning processes were not helpful to improving teaching and learning. Instructor comments such as "I am concerned this might develop into a 'have it my way' class where students expect me to cater to their individual preferences rather than being content that I reach the happy medium" indicated a lack of understanding of the responsibility to teach all

students and accreditation mandates to document improvements in teaching and learning.

In discussing these findings, student comments regarding teaching and learning were clearly useful to most student centered instructors, who already considered student feedback important to their teaching repertoire. Remarkably half of the teacher centered instructors also considered student opinions helpful to improve teaching and learning. For these two instructors, the assessment activity was most beneficial and perhaps transformative.

Despite the positive impact on some instructors, student comments about teaching and learning were rejected by half of the teacher centered instructors, for whom the comments could have the most potentially constructive impact. Student suggestions to improve their learning could provide guidance regarding student centered teaching strategies. It is possible more time would improve the outcome of this formative assessment activity for all instructors, expanding teacher centered intentions and strategies to include more student centered methods.

Forty-three percent of instructors indicated student responses had an impact on teaching practices.

Sixty-four percent of instructors responded assessment by students had little or no impact on the way they think about teaching and 57% responded it did not impact their teaching practices. Instructors responding assessment by students had no impact on teaching practices primarily cited lack of time in the term to modify lessons, and difficulty determining exactly how to change due to conflicting student

recommendations. Teaching approach was not a factor in instructor perception of change in teaching practices.

Forty-three percent (6 of 14) of instructors indicated assessment by students had an impact on teaching practices. Changes in practice, according to comments in individual interviews, included reducing content to improve comprehension of material, increased group work, decreased lecture, improved classroom management and improved communication about intentions of assignments.

Of particular interest to the researcher in a discussion of these findings was instructor perception of "change" in teaching practice, with respect to improved communication. Some instructors considered improved communication between instructor and students a "change in teaching practice" while others did not. For example, despite judging student assessment "not useful" and having no impact on teaching practice, one instructor mentioned he saw a need to inform students of connections between lecture, assignments and readings in class because student comments showed confusion. He did not consider this change. Another instructor described a useful "change" in his teaching practice: "One thing that I thought was really valuable was having a discussion with them about why I do some things." Finally, another instructor succinctly stated "I didn't so much change what I was doing for them, but it changed the way that I shared with them what I was doing for them...It changed the way that they and I communicated about what was going on." Similarly, communication was described in a previous study in which students completed cards similar to Reflection Cards each day for a semester, most faculty cited improved

communication as a value for formative student assessment (Costello et al., 2002). The next section, student perception of impact of Reflection Cards on teaching practice, will add further to this discussion of findings.

In 71% of classes, at least 70% of students reported positive changes in teaching practices as a result of their comments on Reflection Cards.

During week four, students completed a final Reflection Card, indicating perceptions of changes in teaching practices and summarizing impressions of the use of Reflection Cards. Questions on the final Reflection Card were:

- I believe the Reflection Cards affected teaching strategies used in this class….
- I believe the Reflection Cards affected the way the teacher treated us as learners…
- Overall, I believe the Reflection Cards…

Response rates during week four averaged 60% of students registered in classes. Scored on a Likert scale of one to five, one indicating a very negative impact and five representing a very positive impact on teaching practices, all student responses were between three (no impact) and five.

The findings of this study indicated students believed formative assessment by students had a positive influence on teaching practices. In 71% of classes (10 of 14), at least 70% of the reporting students indicated positive changes (score of four or five) in teaching practices as a result of their assessment. No students indicated a negative impact on teaching practices.

Comments on the final Reflection Cards had common themes across instructors which were sorted into four discrete categories: (a) the cards were

pointless, waste of time, repetitive, did not affect teaching; (b) already have a good teacher but cards could be useful; (c) valuable, improved class discussions, good way to communicate between students and teachers; (d) reflection cards were valuable, teachers addressed problems students were having, helped students recognize and improve their own learning issues.

Although most students indicated improved teaching practices as a result of student comments, a high proportion (more than 30%) of students in five instructors' classes fell into the first category, indicating no change in teaching practices. Three of the five instructors with a high proportion in the first category were strongly teacher centered and two were strongly student centered in their approaches to teaching. Overall, instructors with a teacher centered approach had a lower percentage of students indicating positive changes in teaching practices (57% of students scored instructors with a four or five) than instructors with a student centered approach (74% of students scored instructors with a four or five).

Although instructors with a teacher centered approach may be less likely to consider student knowledge an important determinant for teaching practices, it is assumed that instructors with a student centered approach would be highly responsive to student assessment of teaching and learning. Details articulated in interviews with the two student centered instructors with a high proportion of students indicating no change in practices may inform the discrepancy between their approach to teaching and student perception of their apparent lack of consideration of student feedback. One instructor admitted in a semi-structured interview that he had had little time to review

student comments, so had not considered changes in teaching practices. His student comments supported his admission: “I think the Reflection Cards gave good information but may not have been reflected. There was no change in lesson plans, which is OK.” Interestingly, 51% of this instructor’s comments indicated positive change in his teaching practices. Perhaps simply asking students for input impacts their perception of the learning environment, whether or not suggestions are actually discussed or implemented.

The other student centered instructor with minimal changes in teaching practices was in the second year of a new strongly student centered teaching method with a prescribed protocol. She used assessment by students as a way to communicate intentions and protocol to her students, but was unable to make many changes that might impact protocol.

In a previous study about “reaction cards,” students completed cards similar to Reflection Cards each day for a semester. Midsemester comments were analogous to student comments in this study, emphasizing improved communication and recognition of student needs by instructors, including comments such as “Shows the instructor is open to our needs” (Costello et al., 2002, p. 27). By the end of the semester, comments were still primarily positive, but, as in this study, more comments reflected the cards had become “burdensome and tedious” (p. 30). Some comments on the final Reflection Cards in this study were also concerned with the repetitiveness of the Cards, but these were infrequent and primarily associated with instructors whose teaching practices did not change much.

In general, student perceptions regarding changes in teaching intentions and strategies were aligned with instructor perceptions. Of the six instructors indicating assessment by students impacted their teaching practices, five were considered by their students to have modified their practices. Only one instructor believed she changed her practices according to student suggestions, but her students disagreed. This instructor was highly student centered, and was using a new student centered teaching method considered difficult by many of her students. It is possible her inability to accommodate student recommendations because of a new prescribed protocol explains inconsistencies between student and instructor perceptions. Two instructors ranked in the lowest category of "no change" in teaching practices were in agreement with students regarding their placement. One of these instructors, who was highly teacher centered, commented to the researcher that he expected assessment by students to have little impact on his teaching, since his lectures were "scripted." The other instructor, who was student centered, admitted he had not reviewed student comments thoroughly, so had made no changes in practice.

Three instructors ranked in the category of most change by students stated they made no changes in teaching practices as a result of student comments. There are likely a variety of reasons for this, including perception of the definition of "change." During interviews, it was clear some instructors thought they made minor adjustments and clarified assignments but did not consider those "changes in teaching practice." It is possible students considered the adjustments "change."

Overall, instructors and their students had similar perceptions of the impact of student comments on teaching practices.

Ninety-three percent of instructors stated they would use Reflection Cards or a similar formative assessment by students in future courses.

Thirteen of 14 instructors indicated they would use Reflection Cards or something similar in the future, or already have instituted formative student assessment in their courses. This is an important finding, since formative assessment by students needs to be manageable and informative enough to repeat or it is unlikely to be utilized. Most of the instructors considered midterm assessment important, since the traditional end of term student evaluations were not helpful for improving current student learning. Only one instructor stated he was unlikely to use assessment by students in the future, since he did not consider the information he received valuable with regard to his teaching practices.

Recommendations for Practice

Although educational research has evolved over decades, providing a framework for improved teaching and learning, pedagogical and assessment strategies in higher education remain mostly unchanged (Young & Irving, 2005; Sperling, 2003). Promoting changes in teaching approaches that more positively influence student learning involves "helping teachers become more aware of areas where changes are most needed—in terms of student perceptions and learning outcomes—in a respectful guided reflection process that allows teachers to take personal responsibility for identifying areas of change" (McCombs, 2002, p. 185).

Student perceptions of beneficial teaching and learning strategies were used in this study, providing a "respectful guided reflection process" for instructors. Relevant and personally meaningful comments from current students informed and influenced instructors' intentions and practices in a cost effective, minimally invasive manner.

Recommendations for practice encourage midterm formative student assessment, allowing students a voice in their own learning, as a relevant way of promoting learner centered teaching approaches. Specific recommendations for practice are listed:

- Encourage Reflection Cards as a midterm student assessment of teaching and learning practices in any manner that makes sense to instructors (may be specific or broad questions).
- Address students after they have submitted comments, confirming comments have been read, whether or not changes ensue.
- Limit evaluations to once or twice in a term, since many students considered three weekly assessments burdensome and tedious.

Recommendations for Leadership

Accreditation policies mandate documentation of improved teaching and learning, but institutional leaders who go beyond simple accountability and "understand the larger vision," using assessment data to "develop the institution's capability to attend to student learning," have the potential to reshape higher education culture (Shupe, 2007, p. 56). Transforming higher education culture from primarily behaviorist, or teaching centered to more constructivist, or student centered will improve learning opportunities for more students with a wider range of starting points and preparation (Buckridge & Guest, 2007; Hansen & Stephens, 2000).

After decades of traditional behaviorist practices and beliefs, moving from a teaching paradigm to a learning paradigm is a monumental change in educational culture. Leaders recognizing faculty as learners, encouraging and modeling student centered learning principles while helping faculty learn, will be most successful. Ewell's Eight Principles of Learning will inform leaders of how instructors, as empowered learners, gather and construct knowledge for themselves. Using midterm formative student Reflection Cards provides instructors a "compelling presenting problem" on which to focus their own learning, while the other principles shape faculty progression as learners.

1. The learner is not a "receptacle" of knowledge, but rather creates her learning actively and uniquely.
2. Learning is about "meaning making" for an individual learner by establishing and reworking patterns, relationships and connections.
3. Every student can learn—and does learn—all the time—with us or despite us.
4. Direct individual experiences decisively shape individual understandings.
5. Learning occurs when the learner is "ready" to learn.
6. Learning occurs best in the context of a compelling "presenting problem."
7. The results of learning atrophy if they are not exercised, while frequent feedback multiplies the already-strong learning effects of practice.

8. Learning occurs best in a cultural and interpersonal context that supplies a great deal of enjoyable interaction and considerable levels of individual support (Ewell, 1997).

To implement the process of student Reflection Cards, or another formative assessment process to improve teaching, leaders must employ the eight principles of learning as faculty implement new teaching strategies to help improve student learning. Leaders acknowledging the variety of ways faculty learn, while providing opportunities for collaboration with other instructors similarly modifying practices will improve the potential for transforming educational culture and improving learning for all students.

Implications for the Leadership of this Researcher

Palmer (2007), professor, author, and leader, described a need for educating a "new professional [who can] confront, challenge, and help change the workplace" (p. 3) to improve society's institutions. A "new professional" Palmer described, is "not only competent in his or her discipline but has the skill and the will to deal with the institutional pathologies that threaten the profession's highest standards" (p. 3).

Highest standards in postsecondary institutions include improved accountability for a higher quality education for an increasingly diverse population of students. To prepare students to be "new professionals," faculty in higher education must become the first new professionals and "confront, challenge and help change the workplace" of postsecondary education, responding to external mandates to address the pathologies threatening the highest quality academic achievement for all students.

Instructors in postsecondary institutions must acknowledge and embrace their roles in promoting improved learning for every student, while transforming students' worldviews and conceptions.

Through the Educational Leadership program at Lewis and Clark College and through research completed as part of that program, this researcher has become a "new professional," with the skill and the will to "confront, challenge and help change" the community college workplace to improve student learning and maintain highest institutional standards. Improved academic achievement for all students must begin with transforming faculty intentions and teaching approaches from primarily behaviorist, or teacher centered to more constructivist, or student centered approaches. This research showed adult learners are capable of and willing to contribute information to faculty about their diverse learning needs, providing an effective mechanism for promoting student centered teaching approaches. Reflection Cards established an opportunity for students to engage in their learning while helping instructors identify specific teaching strategies to improve their learning, and most faculty were receptive to student comments.

As Department Chair and college wide Assessment Specialist, this researcher has the opportunity to influence faculty and improve student learning by recommending implementation of Reflection Cards by a large number of faculty in a wide range of disciplines. As a leader, this researcher will use formal and informal faculty development opportunities to begin conversations about faculty intentions and teaching approaches, helping students and faculty recognize the value of student

opinion and engagement in their own learning. Some planned formal faculty development strategies include quarterly newsletters addressing differences in teaching intentions and strategies, faculty brown bag lunch hour instruction regarding formative assessment strategies including Reflection Cards, a break out session regarding this research specifically at faculty annual inservice day, and individual instructor assessment planning meetings held with faculty as needed. These conversations should ultimately help influence a cultural change on the community college campus, emphasizing improved academic achievement for all students, and educating new professionals, with the skill and the will to maintain high professional standards in society's institutions.

Data obtained from this study will be shared with Trigwell and Prosser, developers of the ATI-R survey, an agreed upon condition for use of the instrument. These data will contribute to the larger global collection of similar data, describing uses for and impacts of interventions on the ATI-R survey.

Recommendations for Future Research

Accreditors, students, employers and others are calling for more accountability for improved academic achievement for all students in postsecondary institutions. Student centered teaching approaches are recommended to improve student learning for a more diverse student population (Buckridge & Guest, 2007; Hansen & Stephens, 2000). Although researchers have provided a framework for improved teaching and learning, faculty in higher education are not typically trained in pedagogical strategies or assessment of student learning (Vermunt & Vermetten, 2004; Young & Irving,

2005). This study described a strategy to help improve teaching and learning, employing student centered formative assessment, and providing guidance regarding student centered approaches to teaching.

This study was limited to volunteer faculty in two departments within a community college. Although teaching approaches within the departments in this study were not aligned with previous studies, teaching beliefs, intentions and strategies have been reported to vary across disciplines (Norton et al., 2005, p. 554). Using Reflection Cards to as formative student assessment in different departments, including all disciplines campus wide would be informative about teaching approaches as well as the impact of assessment by students on different instructors, and improve reliability of this research.

Participants in this study were all volunteers and potentially more student centered than the majority of instructors in postsecondary institutions. To enhance reliability, implementing midterm evaluation using Reflection Cards in all courses on campus may generate data applicable to a wider range of faculty in postsecondary institutions.

This study involved only instructors at a community college. Repeating the study using Reflection Cards midterm at a 4-year college or university would increase utility of the data across higher education.

Finally, using midterm evaluations over a longer period of time may generate a greater movement toward student centered teaching approaches among faculty. This is a cost effective, minimally invasive strategy that may impact postsecondary learning

culture. Implementing Reflection Cards over the course of a year, with a before and after assessment survey to determine approach to teaching would be valuable and would help document improved teaching as mandated by accreditation policy.

Summary

Postsecondary faculty face certain change in their classrooms as expectations for improved student achievement and increased accountability for learning become more explicit. With increasing demands by accrediting agencies, employers, students and others to provide evidence of improved teaching and learning, it is essential faculty in higher education extend teaching approaches from primarily behaviorist, or teaching centered approaches to include more constructivist, or student centered approaches. With more comprehensive approaches to teaching, learning, and assessment, more diverse students will realize academic success.

Mandated improvement of teaching and learning is difficult without guidance, though, since postsecondary faculty have little training to augment their current pedagogical and assessment strategies. Understanding how students learn and adapting pedagogical strategies to improve learning must be obtained in an efficient, cost effective manner that is easily accessed by current faculty. Formative assessment techniques such as Reflection Cards implemented at midterm provide information about learners' needs, including specific suggestions to increase effective teaching practices. Indeed, a meta-analysis of midterm student evaluations of teaching and learning showed a positive impact on teaching effectiveness. (Cohen, 1980). Importantly, although overall approaches to teaching were not significantly impacted

by assessment by students, this study showed students perceived a very positive impact on teaching practices, with at least 70% of students in 71% of classes reporting positive changes. Forty-three percent of the instructors in this study modified teaching practices, based on student recommendations, to improve student learning.

Formative assessment strategies help inform instructors about learners' needs, and may also empower students by giving them a voice in their own learning. This study and others have shown student assessment to lower "classroom barriers between teachers and students" and "communicated to students that instructors care about their opinions and ideas" (Goldstein, 2007, p. 78). Course adjustments made midterm provide students a chance to influence their own learning, as well as a greater sense of control and belonging (Costello et al., 2002; McCombs, 2001). Reinforcing previous research results, midterm student assessment in this study was shown to engender positive feelings of value by students, whether or not actual changes in teaching practices occurred.

Previous research described five primary purposes for using student assessment techniques:

- To obtain feedback on the effectiveness of and student satisfaction with teaching and classroom activities;
- To improve teaching;
- To monitor students' learning;
- To improve students' learning;
- To improve communication and collaboration with students (Steadman, 1998).

Reflection Cards in this study provided student feedback supporting each of the intentions for formative assessment. Nearly all of the instructors in this study

stated they would use Reflection Cards or a similar formative assessment strategy again, indicating this formative assessment was manageable and informative.

Use of Reflection cards for improving teaching has been shown to be a cost effective, minimally invasive strategy that has a positive impact on teaching in higher education. Asking for student views and perceptions of the learning environment clearly improves student-teacher communications and provides guidance for teachers to take responsibility for improved teaching. Ultimately, student feedback may generate movement toward a more learning centered culture and, most critically, improved academic achievement for a diverse learning population.

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APPENDIX A

APPROACHES TO TEACHING INVENTORY-R

APPROACHES TO TEACHING INVENTORY-R

This inventory is designed to explore a dimension of the way that academics go about teaching in a specific context or subject or course. This may mean that your responses to these items in one context may be different to the responses you might make on your teaching in other contexts or subjects. For this reason we ask you to describe your context.

Please name the subject/course of your response: . . . . . .

For each item please circle one of the numbers (1-5). The numbers stand for the following responses:

1 - this item was **only rarely or never** true for me in this subject.
2 - this item was **sometimes** true for me in this subject.
3 - this item was true for me **about half the time** in this subject.
4 - this item was **frequently** true for me in this subject.
5 - this item was **almost always or always** true for me in this subject.

Please answer each item. Do not spend a long time on each: your first reaction is probably the best one.

		only rarely				almost always
1.	In this subject students should focus their study on what I provide them.	1	2	3	4	5
2.	It is important that this subject should be completely described in terms of specific objectives that relate to formal assessment items.	1	2	3	4	5
3.	In my interactions with students in this subject I try to develop a conversation with them about the topics we are studying.	1	2	3	4	5
4.	It is important to present a lot of facts to students so that they know what they have to learn for this subject.	1	2	3	4	5
5.	I set aside some teaching time so that the students can discuss, among themselves, key concepts and ideas in this subject.	1	2	3	4	5
6.	In this subject I concentrate on covering the information that might be available from key texts and readings.	1	2	3	4	5
7.	I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop.	1	2	3	4	5
8.	In teaching sessions for this subject, I deliberately provoke debate and discussion.	1	2	3	4	5
9.	I structure my teaching in this subject to help students to pass the formal assessment items.	1	2	3	4	5
10.	I think an important reason for running teaching sessions in this subject is to give students a good set of notes.	1	2	3	4	5
11.	In this subject, I provide the students with the information they will need to pass the formal assessments.	1	2	3	4	5
12.	I should know the answers to any questions that students may put to me during this subject.	1	2	3	4	5
13.	I make available opportunities for students in this subject to discuss their changing understanding of the subject.	1	2	3	4	5
14.	It is better for students in this subject to generate their own notes rather than copy mine.	1	2	3	4	5
15.	A lot of teaching time in this subject should be used to question students' ideas.	1	2	3	4	5

16.	In this subject my teaching focuses on the good presentation of information to students.	1	2	3	4	5
17.	I see teaching as helping students develop new ways of thinking in this subject.	1	2	3	4	5
18.	In teaching this subject it is important for me to monitor students' changed understanding of the subject matter.	1	2	3	4	5
19.	My teaching in this subject focuses on delivering what I know to the students.	1	2	3	4	5
20.	Teaching in this subject should help students question their own understanding of the subject matter.	1	2	3	4	5
21.	Teaching in this subject should include helping students find their own learning resources.	1	2	3	4	5
22.	I present material to enable students to build up an information base in this subject.	1	2	3	4	5

Prosser/Trigwell, 2005 (cited in K. Trigwell, personal communication, July 5, 2008) Thank you

APPENDIX B

SEMI-STRUCTURED INTERVIEW QUESTIONS FOR FACULTY

Semi-Structured Interview Questions for Faculty

1. How long have you been teaching?

2. What is your overall impression of the use of Reflection Cards?

3. Considering your responses on the survey, did the feedback from your students change how you think about teaching or learning or not? Please describe any changes, from how you used to think to how you think now.

4. Considering your responses on the survey, did the feedback from your students change your teaching practices or not? Please describe any changes.

5. Will you use Reflection Cards in future courses? Why or Why not?

6. Is there anything else you'd like to add? Thank you so much for participating!