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ABSTRACT

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A Longitudinal Examination of the Cognitive and Affective Behaviors Among Dietetic Students in a Didactic Program in Dietetics.

Food Science and Nutrition Dr. Barbara Lohse Knous, PhD, RD, CD 12/99 239 pages

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The goal of dietetics education is to produce professionals who exhibit the problem-solving and critical thinking skills needed in a profession under continuous transformation (Chernoff 1997b, 539). Little research exists, however, that examines whether dietetic students possess the required attributes to survive and adapt to a constantly changing environment. To assist educators in providing an environment that facilitates optimal learning and is emotionally rewarding for their students, an understanding of the learning and affective behaviors of dietetic students must be investigated. Furthermore, a longitudinal design is required in order to evaluate the full scope of the educational process on these behaviors. The purpose of this study was to

examine the cognitive and affective behaviors among dietetic students progressing through a didactic program in dietetics at the University of Wisconsin-Stout.

Cognitive behaviors examined focused on the learning processes of memorization, reflection, and conceptualization, approaches to studying (e.g., students, texts), information memorized and retained, learning experience, epistemological beliefs, advice for studying, and motivators for learning. Affective behavior study concentrated on self-esteem and locus of control. Professional and personal goals, and enablers and obstacles to goal attainment were also investigated. Data were obtained from the Cognitive Behavior Survey, Rosenberg Self-Esteem Scale, and Rotter Internal-External Locus of Control Scale, and a Goal Analysis Questionnaire. Survey sets were administered to two groups of dietetic students in fall 1995 and 1996 in an introductory course *Dietetics as a Profession.* Survey sets and a Demographic Data Form were re-administered to the 1995 students in 1997, and to the 1996 students in 1998. Using a general linear model, multivariate analysis, the 1995 and 1996 cohorts were collapsed into one representative sample for 17 of 20 variables examined. Most notable, a significant decrease in positive learning experience was observed (PLE) (t 4.08, df 34, p <.0001) from baseline to follow-up. In particular, students found their experience significantly less enjoyable (t 3.50, df 34, p .001) and more tedious (t 4.33, df 34, p <.0001). Working in a field of interest was a major goal that would be met by a career in dietetics at baseline. Fewer students reported this goal as being met at follow-up. Self-motivation was the biggest enabler to goal attainment. Programmatic issues, time management, and financial concerns were consistent obstacles. Seeking help from

others, practicing good time management, and reviewing material were advised as effective for studying at baseline, but reviewing material and help-seeking were less practiced at follow-up. Students were motivated to learn primarily by the presence of competition as they progressed through the program.

A decline in favor toward reflective thinking, transfer status, competition, and burnout were possible reasons for the perceived negativity toward the learning environment. Incorporation of problem-based learning into the dietetics curriculum may enhance critical thinking and collaboration, and provide for a more positive learning experience.

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ILLUSTRATIONS

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ABBREVIATIONS

ADA – American Dietetic Association

ADN – Associate Degree Nursing

BSN – Bachelor of Science Nursing

CBS – Cognitive Behavior Survey

CDR – Commission on Dietetic Registration

CP – Coordinated Program

CS – Conceptualization Scale

DDF – Demographic Data Form

DPD – Didactic Program in Dietetics

DTP – Distinguished Third Party

EC – Externally Controlled

GAQ – Goal Analysis Questionnaire

GPA – Grade Point Average

IC – Internally Controlled

I-E LOC – Internal-External Locus of Control

ILT – Interactive Learning Track

LBC – Lecture Based Case

LBL – Lecture Based Learning

LPN – Licensed Practical Nursing

MS – Memorization Scale

MSLES – Medical Student Learning Environment Survey

MSLQ – Motivated Strategies for Learning Questionnaire

PBL – Problem Based Learning

PCC – Primary Care Curriculum

PLES – Positive Learning Experience Scale

RS – Reflection Scale

SE – Self-Esteem

SOE – Standards of Education

UDP – Undergraduate Dietetic Program

UDS – Undergraduate Dietetic Students

CHAPTER I

INTRODUCTION

> The dogmas of the quiet past are inadequate for the stormy present and future. As our circumstances are new, we must think anew, and act anew.
>
> Abraham Lincoln (Parks 1998, 311)

An Era of Change

As the dietetics profession enters the 21st century, Sneed and Gregoire (1998, 860) emphasize the need for "down-board thinking." In other words, assess the direction and position of the dietetics profession, plan how best to achieve that position, and oversee the execution of the strategy. Parks (1994b, 451) identified an increasing number of trends that would reshape the health care industry and dietetics practice. Five major trends identified by Parks included: (1) hospital downsizing, (2) appearance of mergers and coalitions, (3) shift toward managed care and managed competition, (4) formation of integrated networks, and (5) alterations in referral patterns. In addition, Chernoff (1997a, 75) acknowledged the impact technology would have on the profession, and the necessity for dietetic professionals to stay abreast of current technological advances. According to Parks (1994a, 89):

> As new technologies reshape how, when, and where we practice, we will be able to reach a larger population . . . Practitioners will have to rethink old assumptions, question old traditions, abandon old processes, and embrace a new vision for how they will offer services. . . We must be willing to take risks and to become more aware of how environmental changes affect daily lives. . . Our greatest danger is to deny the reality of a constantly changing environment.

With the revision of the American Dietetic Association's Standards of Professional Practice, which are statements identifying the minimum expectations of dietetic professionals (Brakke et al. 1998, 83), and the Commission on Dietetic Registration's redesigned recertification process for dietetics professionals, Professional Development 2001 (Dahl and Leonberg 1998, 589), the competencies and capabilities of dietetic practitioners are recognized. Dietetic professionals must demonstrate the ability to practice reflection, goal setting, self-evaluation, and to develop, implement, and evaluate a learning plan to meet his/her needs and its effect on practice, with an emphasis on lifelong learning (Dahl and Leonberg 1998, 590). Fitz (1997, 1014) further commented that future dietetic professionals must possess the skills necessary to compete in an ever-changing health care arena. She further stresses participation in lifelong learning to maintain a current knowledge base not only of food, nutrition, and health, but technology and marketing trends, thus challenging dietetic educators to develop new educational styles.

Dietetics Education: Need for Curriculum Evaluation

Chernoff (1997b, 539) asserts that as the 21st century nears, one goal of undergraduate dietetic programs should be to guarantee that graduates demonstrate the ability to think critically. Owen and Rinke (1986, 377) affirmed that the most crucial skills dietetic educators can offer their students are the ability to demonstrate a commitment to lifelong learning, think innovatively, and to identify and improve on one's educational inadequacies. According to recommendations from the Educational Competencies Steering Committee, education programs need to focus on food, outcomes

research, and public policy, enhance management and communication skills, and teach lifelong learning skills, such as problem solving and critical thinking (Fitz 1997, 1014). In addition to problem solving and critical thinking, skills exemplified by lifelong learners should include self-directed learning skills, metacognitive skills, such as self-awareness and reflection, and the ability to locate, evaluate, organize, and utilize relevant information (Duyff 1999, 542). Traits characteristic of lifelong learners include a motivation to learn, a personal responsibility for learning, demonstrating the confidence to learn and share knowledge with others and learn from mistakes, flexible thinking, and persistence.

Research has indicated that dietetic practitioners lack certain skills and competencies. Schiller, Foltz, and Campbell (1993, 869) observed that a number of dietitians possessed dependent, self-defeating conduct. According to a critique by employers, incoming dietetic professionals were deficient in the areas of technology, systems thinking, information management, interpersonal relations, and utilization of cost-effective resources (Parks 1998, 320). Dietitians surveyed in a study by Boudreaux, Shanklin, and Johnson (1991, 1231) indicated that their undergraduate education failed to adequately prepare them for practice in business and industry. The authors emphasized that the success of dietitians in business and industry is in part, contingent on the opportunities offered in dietetics education.

To assist dietetic educators in promoting desirable attributes among their students, Silagyi-Rebovich (1996, 134) suggested that educators evaluate their curriculum to determine if their assessment techniques facilitate critical thinking skills and self-directed

or rote (memorization) learning strategies. Silagyi-Rebovich (1996, 8) further remarked that dietetic educators' selection of appropriate teaching methods to meet various learning requirements would be enhanced by an awareness of the cognitive and affective behaviors of their students. Research documenting the cognitive (learning) and affective behaviors among dietetic students, however, is virtually non-existent. Furthermore, longitudinal research is required to evaluate the full scope of the educational process on these behaviors.

A Longitudinal Examination of Cognitive and Affective Behaviors Among Dietetic Students Progressing Through a Didactic Program in Dietetics

The primary objective of this study was to investigate the changes in learning and affective behavior among dietetic students' during advancement through the dietetics program at UW-Stout. Specifically, the study sought to:

1. Examine the change in dietetic students' use of memorization, conceptualization, and reflection during progression through the DPD.

2. Delineate the resources (e.g., students, texts) utilized by dietetic students as a source of science, health, and nutrition knowledge, and how these resources change during program involvement.

3. Identify how the amount of information dietetic students devote to memorization, and the amount remembered three months and one year after completing a final exam change as students advance through the DPD.

4. Describe the change in dietetic students' perception of the ambiguous, definitive, and stable nature of nutrition knowledge as they progress through their academic studies.

5. Characterize dietetic students' perceptions of their learning experience (e.g., enjoyable, rewarding) in science, health, and nutrition courses over the course of their education.

6. Describe the change in dietetic students' self-esteem and locus of control during participation in the DPD.

7. Explain how the professional and personal goals, and enablers and obstacles to these goals change among dietetic students during progression through the DPD.

8. Delineate effective studying methods utilized by dietetic students at the inception and near completion of their dietetic studies.

9. Determine the motivational forces behind dietetic students desire to learn, and how these motivators change during program involvement.

To ascertain if the behaviors exhibited by novice and experienced dietetic students at UW-Stout were institution or discipline specific, comparisons were made between novice and experienced UW-Stout dietetic students and novice and experienced dietetic students from two universities in the Wisconsin system (School A and School B), and novice and experienced business students at UW-Stout, respectively.

Assumptions of the Study

It was assumed that students were honest and credible in their responses on the survey sets and that the responses were true reflections of their feelings, opinions, and practices.

Delimitations of the Study

The longitudinal scope of this study was limited to dietetic students at the University of Wisconsin-Stout who were enrolled in the 1995 and 1996 fall semesters of *Dietetics as a Profession,* and were still continuing in the program in 1997 and 1998, respectively. The study was also limited to School A novice dietetic students enrolled in an introductory nutrition course in fall 1998, School A experienced dietetic students

enrolled in an advanced nutrition course in fall 1997, novice and experienced dietetic students enrolled in the dietetics program at School B in spring 1998, UW-Stout novice business students enrolled in an introductory business administration course in fall 1998, and UW-Stout experienced business students enrolled in an advanced business course in spring 1998.

Limitations of the Study

Potential sources of bias were possibly a result of the longitudinal study design. History and the effect of testing are two extraneous variables that can jeopardize internal validity in a pre-test, post-test design. History, according to Campbell and Stanley (1963, 9), is associated with events that occurred between pre and post that might influence study findings. They reported that optimism might vary between pre and post due to anxiety with semester examinations.

The effect of testing relates to conditions dealing with anonymity, and a focus on questions that are deemed acceptable (Campbell and Stanley 1963, 9). In other words, students might be hesitant to honor truthfully in fear of being identified, or respond to questions according to what they think is expected, rather that their own beliefs.

Another source of bias related to internal validity, termed instrumentation, was introduced by the researcher, who was a classmate and friend of some of the study participants, and by the researcher's advisor, who was an instructor of an advanced nutrition course in which some of the study participants were enrolled. According to Campbell and Stanley (1963, 9), if human observers are used to provide pre and post measurements, learning processes within the observers will produce pre and post

differences. In addition, shifts between pre and post may occur if the researchers are familiar with the particular subjects.

Organization of the Thesis

This thesis is divided into five chapters. A review of literature is presented in Chapter II, followed by a description of the methodology in Chapter III. Results are reported in Chapter IV, which describes the subjects, followed by representative comparisons, with the study objectives addressed at the end. A discussion of the results, conclusions, and recommendation for future research is contained in Chapter V.

CHAPTER II

REVIEW OF LITERATURE

Dietetics: A Profession Fraught with Change

Addressing the future of the dietetics profession, practitioners are facing considerable challenges as a result of the restructuring of health care delivery and the food industry. Such challenges include maintaining a current knowledge base and a commitment to lifelong learning, demonstrating the ability to provide measurable, high-quality, and cost-effective care, and cultivating a sense of urgency in re-configuring education for the profession (Parks 1998, 316). Furthermore, dietetic professionals are challenged to accept and redefine their roles through the emergence of downsizing, managed care, coalitions and mergers, the integration of networks, referral plans (Parks 1994b, 451), and technological advances (Balch 1996, 1304). For example, more dietitians are turning to management; they are managing entire facilities, multiple facilities, and multiple departments. To advise the health care and foodservice industries, a larger number of dietitians are developing and utilizing computer software. In addition, dietitians are increasingly becoming members of multi-disciplinary teams where the need for cross-trained, flexible, proactive, professionals is essential (Balch 1996, 1302). Pucket (1997, 253) stressed the importance for dietetic professionals to

demonstrate to the public and members of non-dietetic professions that they are appropriately educated and competent.

A Call for Competency

Educators, employers, and practitioners have identified the following competencies, which are statements of performance expected by the beginning practitioner (Chambers et al. 1996, 615) essential for dietetics practice:

> *leadership skills*--having the ability to see and create new opportunities; to create new visions for the profession; and to lead others through the milieu of change that will continue to be part of our professional lives;
>
> *professional and organizational awareness*--understanding of the mission, vision, and goals of the dietetic profession; having the ability to link food and nutrition interventions to the overall health of the individual; seeing how nutrition care fits into the goals of employment sites; and appreciating organizations as dynamic political, economic, and social systems;
>
> *problem-definition and problem-solving skills*--identifying gaps between where a situation is and where it should be and helping others to see how to fill these gaps;
>
> *general business skills*--knowing the economic impacts of food and nutrition interventions; understanding strategic management, marketing, finance, logistics, accounting, and how these business functions work together;
>
> *team building and interpersonal skills*--because of the increasing use of outsourcing and the use of temporary personnel, having strong team-building skills; similarly, having persuasive communication skills to sell new ideas and to obtain support for change;
>
> *entrepreneralism*--having the ability to see new career opportunities, to combine that ability with necessary business skills, and be a risk taker because of short life cycles of most careers; implies a need to challenge traditional roles and prevailing approaches to delivering food and nutrition services;

> *multicultural, multidiversity competence*--having an openness to other cultural values; a global understanding and perspective; and the attitudes, skills, and knowledge to apply a global perspective to clients, colleagues, and employees' needs (Parks 1998, 319).

In addition, the Commission on Dietetic Registration's (CDR) employer survey identified three sets of crucial competencies, with similarities to those described above: conceptual, interpersonal, and technical and clinical (Balch 1996, 1304). Conceptually, dietitians must be able to identify what they need to learn and do so quickly and independently. They must be able to recommend and make decisions, interpret and integrate data, and think critically.

Interpersonal competencies focus on communication and management skills. A dietitian must be able to communicate effectively with patients, clients, policy-makers, team members, and the public. Knowledge of basic management and business skills, as well as the ability to manage their own time; discern and utilize the expertise of others; and develop budgets, contracts, and proposals, are essential. In addition, a dietitian must acknowledge the value of his/her services in the industry and know how best to achieve that value (Balch 1996, 1304).

Technically, a dietitian should be knowledgeable and efficient in the use of current computer technology in his/her field of practice, and be able to apply that technology in the health care and consumer environments (Balch 1996, 1304). Additional competencies include the ability to obtain accurate medical histories and measure vital signs. Clinically, dietitians must have an understanding of biology,

nutrition, and food, and disseminate that information to individual patients and the community. Furthermore, they need to be knowledgeable of what, how, and why people eat, the availability and prices of food in any setting, in addition to understanding the science and technology behind the creation, production, and distribution of food. Balch (1996, 1305) implied that dietetic practitioners must develop these competencies in order to endure in a profession under constant transformation. To meet the requirements of a practice under profound change, the dietetics profession must re-think its educational strategies (Parks 1998, 320).

Dietetics Education

Winterfeldt (1998, 31) remarked that the key to dietetics practice and the future of the dietetics profession is dietetics education. According to Haschke and Maize (1984, 210), in a dramatically changing organization, graduates of dietetics education must be predisposed to execute the required duties of a dietetics practitioner. In 1987, the Standards of Education (SOE) were introduced into dietetics education. Applied to both didactic and experiential learning programs, these standards provided a conventional body of knowledge, skills, and values in dietetics education (Smitherman and Anderson 1987, 1221). To meet these knowledge and skill standards, the curriculum of undergraduate dietetic programs (UDPs) base their coursework on eight key areas of education: communication, physiological and biological sciences, social sciences, research, food, nutrition, management, and health care systems (Winterfeldt 1998, 38).

Two types of UDPs that exist for students pursuing a career in dietetics, are the Coordinated Program (CP) and the Didactic Program in Dietetics (DPD).

Undergraduate Dietetic Programs

Coordinated Program

In the Coordinated Program (CP), students complete the four-year didactic portion, in addition to supervised practice, during the five-year degree program. In supervised practice, students apply the knowledge and skills they've acquired through classroom learning under the supervision of preceptors with various specialties (Sandoval 1998, 46). Students are admitted to the CP in their junior or senior year through a selection process generally determined by grade point average, writing skill, letters of recommendation, work experience, and sometimes an interview. Completion of 900 hours of supervised practice at a hospital, community nutrition site, and foodservice institution is required. Integration of the didactic portion and supervised practice provide for an intense environment, but the advantage of the CP is that once the student finishes the program, he/she is ready to practice (Winterfeldt 1998, 39). There are currently 49 accredited CPs in the United States, versus 235 didactic programs in dietetics (DPD) (CAADE Newsletter, May 1999).

Didactic Programs in Dietetics

In the traditional DPD, students fulfill the four-year didactic portion of the educational requirement during a Bachelor of Science degree program. A number of courses that are required include a combination of classroom and laboratory experience in

such areas as food production, foodservice, clinical nutrition, microbiology, and chemistry. Following completion of the degree, the student pursues supervised practice (Winterfeldt 1998, 38) through one of 250 supervised practice program routes accredited by the Commission on Accreditation/Approval for Dietetics Education (CAADE Newsletter, May 1999), either a dietetic internship or an approved pre-professional practice program (AP4). Compared to a CP, advantages of a DPD include: (1) more time to take elective courses and hold down part-time jobs, (2) the cost, and (3) the location. DPDs are usually less costly to the student and the university because of the larger class sizes and the number of faculty needed. In addition, a larger number of DPDs exist because many universities are not located in areas where they can easily form linkages with health care facilities and other institutions that are able to offer practical experience (Winterfeldt 1998, 38).

Under Standard Four of the Standards of Education, the responsibility of preparing graduates with the expected level of competency to enter dietetics practice is placed on the curriculum of the UDP (Winterfeldt, Bogle, and Ebro 1998, 335). According to the American Dietetic Association's October summary of registration examination results for dietitians, the pass rate for first-time test takers was 87% among students from a CP, and 92% and 84% among students from a dietetic internship and approved pre-professional practice program, respectively (CAADE 1998). Although passage of the registration examination indicates knowledge of selected tenets of

dietetics practice, it does not denote the ability to perform successfully in all areas dietetics practice. A critique by employers revealed that incoming dietetic professionals lack certain competencies, specifically in the areas of technology, systems thinking, information management, interpersonal relations, and utilization of cost-effective resources (Parks 1998, 320).

Competency of the Dietetics Professional: Implications for Education

Parks (1998, 319) identified leadership skills as an essential competency for dietetic professionals. Schiller, Foltz, and Campbell (1993, 872) surveyed dietitians to evaluate their self-perceptions as a means toward enhancing their leadership skills. Two dominant styles of thinking and behavior were identified: self-actualization and dependency. A self-actualization style is described by such terms as optimistic, energetic, spontaneous, independent, realistic, and confident. Individuals dominant on this style have a strong positive self-concept, a continuous need for self-development, and a positive outlook on life. On the flip side, dependency is characterized by self-defeating traits. Persons scoring high on this style are easily influenced, self-doubting, meek, overcautious, and seek direction from others (Schiller, Foltz, and Campbell 1993, 869). Although effective leadership skills were distinctive among many of the dietitians in this study, a substantial number possessed dependent, self-defeating conduct.

Owen and Rinke (1986, 377) stressed to dietetic educators the significance of enhancing the self-image of their students. An analysis of internship and CP graduates and their supervisors' perceptions of the adequacy of educational preparation for supervised practice, showed that graduates rated themselves lower on clinical and administrative competencies, and a majority of knowledge items, compared to supervisory ratings. In addition, supervisors' ratings for the level of performance pertaining to initiative/self-assurance were significantly higher than the graduates' ratings (Gregoire, Vaden, and Hoyt 1986, 1089-1090). This finding validated Owen and Rinke's observations that dietitians are frequently their "own worst enemy." In addition, Owen and Rinke (1986, 377) remarked that the consequences of such self-defeating behavior negatively affect not only dietetic practitioners, but their students, clients, and the profession as well.

Boudreaux, Shanklin, and Johnson (1991, 1231) distinguished the knowledge areas, skills, and attributes needed by dietitians to succeed in business and industry; one area of notable growth for the employment of dietetic practitioners. A total of 299 members of the Dietitians in Business and Industry dietetics practice group participated in the study. Management and communication skills were the two most significant skills reported by dietitians as essential for success in business and industry, in addition to self-confidence, initiative, willingness to work hard, and demonstrating the ability to take risks. These findings were similar to those reported by Kirk, Shanklin, and Gorman (1989, 497) and Parks (1998, 319). Respondents were also asked to rate the adequacy of

their education in preparing them for their position. A finding of concern revealed a perceived inadequacy by respondents of their undergraduate education in preparing them for practice in business and industry. One possible reason cited for this perceived inadequacy of undergraduate training was the failure of educational programs to focus greater attention on management skills. The authors recommended that dietetic educators broaden traditional concepts and approach education with a futuristic view, incorporating learning experiences that will produce dietitians capable to succeed in diverse scopes of practice. They remarked that the "long term success" of dietitians employed in business and industry will depend on the individual's motivation to efficiently prepare for these positions and the educational opportunities provided by dietetic programs and the professional association (Boudreaux, Shanklin, and Johnson 1991, 1232).

Need for Curriculum Evaluation

As dietetics education approaches the 21st century, Chernoff (1997b, 539) believes that one goal of UDPs should be to ensure that graduates are educated young women and men who possess critical thinking and problem solving skills. Owen and Rinke (1986, 377) emphasized in an earlier report that:

> The ability to think creatively and innovatively, to diagnose and remedy one's own educational deficiencies, and to make a commitment to education as an ongoing, lifelong process, are unequivocally *the* most important skills that dietetic educators can provide their learners in this 'time between eras.'

Scott and Markert (1994, 920) reported that the basic premise of medical education is to train students to develop and employ critical thinking and problem-solving skills concerning patient care. Youssef and Goodrich (1996, 77), citing Tanner (1993), emphasized the accountability of nurse educators for designing curricula that produce nurses who can think critically and make sound clinical judgments.

Accordingly**,** Silagyi-Rebovich (1996, 134) suggested that dietetic educators evaluate their curriculum to ascertain if their evaluation methods of student learning promote the utilization of critical thinking skills and the use of self-regulated or rehearsal (e.g., memorization) learning strategies. Furthermore, dietetic educators who are cognizant of students' learning strategies and motivations and their relationship to classroom achievement will enhance their own ability to effectively communicate essential ideas and information to their students. Silagyi-Rebovich (1996, 8), citing several researchers, affirmed that an awareness of the cognitive and affective factors influencing the learning process will assist educators in the selection of appropriate instructional methods to satisfy a variety of learning needs.

Dietitians, like physicians and nurses, are actively involved in patient care, and must demonstrate the ability to think critically, solve problems, and make clinical assessments in an efficient, yet sound manner. The development of competent, knowledgeable dietetic professionals who possess critical thinking ability is the ultimate goal of dietetic educators (Chernoff 1997b, 539). In addition, Schiefele (1991, 316) suggested an interaction between cognitive and emotional factors, noting that emotional

factors influence the desire to use learning strategies, to invest effort, and draw conclusions. To assist dietetic educators in providing an educational climate that produces graduates with the critical thinking and problem solving skills, and an emotional environment required to endure in an ever-changing profession, the cognitive and affective behaviors among dietetic students must be investigated. However, a deficiency of research focusing on these behaviors in dietetics education exists. Nursing and medical education posses an extensive aggregate of research documenting these behaviors, and therefore, may serve as an example for dietetics education, due to similarities in scientific background and clinical application.

To understand the theoretical framework behind a student's desire to learn and the implications for education, cognitive learning strategies, and affective behaviors, which include locus of control and self-esteem, and their relationship to motivation and goal theory, must be reviewed. Before these behaviors can be presented, an initial discussion of learning and cognition is necessary, followed by a description of learning strategies and curricular influences on learning.

Learning and Cognition

Learning, according to cognitive theorists, involves the comprehension of relationships and the interrelationships among ideas (Gorman 1974, 68). A more concrete definition of learning has been defined as "the process by which knowledge and skills are acquired and behavior is changed through self-activity," (e.g. practice,

observation, thinking, and sometimes with the help of a teacher) (Gorman 1974, 62). According to the cognitive perspective, successful learning will occur when persons are able to actively construct and designate meaning to incidents congruous with their own cognitive framework. Research, focusing on how successful learners process information and add to their current knowledge has inspired educators who are cognitively focused to design methods that will promote optimal learning. Such methods include using imagery and metaphors, mapping concepts, collaborative learning groups, self-questioning techniques, and problem-based learning (Brandt 1996, 199). Newble and Entwistle (1986, 164) remarked that the learning strategy a student adopts significantly impacts the quantity and quality of the learning experience.

Description of Learning Strategies

Dansereau (1978), referenced by Singer and Gerson (1979, 229), proposed a definition of learning strategy to be a learner based technique, which when acquired by an individual, could enable them to function efficiently when confronted with the:

a. identification of important, unfamiliar, and difficult material;
b. application of techniques for comprehension and retention of circumstances;
c. efficient retrieval of information under appropriate circumstances; and
d. effective coping with internal and external distractions while these other processes are being employed.

Several instruments to evaluate student learning have been documented in the literature. A discussion of two methods of learning strategy classification follow, one by

the works of Marton and Saljo (1976, 7) and Newble and Entwistle (1986, 164-5), and the other by Mitchell (1994, 163).

Marton and Saljo (1976, 7) have been recognized for identifying two distinct types of learning approaches utilized by students: deep level processing and surface level processing. Learners who adopt a deep approach learn by connecting ideas and relating these ideas to current knowledge of the task. They seek to understand the material, are interested in the subject matter, and are motivated by its vocational relevance (Newble and Entwistle 1986, 164). Learners adopting a predominantly deep learning strategy are reported to remember factual details and have a more complete understanding of material (Marton and Saljo 1976, 7). In other words, deep learners are conceptual, logical, critical, and reflective in their thinking (Cust 1996, 282). A surface approach, on the other hand, is characterized by a superficial level of understanding, the use of rote learning (memorization), and an intent to reproduce information exactly as it was presented. Surface learners are motivated by a desire to complete the course and a fear of failure (Newble and Entwistle 1986, 165).

A third approach to learning, termed strategic level processing, was reported by Newble and Entwistle (1986, 164). Strategic learners are motivated by high grades and competition. These students will implement any learning approach necessary, deep or surface, for success.

Although deep learning has been recognized as the desired learning approach (Newble and Entwistle 1986, 164), Newble and Entwistle (1986, 167-8), referencing

Pask (1976), noted that individuals who consistently adopt a deep approach are not always successful, and differentiated between two types of deep learning: operational learning and comprehension learning. Operational learners, who consistently accept generalizations when they are based only on factual evidence, are more likely to resort to rote learning, especially under time constraints, a concept termed *improvidence.* The comprehension learner, on the other hand, focuses on the interrelationship of ideas and their connections to previous knowledge, but may be too eager to accept generalizations without searching for supporting evidence, a concept referred to as *globetrotting.* Successful students those who are versatile in their learning, altering their approach to conform to the learning task at hand. Difficulty in distinguishing an operational learner from a surface learner, and a strategic learner from one who utilizes both deep and surface approaches, can be lessened by identifying motivational and intentional components.

Relating to the research by Marton and Saljo (1976) and Newble and Entwistle (1986), are the areas of learning covered by the Cognitive Behavior Survey (CBS) (Mitchell 1994). The four components of learning behavior examined are: (1) general cognitive processes; (2) cognitive illustrations; (3) approaches to studying; and (4) student perception of the amount of material learned, retained, memorized, and crammed (Mitchell 1994, 161).

The cognitive processes of learning examined in the CBS include students' use of memorization, conceptualization, and reflection. Memorization focuses on the practice

of rote-learning methods (e.g., creating mnemonic devices), students' perception of the role memorization plays in their learning (e.g., “It is a fast way to learn.”), and the existence of memorization in students' method of understanding, (e.g., "As I read, I identify information which I will memorize later."). Conceptualization refers to the practice of visualization, model-building, and creation of analogies. Reflection applies to the process of thinking about what and how one has learned, which includes the integration of previously learned material with new information, concern over organization of material, and the evaluation of one's knowledge. Students are asked to rate their use of reflection for questions like "How frequently do you construct relationships among material covered within a course to build larger and larger concepts?" and "To improve your understanding of material, do you read and study background material?" (Mitchell 1994, 163).

The second component of learning behavior sampled by the survey involves the cognitive illustrations students build to represent what they've learned. Students' perception of the importance of memorization and visualization to their learning in science and nutrition courses is rated on a 7-point semantic differential scale (1=Little Importance; 7=Major Importance). Some samples of items include: "The ability to memorize large amounts of material in a short period of time." and "The ability to formulate conceptual models which explain the cause-effect relationships of different process.") (Mitchell 1994, 163).

Student approaches to studying are examined in the third component of learning behavior. Note taking strategies and the amount of group study are rated on a semantic

differential scale. Note taking strategies are rated (1=Not Representative; 7=Very Representative) for comments such as "As I read, I make notes in the margins," and "As I read, I make notes of points I do not understand to research at a later time." The amount of group study is also rated (1=Seldom; 7=Frequently) for scale items such as "How often did you study with other students prior to an exam?" and "Have you studied with another student(s) on a regular basis?" Moreover, students are asked to estimate what percent of their knowledge has come from each available source (e.g., lectures, faculty outside of class, textbooks). Furthermore, an open-ended question posed to students is: "What advice would you give to a student just beginning to study science, health, and nutrition on how to study?" (Mitchell 1994, 164).

The last component of learning behavior instructs students to estimate the percent of material learned: (a) by the end of a course; (b) by the end of a course through memorization; (c) after three months upon completion of a course; (d) after one year upon completion of a course; (e) as a result of cramming for exams in science, health, and nutrition courses; (f) was devoted to memorization for science, health, and nutrition courses; and (g) was wasteful and ineffective study time for science, health, and nutrition courses (Mitchell 1994, 164). Newble and Entwistle (1986, 169) remarked in their review that the approach a student employs to learn is not only attributed to their personal

motivations and intentions, but may be influenced, in part, by curriculum structure.

Influence of Curriculum Style on Learning

To explore the influence of curriculum style on the learning process, several researchers have compared the learning strategies among students enrolled in two curricular formats: traditional/conventional and problem-based learning. A discussion of each follows.

Traditional/Conventional Instruction

Distinctive to traditional/conventional instruction is a teacher-centered learning environment (Boud 1985, 15) in which students generally gather for large-group lectures, although some courses include corresponding structured laboratory experience (Albanese and Mitchell 1993, 54). Through a set of learning objectives and assignments, the instructor is solely responsible for what and how students learn, the sequence and pace of information presented, and the method of assessment (Boud 1985, 15), which is typically through periodic multiple-choice exams (Albanese and Mitchell 1993, 54). Concern with traditional/conventional instruction is that it fosters a short-term goal of passing an examination, thereby relinquishing any desire for deep learning and any experience of learning for mere pleasure (Albanese and Mitchell 1993, 61).

Newble and Entwistle (1986, 164) reported that assessments requiring students to merely recall information tend to encourage a surface approach to learning, even among

students who predominantly employ a deep approach. On the other hand, a deep approach is fostered as students anticipate that an exam will necessitate a greater level of cognition. They believed that less emphasis should be given to the reproduction of factual information in both day-to-day contact and in assessments, and a failure to do so will only encourage rote learning. When designing assessments, skills and attributes, rather than recall of factual knowledge, should be evaluated and rewarded to ensure desirable outcomes (Newble and Entwistle 1986, 172). The overall focus of traditional/conventional instruction is on the end product, rather than the process of knowledge acquisition, and the teaching of theory before practice, rather than interweaving the two, a characteristic of problem-based learning (PBL) (Boud 1985, 15).

Problem-Based Learning (PBL)

Problem-based learning is a student-centered method of instruction. Students gather in small groups to solve problems driven by the utilization of case studies (Boud 1985, 15, Albanese and Mitchell 1993, 53 & Woods 1994, 2-2). Typical of a PBL format, the role of the teacher is transformed from instructor to that of facilitator, students' experiences serve as contributions to the learning process, concentration is on the process of learning and knowledge acquisition, and evaluations are conducted through student self- and peer-assessments (Boud 1985, 15). The basic outline of a PBL process includes: (1) encountering the problem, (2) presentation of the problem in a manner typical of a real-life situation, (3) problem-solving with clinical reasoning skills and

identifying learning needs, (4) self-study, (5) applying newly gained knowledge and skills to the problem, and (6) summarizing what was learned and integrating it with prior knowledge and skills (Boud 1985, 14).

Albanese and Mitchell (1993, 62) noted in their review that PBL students were less likely to study for short-term recall, but more likely to analyze what they needed to know and integrate prior knowledge with current information. In addition, because PBL integrates well-written real-life scenarios into the context of the learning environment, there is greater transfer of knowledge into the clinical setting. Newble and Entwistle (1986, 169) remarked that a student's awareness of the applicability of the content and the amount of factual cognizance required to learn impacts the learning process. Regarding a learning task as irrelevant or anxiety inducing has been shown to strengthen the use of surface learning. In addition, Newble and Entwistle (1986, 170), citing Fransson (1977), noted that a failure to interest students in the vocational relevance of the subject matter will likely discourage the more desirable deep approach, especially when students are under time constraints. Newble and Gordon (1985, 7) remarked that educators who strive to promote self-directed and life-long learners must develop a greater focus on the learning strategies students use to approach the educational activities imposed on them.

Learning Strategies in Education

A summary of research on learning strategies in nursing, medical, and dietetics education is displayed in table 1 on pages 28-29. A discussion of the non-longitudinal research follows. Longitudinal research is presented after a discussion of goal theory.

Learning Strategies in Nursing Education

Stiernborg, Guy, and Tinker (1997, 125) examined study approaches of undergraduate nursing students. A total of 316 students; 107 first year, 115 second year, and 94 third year, completed the Approaches to Studying Inventory at the end of the academic year. The one significant finding among the three classes of students was a higher score on achieving orientation, characterized by motivation for high grades and competition, for third year students compared to second year students. This finding was attributed to the fact that third year nursing students, upon arriving at the end stage of their training, had reached a saturation point as they anticipated entry into the professional arena. Overall, no change in nursing students' study orientation was observed among the first and third year students. This finding indicated a possible need for the nursing curriculum to better encourage deep learning strategies as students progress through their three-year training, and to stimulate future self-directed learning.

Learning Strategies in Medical Education

A total of 143 medical students enrolled at the School of Medicine of the Universidad de la Frontera, Temuco Chile, participated in a study of medical student

Table 1. Summary of learning strategy research in nursing, medical, and dietetics education.

Study	Curriculum	Difference/Change in Learning Strategy
Stiernborg, Guy, and Tinker (1997)	Traditional[1]	Significantly higher achieving orientation among third year students compared to second year students
Montecinos and Pantoja (1991)	Traditional[2]	No significant change in learning style Meaning orientation was predominant among all groups
Newble and Gordon (1985)	Traditional[2]	Meaning orientation was predominant among all three classes with third and sixth year students reporting higher scores No significant change in reproducing orientation
Newble and Clarke (1986)	Traditional and PBL[2]	Significantly higher ratings for meaning orientation among PBL students Significantly higher ratings for reproducing orientation among traditional students
Higa et al. (1995)	PBL[2]	Significant increases in reflection and conceptualization from orientation to end of second year

Table 1—Continued

Study	Curriculum	Difference/Change in Learning Strategy
Regan-Smith et al. (1994)	Traditional and PBL[2]	Forty-nine percent of traditional and 6% PBL reported learning half or more than half by memorizing in years 1 and 2 In years 3 and 4, 91% and 97% of traditional and PBL students, respectively, memorized < 25% of the time
Coles (1985)	Conventional and PBL[2]	High meaning and low reproducing orientations at entry for both curricula Significant decrease in meaning orientation and significant increase in reproducing orientation among conventional students Significant decrease in reproducing orientation among PBL students
Bayard (1994)	PBL and LBC[3]	A significant increase in reflection and less reliance on memorization among PBL students compared to LBC students

[1] Medical curricula

[2] Nursing curricula

[3] Dietetics curricula

learning in a traditional curriculum. The Lancaster Inventory of Learning Approach was administered to 40 students in the first year, 40 students in the third year, 44 students in the fifth year, and 19 interns in the seventh year, all at the end of the academic and medical training year. No significant differences were observed for meaning, achieving, and reproducing orientations among the four groups. With respect to the use of learning approach, meaning orientation was the predominant method utilized by all four groups, followed by achieving, and reproducing orientations (Montecinos and Pantoja 1991, 308).

Learning and Affect

Schiefele (1991, 316) suggested that the outcome of the learning process is the consequence of cognitive and affective processes. The affective component of learning has been commonly associated with feelings, emotions (Pierce and Gray 1981, 33), and motivations (Spielberger, Gonzalez, and Fletcher 1979, 111). Additional terms distinguishing affective behaviors include like, dislike, attitude, belief, interest, appreciation, and characterization (Pierce and Gray 1981, 33). Schiefele (1991, 316) implied an interaction between cognitive and emotional factors, noting that emotional factors influence the desire to use learning strategies, to invest effort, and draw conclusions. In turn, the level of cognition applied to the task may contribute to the quality of the emotional experience. Bedford (1984, 670), citing King (1971), further acknowledged the affective domain to be an essential prerequisite to cognitive

performance, reporting that without the feeling process, the thinking process cannot function.

Affect, Learning, and Curricular Influence

Mitchell (1994, 166) identified a strong correlation between the use of reflection (r .48, $p < .001$) and conceptualization (r .28, $p < .01$) and students' positive learning experience (PLE) scale scores, respectively, suggesting that learners who actively attempt to comprehend what they learn will view their experience as more meaningful and gratifying. Moreover, Biddle, Smith, and Tremonti (1985, 628) recognized that for positive learning outcomes to occur, the environment in which learning takes place must be positive. A discussion of the cross-sectional research pertaining to the affective behaviors in nursing, medical, and dietetics education follows.

Affect and Curricular Influences in Nursing Education

Beck et al. (1997, 185) investigated the perceived level and sources of stress among second, third, and fourth year nursing students in comparison to second, third, and fourth year students in medicine, pharmacy, and social work. Of 44 items associated with stress in the student role, the 11 most frequently cited among students of all disciplines were: *exams and/or grades, amount of class material, negative personal habits, long study hours, lack of free time, financial responsibilities, difficulty of class work to be learned, attitudes & expectations of other professionals toward my profession, peer competition stressful, administrative responses to student need,* and *too much responsibility*. The authors were not surprised that the nature of the knowledge base,

which must be mastered by students in health related disciplines, contributed greatly to their list of perceived sources of stress (e.g., exams/grades, amount of class material, difficulty of class work to be learned). Additionally, they emphasized the implications these results have for curriculum planning, evaluation, and student counseling associated with stress management.

Affect and Curricular Influences in Medical Education

Bjorksten et al. (1983, 761-2) attempted to identify the problems of medical students and compared these to other health care students. The Medical University of South Carolina's entire student body (n=1,695) consisting of medical, dental, pharmacy, nursing, graduate, and allied health students participated in the study. Of the 1,695 students, 585 were medical students representing all four-class levels. Students completed the Bjorksten's Student Problems Inventory, consisting of problems dealing with *life situations* (e.g., living and school environments), *other people* (e.g., family, friends), *behavior* (e.g., dating, cheating), and *feelings* (e.g., nervousness, self-confidence). Compared to the other disciplines, medical students reported the same variety of problems, (i.e., *too little time, competition, feel quality of education is poor, feeling dissatisfied with self*), however, the severity of problems was greater. Comparing the four classes, problems with the learning environment were reported by all. Second-year students felt the quality of their education was poor, while skepticism about career choice, future goals, and professional uncertainty was prevalent among third and

fourth-year students. First and second-year students reported more severe problems with time management, in addition, to greater feelings of powerlessness among second-year students. Complaints concerning feeling states (e.g., inhibited, self-confidence) and interpersonal relationships (e.g., marriage, other people at work), were predominant among fourth-year students.

The relationship between anxiety and medical school pressures, among three classes of first and second year medical students, was studied by Vitaliano et al. (1984, 734-5). Students reported six items to be significantly predictive of anxiety. These included: *competition, anonymity, long hours, threat, control of one's life, and mastering knowledge*. The value of these findings suggested that anxiety and stress are a major impetus of cognitive dysfunction, hence negatively affecting the learning process and the quality of the education.

Early work by Edwards and Zimet (1976, 625), who assessed the problems and concerns of four classes of medical students, indicated that a high proportion of students suffered from academic pressures relating to the quantity of material to be learned, examinations, and competition. Comparing the four classes, the lower classmen reported greater feelings of loneliness than the upperclassmen. Sophomores and juniors reported feeling more doubtful about their ability to complete school. Having chosen the wrong profession, *self-esteem needs* (e.g., being treated as irresponsible and immature), and

conflicts with faculty, staff, and attending physicians were prevalent among senior students.

Kaufman and Mann (1996a, 534) studied the perceptions of 73 and 72-second-year medical students enrolled in PBL and conventional curricula, respectively, toward their coursework. Results showed that PBL students rated significantly higher than the conventional students, 11 of 12 curriculum items on the ability to evaluate:

1. higher level thinking (e.g., integrating subject matter, articulating previous knowledge);
2. managing information (e.g., gathering and analyzing information);
3. stimulating self-directed learning (e.g., stimulated to learn more, read medical literature); and
4. overall satisfaction (e.g., stimulating and enjoyable) (Kaufman and Mann 1996a, 534)

Kaufman and Mann (1996b, 1098; Kaufmann and Mann 1997, 179) further studied medical students' attitudes toward the learning environment in conventional versus PBL curriculum. Students were surveyed at the end of their second year. Findings showed that PBL students viewed their experience significantly more positively than students in a conventional curriculum, with regard to faculty's ability to stimulate students' curiosity and the relevance of the experience to their role as a physician. In addition, Kaufman and Mann (1996b, 1098) found that PBL students reported more enthusiasm for the learning experience and described it as more democratic than conventional students. Of interest, however, is that the conventional students were more

positive about student-student interaction than PBL students. Discussion of this finding indicated that it may be unique to this class of students or because the PBL students formed more visible cliques, possibly a result of the small group size and profound involvement.

Affect and Curricular Influences in Dietetics Education

Documentation of research examining the attitudes of dietetic students toward their learning environment is minimal; consequently, this section of the review is limited to unpublished reports. In an informal evaluation of the dietetics program at the University of Wisconsin-Stout, dietetic students enrolled in one of three required courses, which included Nutrition, Food Science, or Diet Therapy, were surveyed to assess their attitudes concerning these courses and the instructor. Nutrition and Food Science are three credit courses incorporated into the curriculum during the sophomore and junior years, and Diet Therapy is a four-credit course offered during the final semester of the senior year. Seven aspects evaluated for the courses were: *perception of course importance, nature of the workload and content, effectiveness, ability to motivate, effect on self-esteem,* and *self-confidence.* Instructor performance was evaluated by four facets: *competency, presentation skill, fairness,* and *approachability.* In general, students' opinion about the courses and instructors was good to excellent. Overall, survey results indicated that students who found their workload tolerable, compared to students expressing a neutral/unfavorable opinion, perceived the course content as significantly

more comprehensible and were significantly more positive about the course's ability to influence their self-esteem and self-confidence toward their coursework. Furthermore, students regarding their workload as tolerable were more likely to view their instructor as approachable and fair, compared to their counterparts discerning a neutral/unfavorable workload (Bayard 1995).

Green (1996, 135) studied UDS response toward a PBL experience and found that students discerned PBL as a more meaningful, intriguing, and effective way to learn. In addition, students felt positive toward their PBL experience because it increased their motivation to learn, promoted an enjoyable working relationship with other group members, similar to the findings of Lancaster et al. (1997, S11), Lieberman et al. (1997, S14-5), and Kaufman and Mann (1996a, 534), and provided interesting case scenarios (Green 1996, 138). Moreover, the dietetic students praised PBL because it addressed real life circumstances, thereby promoting the integration of knowledge into a professional setting (Green 1996, 128).

Jussim, Coleman, and Nassau (1987, 97) observed that students are significantly more likely to evaluate their performance auspiciously, and perceive their instructors as evaluating their performance auspiciously if they have high self-esteem, compared to students low in self-esteem. Research focusing on self-esteem in dietetics education is virtually non-existent; however, inquiry into the self-esteem among nursing and medical students is documented. The majority of nursing and medical student self-esteem for this

review is investigated from a longitudinal perspective, and is discussed later in the chapter. A brief explanation of self-esteem follows.

Self-Esteem

Bhagat and Chassie (1978, 322) found that individuals who reported greater satisfaction with their academic program and personal life, and higher levels of academic performance were more likely to exhibit high self-esteem. According to Korman (1976, 51):

> . . . individuals will be motivated to perform in a manner consistent with their self-images. To the extent that their self-concept concerning the job or task require effective performance in order to result in "consistent" cognitions, then, to that extent they will be motivated to engage in effective performance . . . and furthermore . . . to the extent that one perceives the self as competent and need satisfying, one will choose and find most satisfying those situations which are in balance with these self-perceptions. (Korman 1976, 51)

Self-esteem, as defined by Rosenberg, is "a positive or negative attitude toward a particular object, namely, the self." (Rosenberg 1965, 30). Describing oneself as having high or low self-esteem, however, cannot be generalized to all facets of the personality. A person with high self-esteem may think he/she is "very good," or "adequate" when comparing themselves to others, but only "good enough" or "inadequate" in terms of meeting their own expectations. Rosenberg characterizes high and low self-esteem as follows:

> When we speak of self-esteem, then, we shall simply mean that the individual respects himself, considers himself worthy; he does not necessarily consider himself better than others, but he definitely does not consider himself worse; he does not feel that he is the ultimate in perfection but, on the contrary, recognizes his limitations and expects to grow and improve. Low self-esteem, on the other hand, implies

> self-rejection, self-dissatisfaction, self-contempt. The individual lacks respect for the self he observes. The self-picture is disagreeable, and he wishes it were otherwise. (Rosenberg 1965, 31)

Furthermore, when Rosenberg studied the relationship between self-esteem and sensitivity to criticism or attack, he found that people with low self-esteem:

1. are much more likely to be sensitive to criticism, to be deeply disturbed when they are laughed at, scolded, blamed, criticized, etc.;

2. are much more likely to be bothered if others have a poor opinion of them;

3. are much more likely to be deeply disturbed if they do poorly at some task they have undertaken; and

4. are much more likely to be disturbed when they become aware of some fault or inadequacy in themselves. (Rosenberg 1965, 158)

Significant correlation between self-esteem and locus of control is documented in the literature. The concept of locus of control is described below.

Locus of Control

Developed out of social learning theory, Rotter (1966, 2) believed that one's acquisition and performance of knowledge and skills was dependent on one's perception of the reinforcement, reward, or gratification. According to social learning theory, the association of reinforcement to a particular behavior or event is believed to strengthen an expectancy that a future behavior or event will be followed by the same reinforcement. Rotter defined locus of control, as follows:

> When a reinforcement is perceived by the subject as following some action of his own but not being entirely contingent upon his action, then, in our culture, it is typically perceived as the result of luck, chance, or as unpredictable because of the great complexity of the forces surrounding him. When the event is interpreted in this way

> by an individual, we have labeled this a belief in *external control.* If the person perceives that the event is contingent upon his own behavior or his own relatively permanent characteristics, we have termed this a belief in *internal control.* (Rotter 1966, 1)

Although locus of control may be deemed to be more cognitive in nature because of the perception of controllability, the cognitive set incurred can produce affective outcomes. For example, Seligman (1975, 30), referencing Hiroto (1974), reported that persons who exhibited a more external personality demonstrated greater feelings of helplessness than internally oriented persons. Seligman et al. (1996, 279) noted that people who experience non-contingency or uncontrollability, learn to give up. In contrast, contingency or controllability fosters activity. They remarked that "the probability of an outcome to a specific action, contrasted to the probability of the outcome if one does nothing," are the defining traits of mastery and helplessness.

Fish and Karabenick (1971, 784), Ryckman and Sherman (1973, 1106), and Martin and Coley (1984, 520) observed that individuals who display a tendency toward an external locus of control are more likely to exhibit low self-esteem; conversely, internally oriented individuals exhibit higher self-esteem.

An external locus of control among the college population has been documented in the literature (Rotter 1975, 65, & Khanna, Molinari, and Khanna 1978, 393), with females demonstrating a higher external locus of control (Khanna, Molinari, and Khanna 1978, 393, & Rich and Rich 1987, 65). Results from Prociuk and Breen (1977, 310) and Batilis (1978, 243), who studied the relationship between internal-external locus of

control and information seeking in a college academic situation, indicated that psychology students classified as internals actively sought out and acquired relevant information regarding college academics more than externals. These findings agree with those reported by Lefcourt (1982, 80). When interpreting and coping with certain tasks and situations internals will seek out information that will contribute to these tasks and situations (Lefcourt 1982, 79). Other cognitive functions characteristic of internals are verbal fluency, greater attention to decisions regarding skill-related matters, and alertness. Internals are further described as more perceptive, and when compared to externals, are more curious and efficient processors of information (Lefcourt 1982, 80).

Joe (1971, 625) further supported these findings in a review. He differentiated internally controlled (IC) people from externally controlled (EC) people, reporting that internals score higher on achievement, intellectual efficiency, dominance, sociability, good impression, and feeling of well-being. Moreover, IC people describe themselves as independent, effective, industrious, powerful, assertive, and achieving. On the contrary, EC people are described as exhibiting feelings of severe anxiety, frustration, powerlessness, aggressiveness, hostility (Joe 1971, 623), and greater levels of distress (Linn and Zeppa 1984, 11). In addition, suspicious, mistrustful, dogmatic, authoritative, having low insight, and need for social approval, are used to describe EC people. Moreover, externals are reported to believe they have little control over reward and punishment, therefore they show less interest in achievement (Joe 1971, 625), and are more apt to attribute their achievement to luck (Edwards and Waters 1981, 531).

The review of locus control research in nursing and medical literature, like self-esteem, is addressed from a longitudinal standpoint later in the chapter. Examination of locus of control among dietetic students is severely limited or non-existent, thus greatly warranting further investigation.

Locus of Control in Nursing Education

Neaves (1989, 12) remarked that current nursing literature suggests that nursing students are characterized as doubtful, dependent, and exhibiting low self-confidence and a low sense of accountability, and conducted a study to determine the relationship between I-E locus of control to decision making in nursing students. Students were asked to complete a two part "Medication Administration Questionnaire". Each response set consisted of an independent and dependent option, pertaining to two hypothetical situations involving medication administration to patients and alternative actions and/or decisions available. Results revealed that students who were internally controlled selected more independent responses, whereas more externally controlled students selected dependent responses (Neaves 1989, 15). Deci et al. (1991, 326) suggested that persons with a locus of control external to oneself would demonstrate extrinsically motivated behavior.

Motivation

Coon (1998, 428) described an individual who is extrinsically motivated as one who is influenced by rewards, grades, money, obligations, and approval. Their behaviors are not performed out of interest, but due to an outside reinforcement (Deci et al. 1991,

328). Consequently, a person who engages in a behavior out of interest (Deci et al. 1991, 328), to perform an activity for enjoyment, to display ability, or gain skill, is regarded as intrinsically motivated because there is no external reward or purpose behind the action (Coon 1998, 428). Gorman (1974, 122) stated that a student's involvement in a learning environment is initiated and sustained by their own motivation, thereby determining the direction and effectiveness of his learning. Schiefele (1991, 316) suggested the assumption that a person's interest and their level of intrinsic motivation will be heightened when they believe they have succeeded at a learning task and find the learning process enjoyable, stimulating, and personally significant. The association of intrinsic-extrinsic motivation to learning approach has been discussed by Ainley (1993, 397) and Cust (1996, 257). Ainley (1993, 397) reported that the deep approach to learning is grounded on intrinsic motivation, where extrinsic motivation, conversely, is associated with both the strategic and surface approaches (Ainley 1993, 397 & Cust 1996, 257).

Motivation in Dietetics Education

Silagyi-Rebovich (1996, 114) conducted a study of cognitive and affective behaviors among dietetic students. A total of 554 volunteer dietetic students from 70% (n=35) of randomly selected dietetics programs, enrolled in basic food and/or nutrition courses, completed the Motivated Strategies for Learning Questionnaire (MSLQ), from January through May of 1996. Results revealed significant positive correlations between

intrinsic motivation and deep learning strategies such as elaboration, critical thinking, and metacognition, as well as the use of time management. Extrinsic motivation, on the contrary, was not significantly correlated with any of these. One recommendation emphasized the discussion of motivation and cognition in the dietetics curriculum to facilitate students' ability to generalize and convey that knowledge to enhance the techniques they employ to educate patients and other groups in the future (Silagyi-Rebovich 1996, 133). Coon (1998, 407) noted that regardless of the intent of the motivation, the "target" of motivated behaviors are the goals we seek to attain.

Goal Theory

Ainley (1993, 396), citing Ford and Nichols (1991), defined goals as the "cognitive representations of what the student wants to achieve." Schunk and Gaa (1981, 38) reported that through the process of goal setting, students are more likely to persist at tasks, attend to instructional processes, have a greater sense of self-efficacy, and expend greater effort to accomplish their goals. Furthermore, persons who attain the goals they've set will derive a sense of satisfaction, thereby encouraging additional learning by establishing new goals. As noted in Ames (1992, 261), an integration of cognitive and affective components of goal-directed behavior, incorporated into an achievement goal framework, has been identified in the literature. Ames (1992, 261) reported on two contrasting goal achievement structures, differentiated by their motivational outcomes: mastery goals and performance goals.

Persons pursuing mastery, or learning goals as referred to by Elliot and Dweck (1988, 5), seek to increase their ability, master new tasks (Elliot and Dweck 1988, 5, & Nolen 1988, 270), understand their work, and improve their competence, (Ames 1992, 262). Furthermore, mastery goals are also associated with an intrinsic interest in and a positive attitude toward learning (Nolen 1988, 270 & Ames 1992, 262). Moreover, students adopting mastery goals have reported utilizing deep approaches to learning (Nolen 1988, 270). A question posed by this type of individual may be "How can I best acquire this skill or master this task?" (Elliot and Dweck 1988, 5). Information to answer this question may be furnished as a result of a subsequent failure, thereby encouraging these individuals to search for alternate strategies for learning. Elliot and Dweck (1988, 6) further reported that individuals who feel inadequate about their current abilities would even display a mastery-oriented model because: (a) they are not judging their current ability; (b) within a learning goal, errors are not suggestive of goal failure; and (c) if the task is deemed valuable by the individual, greater skill acquisition would be desirable.

Performance goals, in contrast to mastery goals, focus on one's sense of self-worth and competency, evident by a desire to out perform others, achieving above normal requirements, and attaining success, with little effort (Ames 1992, 262). A person who adopts a performance goal bases their self-worth on their capability to perform. A question posed by those who seek performance goals would be one of "Is my ability

adequate?" (Elliot and Dweck 1988, 5). As described for mastery goals, succeeding events that end in failure may provide answers to this question, leading individuals, especially those who are doubtful of their skill, to attribute this failure as a consequence of their own competency. Moreover, when students have a low self-concept they will be less likely to practice self-directed learning strategies (Pintrich and DeGroot 1990, 37). Accordingly, Ames (1992, 263) further reported that performance goal orientation is shown to be associated with inferior strategies of learning such as memorization and rehearsal. Ames (1992, 263) also noted that:

> Self-concept of ability, then, is a significant mediator of cognitive, affective, and behavioral variables when students are focused on doing better than others, but not when they are focused on trying and learning, as a mastery goal orientation.

The focus of this review, thus far, has been limited to non-longitudinal research of cognitive and affective behaviors among nursing, medical, and dietetic students. Longitudinal studies, however, measure changes in cognitive and affective behavior pursuant to a specific educational experience. A discussion of the longitudinal research regarding these behaviors in nursing, medical, and dietetics education follows.

Longitudinal Research in Nursing Education

Self-Esteem in Nursing Education

Lengacher (1993, 44) studied the differences in self-esteem among traditional associate degree nursing (ADN) students, licensed practical nursing (LPN) students, and Bachelor of Science nursing (BSN) students. The LPN and BSN students attended

stress-reducing seminars, the goal of which was to increase students' self-esteem following completion of the seminars. A sample of the BSN group did not attend the seminars, and therefore was designated the control group. Upon finishing the seminars, the Coopersmith Self-Esteem Adult Form Inventory was administered to 17 LPN students on entry into the transition program and prior to graduation, to 47 ADN students at the end of their first year in the nursing program and before graduation, and to 24 BSN students (those who attended seminars and the control group) at the beginning of their advanced level classes and again upon exiting the program. Results revealed that within all groups, including the control group, self-esteem scores increased from entry to exit, indicating that the seminars could be useful to the curriculum, if offered as an elective to those students who feel the need for support. The authors noted, however, that because all groups showed an increase in self-esteem, time and age could have affected the results.

Longitudinal Research in Medical Education

Curricular Influence on Learning Strategy in Medical Education

In an unpublished report, Higa et al. (1995, 6), examined the use of memorization, conceptualization, and reflection, in a problem-based learning (PBL) medical program. Twenty-five students completed the Cognitive Behavior Survey at orientation and at the end of their first and second years in the program. Results indicated a significant increase

in students' employment of conceptualization and reflection from the time of orientation to the end of the second year. Memorization use decreased, but was significant. Enhancing students' utilization of conceptualization and reflection supported the continuance of a PBL format. Further conclusions implied that although memorization is deemed a less superior approach to conceptualization and reflection, to think and function conceptually and reflectively, some information must be memorized.

Regan-Smith et al. (1994, 1380) suggested that the amount of rote-learning that occur in many medical schools could be contributing to the lack of expected understanding by third year students (a time when students begin their clerkship). In an attempt to quantify the amount of rote learning between traditional versus PBL curricula, a questionnaire was administered to fourth-year students enrolled in six medical schools; two traditional, one exclusively PBL, and three combined (offering both traditional and PBL) schools, participated in the study. Students were asked, "How much learning by memorizing without understanding did you do in years 1 and 2, and in years 3 and 4?" The response set included: (a) <20%, (b) ~ 25%, (c) ~ 50%, (d) ~ 70%, and (e) >75%. A total of 569 students, 453 traditional and 106 PBL, completed the questionnaire. Forty-nine percent of traditional students reported learning half or more than half of the material in years 1 and 2 by memorizing without understanding (rote learning), compared to only 6% of the students in the PBL curricula. Most PBL students (78%) reported learning little (<20%) by rote. During the clerkship years (3 and 4), 91% of the traditional students and 97% of

the PBL students perceived themselves doing 25% or less rote learning. The authors noted that less rote learning occurs in a PBL curriculum because students relate previously learned material to current knowledge as they apply basic scientific principles to examine patients' clinical problems. They believed that:

> . . . without improved strategies, traditional basic science curricula may be wasting much of medical students' time and energy if the goal is to prepare medical students for clinical problem solving. (Regan-Smith et al. 1994, 1381).

Coles (1985, 308-9) conducted a longitudinal, comparative study of medical students' approaches to studying in conventional and PBL curricula. Students in both curricula completed the Short Inventory of Approaches to Studying upon entry and again after the first year of medical school. Both cohorts of students reported desirable methods of learning: high meaning, high versatility, and low reproducing, at entry. At the end of the academic year, however, students enrolled in the conventional curricula showed a shift towards inferior study methods with significant decreases in meaning orientation and versatility and a significant increase in reproducing. Although the PBL students demonstrated lower scores for meaning orientation and versatility, the decreases were not significant. There was a significant decrease in reproducing orientation, however, suggesting that a PBL format promotes an environment conducive to learning, unlike a conventional curriculum which appears to confine its students to employ less desirable methods for studying.

Affect and Curricular Influence in Medical Education

Medical student distress was examined in a longitudinal study by Vitaliano et al. (1989, 73). Distress, stress, vulnerability, exposure to stressors, psychological resources, and social resources were evaluated through several test instruments for two classes of medical students at baseline (September orientation) and again two weeks before May final exams. Findings indicated significant increases in mean depression and stress scores from September to May. Students who exhibited distress in May were more likely to be distressed in September and have increased anger suppression scores in May. Furthermore, students who had both high distress scores in September and high anger suppression scores in May were at significantly higher risk for distress in May. Early identification of student distress in the undergraduate years was cited as important for determining whether the same psychological risk factors for distress in medical school are also predictive of performance in residency and clinical practice.

A longitudinal study predicting the stress of first year medical students was conducted by Stewart et al. (1997, 166). A total of 121 of 150 students participated in the study. Students were surveyed following orientation prior to the beginning of classes and eight months later. An increase in concerns about curriculum and environment, personal competence and endurance, and loss of control over time were significantly correlated with an increase in depression. Anxiety levels significantly increased with concern over personal attributes.

Konefal and Provenzo (1983, 146) conducted a four-year longitudinal study of medical students' attitudes toward learning and learning related skills. Students were

surveyed on their first day of medical school and at the end of their first and last year. Findings indicated that negativity toward learning and learning-related skills and cynicism increased among medical students through their first year, but by the end of their fourth year cynicism decreased. The authors suggested that the increase in cynicism and negative views toward learning through the first year was attributable to the major period of adjustment students experience upon entering medical.

Wolf et al. (1989, 21) studied attitude change of senior medical students during the course of their education. Subjects were asked to identify their perception of attitude change they experienced from the time they entered medical school to graduation. Seventy of 157 students completed a questionnaire at the end of the 1987 school year after a four week Special Topics course and again after completion of clinical rotations and final examinations. Opposing the findings of Konefal and Provenzo (1983), who found a decrease in cynicism by the end of the fourth year, an increase in cynicism was observed during the course of the medical education experience. Seventy-six percent of the students perceived themselves as being more cynical, a factor the authors believed could consequently lead to possible burnout and impairment (Wolf et al. 1989, 21).

West et al. (1982, 190) studied the attitudes of medical students enrolled in a PBL style curriculum, entitled the Primary Care Curriculum (PCC), with those in a conventional, lecture-based curriculum at the University of New Mexico School of Medicine. Two classes of first year students in the PCC and conventional curricula completed the Physician Ideology Questionnaire and the Student-Faculty Role Questionnaire at the beginning of the first and second terms of the academic year.

Results showed that students in both classes of the conventional curriculum found their experiences to be significantly less positive, indicated by lower scores on the responses: "the information and experiences I have gotten to date are fundamental to my future role as a physician," and "faculty members excite students' curiosity through the teaching of basic sciences". One class of PCC students found their experience significantly more positive on the latter item related to faculty, with PCC students appraising and recognizing the relevance of their learning of the basic sciences compared to conventional students. The authors attributed the increased cynicism displayed among the conventional students, consistent with the later findings of Wolf et al. (1989, 21), to the students' perception of curriculum instruction rather than concern about the usefulness of basic sciences.

Lancaster et al. (1997, S11) investigated the effects of PBL on the medical student learning environment. The Medical Student Learning Environment Survey (MSLES) was administered upon admission and again after the first year to three freshman classes from two schools, the Medical University of South Carolina College of Medicine and the University of Texas Medical Branch at Galveston. Students were categorized by the curricula in which they were enrolled: PBL (n=56), LBL (a traditional lecture based learning curricula; n=258), and ANS-T (those who applied, but were not selected into the PBL curricula and admitted to the LBL curricula; n=27). Statistically significant differences were observed for six of seven scales measured by the MSLES between PBL and LBL students. The PBL students felt their experience was more meaningful, flexible, nurturing, allowed for inquiry into self-interests, and provided for a more positive

emotional climate than they had expected at admission. The students also reported that PBL encouraged greater interaction between the students. The LBL students, on the other hand, reported their experience to be more negative than anticipated. ANS-T students, who were indistinguishable from the PBL students upon admission, were significantly different after their freshman year on three scales: *flexibility, student-student interaction,* and *meaningful learning experience,* their results resembling the LBL students (Lancaster et al. 1997, S11).

The MSLES was also employed, in addition to the Positive Learning Experience (PLE) scale to compare medical students' perception of a PBL curricula, entitled the Interactive Learning Track (ILT) with a traditional curricula at the University of Texas Medical Branch at Galveston (Lieberman et al. 1997, S14-5). A total of 24 ILT and 176 traditional students' data, collected at the beginning and end of their first year of medical education were included in the study. Findings imitated those of Lancaster et al. (1997), showing that after one year of medical school, ILT students had significantly higher scores than traditional students on eight of ten scales: *nurturing, flexibility, student-student interaction, breadth of interest, emotional climate, meaningful learning experience, positive learning experience,* and overall MSLES total score. Paired t-tests revealed that after one year, traditional students had a significant decrease in mean PLE score when compared to the ILT students, who showed a non-significant increase in PLE score (48.8 to 44.7 and 47.9 to 50.8 out of 63 possible points), respectively.

A study conducted by Moore-West et al. (1989, 154-6), examined medical students' attitudes toward conventional and Primary Care Curriculum (PCC), and the

relationship to distress during a two- year period. A total of 147 conventional students, and 62 PCC students, from six graduating classes, completed the Symptom Questionnaire and Learning Environment Questionnaire. Findings revealed that PCC students saw their learning environment as significantly more meaningful over the four semesters compared to the traditional students, consistent with the later findings of Lancaster et al. (1997, S11) and Lieberman et al. (1997, S14-5). Although the emotional climate of the learning environment was less favorable over the two years for both curricula, the decline was greater for the traditional students. Furthermore, the PCC students discerned significantly less distress than their traditional colleagues in all semesters but the first, in which there was no change (Moore-West et al. 1989, (154-6).

Self-Esteem and Locus of Control in Medical Education

Wolf et al. (1991, 176) examined psychosocial changes of 128 medical students at Louisiana State University School of Medicine, during their first year of medical school. Students completed a series of test instruments prior to the beginning of formal classes and again upon completion of the academic year. These instruments included the New York Self-Esteem Scale, Multidimensional Health Locus of Control Scale, Medical Hassles Scale (to assess irritating, frustrating, and distressing experiences), Medical Uplifts Scale (to assess pleasurable, happy, and satisfying experiences), and Affects Balance Scale (to measure affective mood state, including Positive and Negative Total scales). A significant decrease in self-esteem, powerful other locus of control (external locus of control) and uplifts was observed over the course of the year, where all four positive mood dimensions under the Positive Total: *joy, contentment, vigor,* and

affection, decreased. Furthermore, the hostility and depression sub-scales increased and Affects Balance Scale Index decreased.

Linn and Zeppa (1984, 11) examined the relationship of stress to personality and performance in junior medical students. To measure the degree of stress among junior medical students and its effect on personality, 167 subjects completed the Stress in Medical School Scale, the Rotter I-E Scale, and Cutnick Self-Esteem Scale, respectively, prior to and at the end of their clinical clerkship. Findings revealed that students who experienced a greater degree of unfavorable stress significantly displayed a tendency toward lower self-esteem, in addition to an external locus of control.

Findings from Kilpatrick, Dubin, and Marcotte (1974, 1217-19) supported the traits, described earlier, that are characteristic of internals and externals. The Profile Mood States Scale and Rotter's I-E Scale were administered to 109 freshman students at the beginning of the academic year and again after the first quarter, in addition to 84 sophomore, 40 junior, and 44 senior medical students, to identify changes in personality, levels of stress attributed to the medical education process, and affective mood state. Although no significant difference in locus of control was observed among the classes, students who were categorized as externals scored significantly higher on the mood variables of *tension-anxiety, depression-dejection, anger-hostility,* and *confusion-bewilderment,* compared to internals. Similarly, no significant difference in locus of control occurred among the freshman students from baseline to the end of the first quarter. An increase in *tension-anxiety, anger-hostility,* and *confusion-bewilderment,* and a decrease in *vigor-activity* scores were significant,

however, among the freshman students after the first quarter. Furthermore, externally oriented freshman scored significantly higher than their internally oriented peers on *depression-dejection, anger-hostility, confusion-bewilderment,* and *fatigue-inertia.*

A four-year longitudinal study of personality changes in medical students was conducted by Zeldow, Daugherty, and Leksas (1987, 993). Seventy-two of the entire class (n=120) of students at Rush Medical College, completed the Eysenck Personality Inventory, a measure of extroversion and neuroticism (anxiety), and Rotter I-E scale, at orientation and late in the first year, early and late in year two, and midway through years three and four. Results indicated that students became more external, tense, and irritable through the first three years of medical school, but returned to their baseline scores in year four, attributed to the eases of academic and clinical stresses.

Academic anxiety, locus of control, and achievement were studied in first year medical students. Of the 29 students completing the test instruments, over half (55.2%) demonstrated a significant shift towards externality during the year (Grover and Smith 1981, 733), similar to the findings by Zeldow, Daugherty, and Leksas (1987, 993).

A considerable body of research investigating the cognitive and affective behavior changes nursing and medical students experience during progression through their academic career is documented in the literature. Longitudinal research concerning dietetics education, however, is extremely limited or non-existent. The following two studies have addressed these behavior changes among dietetic students.

Longitudinal Research in Dietetics Education

Learning Strategy and Affect in Dietetics Education

Bayard (1994, 194) examined the learning strategies of undergraduate dietetic students (UDS) participating in a PBL format and compared those to students in a lecture-based case (LBC) program. LBC is a taxonomic category of PBL characterized by the presentation of information by an instructor in a lecture format, succeeded by an illustration of the applicability of the lecture material (Barrows 1986, 483). Students completed the Cognitive Behavior Survey prior to, and upon completion of the 6-week PBL experience. Although both groups reported decreases in the use of memorization, the PBL students exhibited less reliance on memorization compared to their LBC counterparts. In addition, a significant increase in the use of reflective thinking was observed for the PBL students, unlike the LBC students who decreased their use of reflective thinking (Bayard 1994, 194).

Although the PBL UDS practiced deeper approaches to learning, they significantly viewed their experience more negatively when compared to the LBC students, evident by decreases in mean PLES scale scores (Bayard 1994, 135). PBL students were also less inclined to want to experience PBL again, than their LBC counterparts, expressing a level of dissatisfaction over the amount of information to be learned and the required interaction between peers (Bayard 1994, 139), a finding similar to Kaufman and Mann (1996b, 1098; 1997, 179). The UDS dissatisfaction and unwillingness to experience PBL again may have been related to the fact that the UDS

had to participate in the PBL format, and they were greatly concerned about passing and performing well. Although the UDS reported a less favorable approach to PBL, integrating PBL into a dietetic curriculum was suggested as a means to enhance reflective thinking. In addition, through an investment of time and resources, PBL could ease students' anxiety and concerns.

Summary

The quality of the educational experience is a major component in preparing competent and successful graduates. To foster this competency and success, educators must provide an experience that promotes optimal learning and growth. The quality and quantity of the learning experience is related to the learning strategy a student employs (Newble and Entwistle (1986, 164), and a student's desire to utilize a learning strategy is, in turn, influenced by the emotional experience (Schiefele 1991, 316).

A wealth of nursing and medical research has examined the cognitive and affective behaviors among its students; however, research pertaining to dietetics education is virtually non-existent. In addition, longitudinal studies are needed to investigate whether changes in these behaviors are a consequence of the educational process or are attributed, in part, to other factors (e.g., maturation, time). Findings from this review suggest that during exposure to the educational experience, students undergo both cognitive and affective changes, evident by alterations in learning strategy, perceptions toward the learning experience, self-esteem, and locus of control. Furthermore, these changes could be a consequence of curricular influences, thus necessitating the need for curriculum evaluation.

Dietetics education is the key to dietetics practice (Winterfeldt (1998, 31), and in a practice under continuous transformation, dietetic professionals must develop and demonstrate the competency to survive (Balch 1996, 1305). During this time of profound change, dietetic educators must promote critical thinking and enhance the self-image of their students (Owen and Rinke 1986, 377). To foster desirable attributes in dietetics education, it is imperative to recognize the cognitive and affective behaviors among dietetic students. In addition, with such a severe deficiency of research examining the changes in cognitive and affective behaviors among dietetic students, a longitudinal design is essential to evaluate the full scope of the educational experience on these behaviors and to provide support for necessary curriculum modification.

CHAPTER III

METHODOLOGY

Due to transformations in health care delivery and technological advances, dietetic practitioners are being called upon to re-examine and re-structure their role in the profession to meet the increasing demands of society. The need for capable, proactive, pliant individuals who possess the skills and attitudes necessary to perform successfully during a time of steadfast change is essential.

The responsibility of preparing competent dietetic professionals begins with dietetics education in an environment that promotes optimal learning among its students. The quality and magnitude of the learning experience, according to Newble and Entwistle (1986, 164), are dependent upon the approach a student employs to learn. In addition, the outcome of the learning process can be influenced by affective behaviors (Schiefele 1991, 316). Although abundant in medical and nursing literature, research concerning the learning and affective behaviors in dietetics education is insufficient. Furthermore, longitudinal studies are needed to evaluate the full scope of the educational process on these behaviors. The purpose of this investigation, therefore, was to discern the cognitive and affective behavior changes among dietetic students progressing through a didactic program in dietetics at the University of Wisconsin-Stout. Results will be

utilized to facilitate the development of a constructive learning environment for dietetic students.

Research Design

A one-group, pre-test-post-test design was utilized in this longitudinal study. The internal validity of this method is subject to a number of confounding variables (e.g., history, maturation, testing,) that offer plausible hypotheses to rival the hypothesis that exposure to a measurable event caused the difference. With regard to history, for example, the change that occurs between pre and post-test may be the result of change-producing events, such as an influential news event, that occurred in addition to the experimenter's event. Furthermore, the biological and physiological processes that occur during maturation can rival the conclusion that the investigator's event caused the transformation from pre to post-test. The difference may reflect students growing older, hungrier, more bored, more tired, etc. A third confounding variable, testing, is the effect of the pre-test itself on changes in the measured variables. For example, anonymity, and an increased awareness of what answer is acceptable, would have a bearing on the direction of the outcome (Campbell and Stanley 1966, 7-15).

Descriptive, quantitative, and qualitative data concerning cognitive and affective behaviors were gathered. Descriptive and quantitative data included semantic differential responses, likert type responses, forced-choice items, and percentage responses to fill-in questions. Responses to open-ended questions, pertaining to advice on professional and personal goals, advice on studying, and motivations to learning,

comprised the qualitative data.

Selection of Subjects

Two groups of undergraduate dietetic students (UDS) enrolled in the fall 1995 and 1996 semesters of a *Dietetics as a Profession* course participated in this longitudinal study. *Dietetics as a Profession* is a required, one-credit, introductory course offered by the University of Wisconsin-Stout. Students enrolled in this course are typically freshman or transfer students at the inception of their dietetics study, consequently representing a suitable cohort for the undertaking of a longitudinal investigation.

Representativeness to Dietetic Students in General

Two sets of novice and experienced dietetic students from separate universities in the Wisconsin system, henceforth referred to as School A and School B, were invited to participate in this investigation. These students served to verify if novice and experienced UW-Stout dietetic students demonstrated similar characteristics.

Representativeness to UW-Stout Students

Novice and experienced business students were surveyed to ascertain UW-Stout dietetic students were unique among novice and experienced students at UW-Stout. Students enrolled in the business program were selected as a representative sample because their core requirements did not include the completion of any nutrition courses, thus decreasing the possibility of including dietetic students.

Data Collection

Instruments

Displayed in table 2, on page 65, is a list of instruments employed in this study, including the criteria measured, time of administration, and the subjects completing each instrument. Instruments are found in appendix A, and a summary of each follow.

Demographic Data Form

Before surveying the continuing dietetic students from the initial 1995 class, an interest in the demographic variables of the study samples prompted the inclusion of a demographic data form (DDF) to the survey set in fall 1997. Developed specifically for the study, students were requested to indicate their gender, date of birth, class standing, current G.P.A., and whether they were a transfer student, and if so, the semester, and year (e.g., 1994, 1995, 1996, other) of transfer. Demographic forms were altered slightly to accommodate the characteristics of the study samples. Additional information obtained from the DDF for the 1996 cohort were class standing and completion or current enrollment in an advanced level nutrition course, recommended to be completed during the fall semester of the junior year. Further identification of class standing and completion of the advanced nutrition course was warranted from the 1996 cohort to serve as a possible source of bias over study findings. For example, current participation or completion of the advanced nutrition course would imply a greater need for conceptual and reflective thinking, and because of the larger number of students in the 1995 cohort who were already enrolled or had taken the course, higher conceptualization and

reflection scale scores might be expected, compared to the 1996 cohort. The demographic forms for each study group are displayed in appendix A.

Cognitive Behavior Survey

Designed for evaluation of Harvard's problem-based learning (PBL) curriculum, the New Pathway, the Cognitive Behavior Survey (CBS) (Mitchell 1994), was developed to identify differences in medical students' learning behavior between those enrolled in the New Pathway and Traditional programs. The CBS examines learning behavior, learning experience, and epistemological beliefs using semantic differential scale items, rank order items, and fill in and open ended questions. The survey is composed of 11 questions, with over 50% of the questions focusing on learning behavior. The four components of learning behavior examined are: (1) general cognitive processes; (2) cognitive illustrations; (3) approaches to studying; and (4) student perception of the amount of material learned, retained, memorized, and crammed. General cognitive processes include memorization, conceptualization, and reflection (Mitchell 1994, 163). Subjects are asked to rate their response to a series of phrases using a semantic differential scale (e.g., 1=Very Rarely; 7=Very Frequently). A selected number of phrases are assigned to each scale. The responses are summed and comprise the score for each scale. The Cronbach alphas for the memorization scale (MS), conceptualization scale (CS), and reflection scale (RS) are 0.82, 0.79, and 0.76, respectively (Mitchell 1994, 164-5).

The second component of learning behavior sampled by the survey involves the cognitive illustrations students build to represent what they've learned. Students' perception of the importance of memorization and visualization to their learning in science and nutrition courses is rated on a 7-point semantic differential scale (1=Little Importance; 7=Major Importance) (Mitchell 1994, 163).

Student approaches to studying are examined in the third component of learning behavior. Note taking strategies and the amount of group study are rated on a semantic differential scale. Note taking strategies are rated, 1=Not Representative; 7=Very Representative. An open-ended question posed to students is: "What advice would you give to a student just beginning to study science, health, and nutrition on how to study?" (Mitchell 1994, 164).

The last component of learning behavior instructs students to estimate the percent of material learned: (a) by the end of a course; (b) by the end of a course through memorization; (c) after three months upon completion of a course; (d) after one year upon completion of a course; (e) as a result of cramming for exams in science, health, and nutrition courses; (f) was devoted to memorization for science, health, and nutrition courses; and (g) was wasteful and ineffective study time for science, health, and nutrition courses (Mitchell 1994, 164).

Table 2. Instrument characteristics

Instrument	Criteria Measured	Time of Administration
Demographic Data Form	■ Age ■ Gender ■ Class standing ■ Transfer status ■ G.P.A.	■ Fall 1997 [1, 2] ■ Spring 1998 [3, 4] ■ Fall 1998 [5, 6, 7]
Cognitive Behavior Survey	■ Learning behavior ■ Learning experience ■ Epistemological beliefs	■ Fall 1995 [1, 8] ■ Fall 1996 [2, 9] ■ Fall 1997 [1, 2] ■ Spring 1998 [3, 4] ■ Fall 1998 [5, 6, 7]
Rosenberg Self-Esteem Scale	■ Global self-esteem	
Rotter Internal-External Locus of Control Scale	■ Internal/External LOC	
Goal Analysis Questionnaire	■ Achievement, enablers, and obstacles of professional and personal goals	

[1] 1995 Longitudinal UW-Stout Dietetic Students, [2] School A Experienced Dietetic Students , [3] Experienced UW-Stout Business Students, [4] School B Novice and Experienced Dietetic Students, [5] 1996 Longitudinal UW-Stout Dietetic Students, [6] Novice UW-Stout Business Students, [7] School A Novice Dietetic Students, [8] 1995 Program Drop-outs, [9] 1996 Program Drop-outs

The second section of the CBS focuses on learning experience, and is titled the Positive Learning Experience (PLE) scale. In this section, students are presented with 11 words and phrases to describe a learning experience. Students are asked to indicate on a semantic differential scale (1=Not at all; 7=Very Descriptive) how well the words or phrases characterize their view of nutrition. The 11 scale items include *meaningful, enjoyable, stressful, stimulating, sense of closure, sense of discovery, rewarding, motivating, leads to new questions, uneventful,* and *tedious* (Mitchell 1994, 164). Nine of the 11 items comprise the final scale score, which is determined by summing the ratings

of the nine items, with the items *tedious* and *uneventfu*l reverse scored. The Cronbach alpha for the PLES is .91. (Mitchell 1994, 166).

The final section of the CBS concentrates on epistemological beliefs. On a semantic differential scale (1=Not at all; 7=Very Descriptive) students are asked to describe their view of nutrition knowledge using the following terms: *fallible, descriptive, contradictory, stable, ambiguous, definitive,* and *precise.* Moreover, students are instructed to rank the following statements (1=Least important statement; 6=Most important statement) that best depicts their level of understanding of nutrition and nutrition related issues as: (a) the result of my cognitive abilities; (b) the result of the quality of teaching; (c) the result of the quality of the textbooks; (d) determined by what I decide to learn; (e) the result of the cohesiveness of the curriculum; and (f) the result of personal motivation. In addition, students are asked to respond to the open-ended question "In your view, what motivates the dietetic students at UW-Stout to learn?" (Mitchell 1994, 164).

Wording in the CBS was altered to reflect business terminology. The terms “science, health, and nutrition” were replaced by “management, accounting, and marketing,” and the phrases “Discussing a scientific process or concept with other students,” and “As I read descriptions of physiological mechanisms, I try to construct a mental image of the process,” were changed to “As I read descriptions of managerial processes, I try to construct a mental image of the process,” and “Discussing a managerial process or marketing concept with other students,” respectively.

Rosenberg Self-Esteem Scale

The Rosenberg Self-Esteem (SE) scale is a global, self-report measure of self-esteem. In Gutman scale format, from the strongest to the weakest responses, respondents are asked to strongly agree, agree, disagree, or strongly disagree with ten statements, incorporated under six scale items. To reduce the risk of a respondent set, positive and negative statements are presented alternately. Reproducibility, scalability (six scale items), and scalability (ten individual items) were 93%, 73%, and 72%, respectively (Rosenberg 1965, 307). The SE scale is scored by summing the "positive" responses from each of the six scales (0=High self-esteem; 6=Low self-esteem); "positive" indicating low self-esteem.

Rotter Internal-External Locus of Control Scale

Utilizing Social Learning Theory as the theoretical background for the nature and consequences of reinforcement, Rotter developed the Rotter Internal-External Locus of Control (I-E LOC) scale (Rotter 1966). This scale is a 29-item forced-choice questionnaire, including six filler items. Questions on the scale are intended to focus exclusively on an individual's belief about the nature of the world, in other words, how one perceives his or her control of reinforcement. Respondents are asked to select an *a* or *b* response for each question. One response in each set describes an internal and an external situation. For example, a subject would be asked to select the response that best describes his or her belief of the following:

a) In the long run the bad things that happen to us are balanced by the good ones.

b) Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

The scale is scored by summing the number of external responses, that is, the higher the score, the more external the individual (0=Internal; 23=External).

Goal Analysis Questionnaire

Students' professional and personal goals were examined through a Goal Analysis Questionnaire (GAQ), designed distinctively for the purpose of this investigation. Students were asked to respond to the following questions: "Explain how your professional and personal goals will be met by preparing for a career in dietetics?" and "What enablers and obstacles do you feel will affect your ability to meet these goals?"

To ensure accuracy in instrument scoring by the principal researcher, 10 each randomly selected cognitive behavior surveys, self-esteem scales, and locus of control scales were scored again by the research advisor.

Procedure

UW-Stout Dietetic Students

This longitudinal pre-test, post-test design was begun in September 1995. This investigation was approved by the Committee for the Protection of Human Subjects in Graduate Student Research at the University of Wisconsin-Stout. Dietetic students enrolled in a *Dietetics as a Profession* course were informed by their instructor of the purpose of the study. To ensure confidentiality, an identifier code was randomly assigned to each student by a disinterested third party (DTP). Identifier codes,

represented by 1##-95, were written next to each student's name, cut into strips, with the code taped over allowing only the student's name to appear, and placed into an envelope. A sealed master copy was kept in the possession of the DTP and principal investigators. All parties, except for the DTP were blind to the names and assigned identifier codes. At the end of a class lecture, identifier codes, prepared as described above, and consent forms, were handed out to each student (appendix B). After obtaining informed consent, survey sets were administered to the students. They were instructed to complete and return the surveys within one week as a class assignment. The method of designating identifier codes, obtaining consent, dissemination of surveys, and collection of data, was conducted in the same manner for dietetic students enrolled in the succeeding 1996 *Dietetics as a Profession* course.

In November, 1997, identical surveys, in addition to a demographic data form (DDF), were re-administered to students from the original 1995 cohort, who continued in the dietetics program. Subjects continuing in the program were identified by matching their names from the 1995 introductory class roster to a list of students, provided by the undergraduate program director, enrolled in the dietetics program in the fall 1997. Withdrawal from school, change in major, and graduation attributed to the decrease in follow-up participation. The list of students continuing in the program was provided to the DTP, who referred to the 1995 list to apply the same identifier codes to those students. The DTP held a master copy of the codes and names. In addition, a sealed copy of the assigned codes and names was provided to the principal investigators.

To locate students continuing in the program, various instructors in the Department of Food and Nutrition were informed of the study and asked to identify the continuing students who were enrolled in their courses. Permission was granted to administer survey sets prior to the beginning of a scheduled class period. Meeting times were arranged on campus to distribute survey sets to those students who could not be contacted through class or were not enrolled in a food or nutrition course for fall 1997. Acquiring consent was not necessary for this cohort, as they agreed to longitudinal participation when they conferred consent in fall 1995. Although consent was granted, students were verbally reminded prior to administration of the survey sets that their participation was voluntary. Students were informed again of the purpose of the study, given one week to complete the survey set, and instructed to return the completed set in the attached self-addressed envelope through inter-campus mail. One week following administration of the survey sets, subjects were reminded to complete and return their survey sets through face-to-face and telephone contact.

The same procedure for survey administration, obtaining consent, and assignment of identifier codes was followed for that of the 1995 cohort at baseline. The only difference was that the codes for the 1996 cohort were designated as 96##, for ease of differentiating survey sets between the cohorts. In November, 1998, continuing students from the 1996 cohort were re-administered identical surveys, plus a DDF. Again, the procedure for identifying and locating students, and administering survey sets followed that of the 1995 cohort.

School A and School B Dietetic Students

School A Experienced Dietetic Students

Experienced dietetic students registered in an advanced nutrition course at School A were invited to participate in the study in fall 1997 to ascertain if experienced UW-Stout dietetic students were representative of experienced dietetic students. The instructor of this course was contacted by e-mail and informed of the purpose of the investigation. To protect students' confidentiality, a class roster could not be released; therefore, identifier codes were assigned by the department secretary at School A, designated as 5##. The number of students in the course (n=30) was provided to the principal investigators for compiling the correct number of survey sets. An instructional letter explained the procedure for obtaining consent, and distribution, collection, and return of the survey sets (see appendix C). This letter and a large self-addressed stamped envelope, supplied for returning the signed consent forms (appendix B), were included with the survey materials and mailed to the instructor of the course. To evade instructor bias toward or against responders, students were directed to give their signed consent forms to the department secretary who would then return the forms via the large self-addressed stamped envelope. Students were also directed to return their completed materials within one week in the self-addressed stamped envelope attached to each individual survey set. To verify that those students who returned survey sets gave consent, a cross-check was conducted between the department secretary and research advisor. The research advisor gave a list of the identifier codes from the returned survey

sets to the department secretary, and the secretary matched those codes to the students' names on the consent forms given to her.

School A Novice Dietetic Students

In the fall 1998, the instructor of an introductory nutrition course at School A was contacted by e-mail to request permission to survey the students to verify if novice dietetic students at UW-Stout were characteristic of novice dietetic students in general. Due to a high enrollment, course structure, and time constraints, survey sets could not be distributed to individual students. Because no names were associated with identifier codes, a three-digit code, designated as 7## for consistency with the identifier codes allotted to the experienced cohort, was assigned and written on the top of each instrument to facilitate survey administration, proper completion of the survey sets, and to correlate responses from the various surveys. Survey sets were delivered to the instructor by the research advisor. The instructor informed the students about the study and if interested, directed them to pick up a survey set following completion of a scheduled class. A form indicating the purpose of the study and directions for completing the surveys was attached to each survey set (appendix B). Return of the survey set verified consent by the student. A total of 50 survey sets were provided for interested students.

School B Novice and Experienced Dietetic Students

In the 1998 Spring semester, permission was given by the dietetics program director at School B, who was acquainted with the study by telephone, for inclusion of novice and experienced dietetic students to partake in the investigation. A list of student names was supplied to assign identifier codes. A code was assigned to each student, indicated by GB1##-98 and GB2##-98 for the experienced (n=17) and novice students (n=9), respectively. Codes were typed, and cut into strips, which were taped over to reveal only the student's name, and then attached to each survey set. Survey sets were compiled and mailed to the Dietetics Program Director with the consent forms (appendix B) and a large self-addressed-stamped envelope for returning signed consent forms. An instructional letter explaining the purpose of the study, and directions for obtaining consent and return of the survey sets was provided (appendix C). Dietetic students were administered the survey sets when they picked up their final projects at the end of the semester from the program director. Students were instructed to return their signed consent forms to the department secretary, who would then return them via the large, self-addressed, stamped envelope. To confirm that each student who returned survey materials gave consent, the research investigator matched the identifier codes from the returned survey sets to the names on the returned consent forms from the department secretary. For easy identification of study samples, survey sets were color coded for each group of subjects: UW-Stout's 1995 and 1996 dietetic students, 1998 business students, and the class of dietetic students at School A, and School B, respectively.

UW-Stout Business Students

Experienced Business Students

During spring 1998, survey sets were administered to business students (n=25) enrolled in an advanced business class. Prior to administration of the survey sets, the program director of the business department was contacted by telephone and asked to identify courses with adequate representation of experienced business students. The instructor of the advanced class was contacted by telephone to request permission to include the business students in the study. Confidentiality of the students was guaranteed through the use of identifier codes developed by the research investigator, and represented by BU2##-98. Identifier codes were not assigned to individual students because they would not be participating in any follow-up study. The codes served as a record if a student later decided to withdraw from the study, and for correlating data among the instruments. To ensure a sufficient response rate, the instructor agreed to offer an incentive to the students, in the form of extra-credit points, for completing and returning the survey sets. Preceding a class lecture, students were informed of the study, and consent forms were distributed (appendix B). The voluntary nature of the study was stressed. To avoid early discrimination of students who did not give consent, all consent forms were collected. Survey sets were administered to all students, and they were instructed to complete the survey within one week and return it in an attached, sealed envelope to the instructor. Because the envelopes were sealed, the instructor was unable to see the survey results. The instructor supplied the names of students not present on the day of administration, and arrangements were made between those students and the

research investigator to obtain consent and distribute survey sets. All survey sets were returned to the instructor to enable identification of participating students for incentive receipt. All completed survey sets were collected from the instructor within one week.

Novice Business Students

Novice business students enrolled in an introductory business administration class were invited to participate in the study in fall 1998. The instructor of the course was contacted, and permission to survey the students was granted. Because the instructor was the program director at the time the experienced business students participated in the study, she was familiar with the nature of the study. To assure confidentiality, students were identified through the use of codes like that of the experienced business students. Identifier codes were not individually assigned to students, however, due to the large enrollment, and because these students would not be participating in any follow-up study. Identifier codes were designated as BU3xx-98. Prior to completion of a class lecture, students were informed of the purpose and confidential nature of the study, and for ease in administration, were instructed to pick up a survey set if interested in taking part in the study. An instructional letter was attached to each survey set explaining the rules for completing and returning the surveys (appendix C). Students conferred consent by returning the survey set. A total of 62 survey sets were supplied.

Data Analysis

Qualitative data, which included student responses to the questions "Explain how your professional and personal goals will be met by preparing for a career in dietetics?", "What enablers and/or obstacles will affect your ability to meet these goals?", "What advice would you give a student just beginning to study science, health, and nutrition on how to study?", and "In your view, what motivates dietetic students at UW-Stout to learn?", were analyzed by means of coding and pattern coding, as described in appendix D.

Quantitative data were analyzed using SPSS for Windows, Version 7.5 (SPSS Inc. 1997). A general linear model, multivariate analysis was used to compare baseline and final data between the 1995 and 1996 dietetic cohorts, respectively, to ascertain if the two cohorts could be collapsed into one dietetic study sample. In addition, an independent t-test was used to compare the mean changes in each cognitive and affective variable, between the 1995 and 1996 dietetic cohorts, to further determine if the two cohorts could be combined into one sample of UW-Stout dietetic students. Rosenthal and Berven (1999, 255) reported that when comparing two independent groups on several multiple dependent variables, testing separately for differences on the individual variables between the groups is an alternative to multivariate analysis, ie, Hotelling's T^2. Rosenthal and Berven (1999, 255) citing Darlington (1990), noted that if the truth of one hypothesis is independent of the probability of the other hypothesis, "dividing the alpha level by the number of hypotheses becomes unnecessary." The general linear model, multivariate analysis was also used to compare data according to transfer status between

each class, with the variables of interest (e.g., memorization use at baseline and follow-up) representing the dependent variables, and class and transfer status representing the fixed variables. A paired t-test was used to assess the significance of difference between baseline and final cognitive and affective variables of the longitudinal dietetic study sample. To determine representativeness of UW-Stout business students and other dietetic students to UW-Stout dietetic students, respectively, planned contrasts were utilized.

When homogeneity of variance could not be assumed, as indicated by the Levene's test, data were analyzed using separate variance results, Mann-Whitney-U, or spread-versus-level plot. When spread-versus-level plot showed a linear relationship between the standard deviation and the mean, data values were transformed to log base 10 and re-analyzed. The relationship between variables within each study group was measured using Pearson correlation coefficient. Nominal data (e.g., gender, G.P.A., transfer status) were analyzed using chi-square. For all tests, a probability of less than .05 was considered significant.

Because age was not obtained from the 1995 and 1996 cohorts at baseline, mean baseline age was determined by using the self-reported birth date on the DDF at follow-up, and adjusting the age to the date of completion of the baseline surveys

Baseline class standing (based on credit hours earned) for each cohort was gathered from the 1995 and 1996 class rosters from the *Dietetics as a Profession* course. To determine baseline class standing for each student who returned a follow-up survey, a list of student identifier codes for those was given to the DTP, who matched the identifier

code to the name and class rank on the baseline roster. Because class standing was not collected from the 1995 cohort at follow-up, two years were added to each continuing student's class rank at baseline, assuming consistent progression through the dietetics program.

Incomplete or missing variable responses resulting from students skipping questions or answering a question twice were not included in the data analysis. With regard to the question on the CBS asking students to identify what percentage of nutrition knowledge came from various sources (e.g., texts, students), student totals that were above or below the 100% requirement were also excluded from data analysis.

CHAPTER IV

RESULTS

The purpose of this investigation was to examine the cognitive and affective behavior changes among dietetic students progressing through a didactic program in dietetics (DPD) at the University of Wisconsin-Stout. Changes in cognitive behavior concentrated on learning processes, approaches to studying, information memorized and retained, learning experience, epistemological beliefs, advice for studying, and motivators to learning. Affective behavior changes focused on self-esteem and locus of control. Changes related to professional and personal goals, and students' perceived enablers and obstacles to meeting these goals were also investigated. The primary objective of the study was to discern the changes in cognitive and affective behavior among dietetic students as they progress through the DPD at UW-Stout. The study specifically sought to:

1. Examine the change in dietetic students' use of memorization, conceptualization, and reflection during progression through the DPD.

2. Delineate the resources (e.g., students, texts) utilized by dietetic students as a source of science, health, and nutrition knowledge, and how these resources change during program involvement.

3. Identify how the amount of information dietetic students devote to memorization, and the amount remembered three months and one year after completing a final exam change as students advance through the DPD.

4. Describe the change in dietetic students' perception of the ambiguous, definitive, and stable nature of nutrition knowledge as they progress through their academic studies.

5. Characterize dietetic students' perceptions of their learning experience (e.g., enjoyable, rewarding) in science, health, and nutrition courses over the course of their education.

6. Describe the changes in dietetic students' self-esteem and locus of control during participation in the DPD.

7. Explain how the professional and personal goals, and enablers and obstacles to these goals change among dietetic students during progression through the DPD.

8. Delineate effective studying methods utilized by dietetic students at the inception and near completion of their dietetic studies.

9. Determine the motivational forces behind dietetic students desire to learn at UW-Stout, and how these motivators change during program involvement.

Data were obtained from four instruments to satisfy these nine objectives. The instruments included the Cognitive Behavior Survey (CBS), Rotter Internal-External Locus of Control Scale (I-E LOC), Rosenberg Self-Esteem Scale (SE), and a Goal Analysis Questionnaire (GAQ), designed specifically for this pre-test, post-test longitudinal study.

A narrative of the layout of study findings is necessary for the reader to understand the basis behind the presentation of results. A description of the subjects from the 1995 and 1996 cohorts is displayed first. To determine whether the 1995 and 1996 cohorts could be combined into one representative sample of dietetic students at UW-Stout, comparisons of objective and subjective cognitive and affective behaviors between the 1995 and 1996 cohort were made, and follow the description of subjects. Based on the comparisons between the 1995 and 1996 cohorts, the two cohorts were unified into one representative sample of UW-Stout dietetic students on objective and subjective data, which is described next. After the results from the unified study sample

are presented, comparisons between the UW-Stout sample and pooled program drop-outs from each cohort are displayed. These comparisons were made to ascertain if program drop-outs were characteristic of continuing dietetic students. Dietetic students from two schools in the Wisconsin system and UW-Stout business students participated in this study. The sole purpose for inclusion of these study groups was to determine if findings reported by UW-Stout dietetic students were characteristic of dietetic students in general, or were traits unique to UW-Stout students, respectively. Comparisons between novice and experienced UW-Stout dietetic students and other novice and experienced dietetic students, and UW-Stout business students, respectively, are then presented. Lastly, the behavior changes that occur among dietetic students advancing through a DPD at UW-Stout are reported.

Generalizability of UW-Stout Dietetic Students to School X Dietetic Students and UW-Stout Business Students

The results from this study suggest that the cognitive and affective behaviors experienced by UW-Stout dietetic students can be generalized to School X dietetic students. Conversely, findings are not generalizable to UW-Stout business students. At baseline, even though the novice UW-Stout dietetic students exhibited objective behaviors closer to those of novice business students at UW-Stout, the subjective data of UW-Stout dietetic students (i.e., goals, enablers and obstacles to goal attainment, advice for studying, motivators to learning) paralleled that of novice School X dietetic, described on page 117. Due to very small study samples of novice School X students (n=4) and

novice UW-Stout business students (n=5), however, caution should be taken when interpreting these findings.

At follow-up, regarding demographics, the UW-Stout dietetic students were like other experienced dietetic students and UW-Stout business students, as shown in table 3 on page 83. The experienced dietetic students at UW-Stout demonstrated similar objective and subjective data to School X dietetic students, compared to the experienced business students, where apparent differences existed, specifically in the subjective component of this study, which is discussed on page 132. The most obvious exception between the two groups of dietetic students related to the obstacles to goal attainment. Obstacles reported by UW-Stout dietetic students included programmatic issues, finances, and time management. Because these obstacles were cited by only one School X dietetic student, and one business student at Stout, these may be unique barriers for UW-Stout dietetic students, indicating the need for further exploration into these concerns, and their impact on the learning process within the dietetics program at UW-Stout. A summary of the objective and subjective cognitive and affective data of novice and experienced UW-Stout dietetic students, School X dietetic students, and UW-Stout business students are shown in tables 4 and 5 on pages 85 and 87, respectively.

Description of Subjects

To investigate the cognitive and affective behavior changes among UW-Stout dietetic students in a DPD, students enrolled in the introductory course *Dietetics as a Profession* for fall 1995 and 1996 were studied. In addition to studying more students,

Table 3. Gender, transfer status, and g.p.a frequencies of UW-Stout and School X dietetic students, and UW-Stout business students.

Demographic Variable	UW-Stout Dietetic	School X Dietetic	UW-Stout Business
Gender			
Male	4	3	9
Female	30	15	15
Transfer			
Yes	13	9	10
No	22	9	13
G.P.A.[1]			
4.0-3.5	14	5	5
3.49-3.0	13	7	12
2.99-2.5	8	6	7

[1] Indicates G.P.A. near end of academic program.

inclusion of the 1996 cohort of dietetic students served to strengthen the generalizable nature of study findings to UW-Stout dietetic students.

1995 UW-Stout Dietetic Cohort

A total of 58 students from the 1995 cohort participated in the study. Fifty-seven of the 58 students completed baseline survey sets, which included the CBS, Rotter I-E LOC Scale, Rosenberg SE Scale, and GAQ. In fall 1997, 24 students continued in the dietetics program, and were re-administered identical survey sets plus a demographic data form (DDF). Twenty-one of 24 students from the 1995 cohort were enrolled in the advanced nutrition course. Of those students continuing in the program, 19 returned final

surveys sets. One student did not provide baseline surveys, therefore, longitudinal data were available for 18 students, representing a response rate of 75% (18 of 24).

The mean baseline and follow-up ages for the cohort were 22.88 and 25.18 years, resepctively; ages ranged from 18-48 and 20-50 years, respectively (n=17; age was not reported by one student). Age frequencies are shown in table 6 on page 89. Gender, transfer status, and follow-up G.P.A. frequencies are displayed in table 7 on page 89. Only follow-up G.P.A. is given because G.P.A. was not collected at baseline. One student did not identify gender. Of the 17 students, based on credit hours, eight were juniors, three were sophomores, and seven were freshman at baseline. Adjusting credit hours from baseline by adding two years, assuming consistent progression through the DPD, the 1995 cohort consisted of seven juniors and 11 seniors. Based on credits earned, eight of the 11 seniors were beyond second semester senior standing.

To verify if the program drop-outs were characteristic of the continuing dietetic students, comparisons of cognitive and affective behaviors were made. These data are presented later on page 112.

1996 UW-Stout Dietetic Cohort

A total of 41 students from the 1996 cohort completed survey sets at baseline. Of the 41 students, 22 continued in the dietetics program and were re-administered survey sets plus a DDF in fall 1998. Nine of 22 continuing students were enrolled in the advanced nutrition course. A total of 19 survey sets were returned. Baseline data were not obtained from two students, therefore, longitudinal data were available for 17 students, representing a response rate of 77% (17 of 22).

Table 4. Summary of cognitive and affective behaviors by novice and experienced UW-Stout dietetic students, School X dietetic students, and UW-Stout business students.

Variable	UW-Stout Study Sample Baseline Mean[a]		UW-Stout Study Sample Follow-Up Mean[a]		Novice School X Mean[1]	Experienced School X Mean	Novice Business Mean	Experienced Business Mean
CBS Learning Processes								
MS[b](Range 11-77)	53.83/7.26[d, 2, 3] 47.56/5.66[8, 11]	51.03/ 7.14[c, 4]	54.33/11.03[3] 48.56/9.85 [c, 6]	51.62/ 10.74[5]	44.25/6.45	53.25/7.13[6]	53.00/4.08[1]	50.04/6.48[7]
CS[e] (Range 9-63)	46.47/6.81[5]		48.00/8.47[5]		54.25/4.19	46.83/4.82[3]	47.80/1.64[9]	43.63/7.61[10]
RS[f] (Range 6-42)	24.31/5.20[4]		24.91/5.28[4]		25.25/3.59	22.24/3.33[11]	20.20/7.85[9]	22.22/5.94[7]
Information Memorized and Retained (%)								
After 3 months	59.70/21.50[12]		47.79/24.13[12]		52.50/15.55	48.61/18.54[3]	54.00/28.63[9]	37.92/19.72[10]
After 1 year	46.45/19.21[12]		37.88/21.33[12]		32.50/8.66	37.50/16.83[3]	42.60/25.42[9]	27.33/18.46[10]
Devoted to Memorization	52.12/23.29[5]		54.26/27.17[5]		45.00/12.91	58.22/24.73[3]	33.40/32.61[9]	55.21/23.80[10]
Epistemological Beliefs (Range 1-7)[g] 1=Not at all descriptive 7=Very descriptive								
Ambiguous	4.12/1.05[12]		3.82/1.21[12]		2.75/1.26	3.59/1.58[11]	2.75/1.26[1]	4.13/1.19[10]
Definitive	5.06/.94[2, 3] 4.33/.98[8, 13]	4.73/ 1.01[c, 12]	4.72/1.41[3] 4.60/1.12[11]	4.77/ 1.31[c, 4]	4.25/1.89	3.50/1.34[3]	4.25/1.89[1]	4.83/1.20[10]
Stable	4.66/.77[4]		4.26/1.15[4]		4.50/1.73	3.83/1.47[3]	4.50/1.73[1]	4.58/1.38[10]
Approaches to Studying (%)								
Lectures	40.03/15.93[14]		52.03/14.05[14]		41.25/2.50	58.63/19.03[6]	33.75/13.77[1]	40.04/21.42[7]
Conf/Tutorials	4.19/5.71[14]		3.55/7.36[14]		6.25/9.46	2.06/3.57[6]	3.75/2.5[1]	4.04/5.56[7]

Table 4—Continued

Variable	UW-Stout Study Sample Baseline Mean		UW-Stout Study Sample Follow-Up Mean		Novice School X Mean[1]	Experienced School X Mean	Novice Business Mean	Experienced Business Mean
Faculty	3.71/3.50[15]		4.06/4.48[15]		1.25/2.50	2.97/3.98[6]	7.50/8.66[1]	5.17/4.85[7]
Students	8.71/7.03[2, 3]	9.42/ 7.09[c, 12]	3.94/4.35[11]	6.58/ 5.28[c, 12]	2.50/2.89	3.13/4.29[6]	8.75/6.29[1]	8.78/8.36[7]
	10.57/7.69[8, 13]		8.57/4.15[6]					
Texts	23.23/12.55[14]		21.87/15.75[14]		24.75/22.95	20.75/14.53[6]	20.00/10.80[1]	22.61/18.21[7]
Articles	7.76/7.70[14]		4.87/3.36[14]		1.50/2.38	5.41/3.51[6]	5.00/4.08[1]	6.78/5.05[7]
Labs	11.37/7.88[14]		7.06/4.06[14]		18.75/18.87	7.06/6.32[6]	8.75/14.36[1]	6.26/6.77[7]
Other	.16/.90[14]		.52/1.99[14]		3.75/7.50	0.00/0.00[6]	12.50/25.00[1]	6.30/13.92[7]
PLES[h] (Range 9-63)	49.63/4.47[4]		45.03/6.05[4]		49.00/6.38	45.88/7.45[11]	39.60/8.35[9]	41.65/7.71[47]
Self-Esteem (0=High; 6=Low)	1.56/1.05[5]		1.35/1.15[5]		1.75/2.87	.89/.90[3]	3.50/2.08[1]	1.42/1.64[10]
Locus of Control (Range 0-23)	10.28/4.18[16]		10.81/3.87[16]		8.00/2.94	10.31/3.20[6]	14.75/3.95[1]	10.78/3.00[4]

[a] Means are representative of the longitudinal study sample unless otherwise indicated

[b] MS-Memorization Scale

[c] Mean is representative of the combined 1995 and 1996 cohorts

[d] Each cell represents mean/standard deviation

[e] CS-Conceptualization Scale

[f] RS-Reflection Scale

[g] One component of epistemological beliefs focuses on how students view the nature of nutrition knowledge.

[h] PLES-Positive Learning Experience Scale

[1] n=4, [2] 1995 cohort, [3] n=18, [4] n=35, [5] n=34, [6] n=16, [7] n=23, [8] n=1996 cohort, [9] n=5, [10] n=24, [11] n=17, [12] n=33, [13] n=15, [14] n=31, [15] n=30, [16] n=32

Table 5. Summary of subjective cognitive and affective behaviors by novice and experienced UW-Stout dietetic students, School X dietetic students, and UW-Stout business students.

Variable	Novice UW-Stout Dietetic[1]	Experienced UW-Stout Dietetic[1]	Novice School X Dietetic[2]	Experienced School X Dietetic[3]	Novice UW-Stout Business[4]	Experienced UW-Stout Business[5]
Professional and Personal Goals	▪ Help others ▪ Gain knowledge ▪ Work/study in field of interest	▪ Help others ▪ Gain knowledge	▪ Help others ▪ Work in field of interest	▪ Help others ▪ Gain knowledge ▪ Work/study in field of interest	▪ Afford material goods ▪ Live comfortably	▪ Financial security ▪ Job with variety ▪ Afford material goods
Enablers	▪ Outside support ▪ Self-motivation ▪ Interest in field	▪ Self-motivation	▪ Self-motivation	▪ Outside support ▪ Self-motivation	▪ Self-motivation ▪ Outside support	▪ Outside support
Obstacles	▪ Time management ▪ Programmatic issues ▪ Finances	▪ Programmatic issues ▪ Finances ▪ Time management	▪ Time management ▪ Difficult classes	▪ Internship issues	▪ No self confidence ▪ Job availability	▪ Lack of experience
Advice for Studying	▪ Seek outside help ▪ Review material ▪ Practice time management	▪ Seek outside help ▪ Practice time management ▪ Review material	▪ Practice time management ▪ Visualize and connect ideas	▪ Practice time management ▪ Review material	▪ Complete assignments ▪ Practice time management	▪ Seek outside help ▪ Read text
Motivators to Learn	▪ Interest in field ▪ Help others ▪ Outside support	▪ Competition ▪ Help others ▪ Interest in field	▪ Self-motivation ▪ Interest in field ▪ Outside support	▪ Competition ▪ Interest in field	▪ High paying job ▪ Career following graduation	▪ Outside support ▪ Maintain good G.P.A/grades ▪ Make money

[1] n=35, [2] n=4, [3] n=18, [4] n=5, [6] n=6

Mean baseline and final ages for the 1996 cohort were 19 and 21.31 years; ages ranged from 17-23 and 19-25 years, respectively (n=16; age was not reported by one student). Age frequencies are shown in table 6 on page 89**.** Gender, transfer status, and follow-up G.P.A. frequencies are shown in table 7 on page 89. At baseline, according to credit hours earned, three were juniors, three were sophomores, and 11 were freshman. At follow-up administration, among the total 1996 cohort, 10 students were juniors, and seven were seniors. There were no seniors beyond the second semester standing according to credits earned.

To verify that the program drop-outs were characteristic of the continuing dietetic students, comparisons of cognitive and affective traits were made. These data are presented later, following the results of the combined study sample on page 112**.**

Comparison of Cognitive and Affective Behaviors Between the 1995 and 1996 Dietetic Cohorts to Determine Unification into One UW-Stout Dietetic Study Sample

To determine if the 1995 and 1996 cohorts could serve as one representative sample of UW-Stout dietetic students advancing through a DPD, baseline and follow-up comparisons were made between the 1995 and 1996 continuing students.

Comparison of Demographic Traits Between the 1995 and 1996 Dietetic Cohorts

The 1995 and 1996 cohorts did not differ by gender, transfer status, or follow-up G.P.A.; frequencies are displayed in table 6 on page 89. Frequencies for gender, transfer status, and follow-up G.P.A for the combined cohorts are displayed in table 7 on page 89.

Table 6. Baseline and follow-up age frequencies of the 1995 and 1996 UW-Stout dietetic cohorts.

	Baseline Frequency		Follow-Up Frequency	
Age (years)	**1995 [1]**	**1996 [2]**	**1995 [1]**	**1996 [2]**
17	0	1	0	0
18	5	8	0	0
19	2	2	0	1
20	2	3	3	6
21	4	0	3	3
22	0	1	2	2
23	0	1	4	2
24	1	0	1	1
25	0	0	0	1
26	0	0	1	0
30	1	0	0	0
32	0	0	1	0
35	1	0	0	0
37	0	0	1	0
48	1	0	0	0
50	0	0	1	0

[1] n=17, [2] n=16

Table 7. Gender, transfer status, and follow up g.p.a. frequencies of the 1995 and 1996 UW-Stout dietetic cohorts.

Demographic Variable	1995 Cohort	1996 Cohort	Statistic
Gender			
Male	3	1	x^2 1.13, df 1, p .29
Female	14	16	
Transfer			
Yes	7	6	x^2 .05, df 1, p .83
No	11	11	
G.P.A.			
4.0-3.5	8	6	x^2 .33, df 2, p .85
3.49-3.0	6	7	
2.99-2.5	4	4	

The study sample had one outlier at baseline (48 years) and at follow-up (50 years). However, no statistically significant difference in age was found between the cohorts at baseline (F 3.67, df 1, p .07) or follow-up (F 3.74, df 1, p .06) when the outliers were included in the analysis. Combined mean baseline and final ages for the dietetic study sample were 21 (SD 6.06) and 23.30 years (SD 5.98), respectively; ages ranged from 17-48 and 19-50 years, respectively. Age frequencies for the study sample are shown in table 8 on page 91. Age frequencies are also presented for experienced School X and experienced UW-Stout business students. These data are discussed later on pages 121 and 129, respectively.

Description of Transfer Students from the 1995 and 1996 Dietetic Cohorts

Study findings suggest that the differences in behavior may be due to the interaction of transfer status between the 1995 and 1996 cohorts, therefore, a description of the transfer students from each cohort is needed to more fully characterize these students. Table 9 on page 92 displays a summary of the mean baseline and final ages, and demographic frequencies for the 1995 and 1996 transfer and non-transfer students, and for the combined dietetic sample.

Comparison of Baseline and Follow-Up Cognitive and Affective Behaviors Between the 1995 and 1996 Dietetic Cohorts

Comparison of the baseline and follow-up cognitive and affective behaviors between the two dietetic cohorts was conducted using a general linear model, multivariate analysis. Findings indicated that the 1995 and 1996 cohorts could be

Table 8. Age frequencies of experienced UW-Stout dietetic students, experienced School X dietetic students, and experienced UW-Stout business students.

Age (years)	UW-Stout Dietetic[1]	School X[2]	UW-Stout Business[3]
19	1	0	0
20	10	0	0
21	6	4	0
22	4	6	6
23	7	3	5
24	3	1	2
25	1	0	1
26	1	0	2
27	0	0	1
31	0	1	0
32	1	0	0
35	0	1	0
37	1	0	0
42	0	0	1
44	0	1	0
50	1	0	0

[1] n=36, [2] n=17, [3] n=24

combined into one representative sample of UW-Stout dietetic students for 17 of the 20 variables examined. Baseline and follow-up comparisons are shown in tables 10 and 11 on pages 94 and 96, respectively. At baseline, students from the 1995 cohort utilized significantly more memorization (F 7.74, df 1, p .01) and described the nature of nutrition knowledge as significantly more definitive (F 4.68, df 1, p .04) than their 1996 counterparts. Memory use according to transfer status was examined as a possible explanation for this difference. The interaction between class and transfer status on baseline memory use was not significant, however (F 2.91, df 1, p .10). Near completion

Table 9. Mean baseline and follow-up age, and frequencies of gender and g.p.a. by transfer status for the 1995 and 1996 dietetic cohorts and combined dietetic study sample.

Variable	1995 Cohort		1996 Cohort		Dietetic Study Sample	
	Transfer[1]	Non-Transfer[2]	Transfer[3]	Non-Transfer[2]	Transfer[4]	Non-Transfer[5]
Age[6]	22.67/3.93/19-30	23.00/9.65/18-48	20.17/1.94/18-23	18.30/.95/17-20	21.42/3.23/18-30	20.76/7.27/17-48
Age [7]	24.83/3.87/21-32	25.36/9.49/20-50	22.33/1.86/20-25	20.70/1.34/19-23	23.58/3.18/20-32	23.14/7.18/19-50
Gender						
Male	0	3	6	1	12	4
Female	6	8	0	10	0	18
G.P.A.[8]						
4.0-3.5	5	3	3	3	8	6
3.49-3.0	2	4	1	6	3	10
2.99-2.5	0	4	2	2	2	6

[1] n=7; one student did not identify gender, [2] n=11, [3] n=6, [4] n=13; [5] n=22, [6] Baseline age; [7] Follow-up age; [8] Follow-up G.P.A.

of the academic program, the 1995 cohort relied significantly less on students (F 9.07, df 1, p .005) as a source of nutrition knowledge compared to the 1996 students.

As indicated in tables 10 and 11 on pages 94 and 96, respectively, the F ratios reported for the use of conference/tutorials as a source of nutrition knowledge, and positive learning experience represent the log base 10 of the data values. When the log base 10 of conference/tutorials was analyzed, the sample size dropped from 17 to five in the 1995 cohort, and from 14 to six in the 1996 cohort, due to log base 10 values less than or equal to zero. When PLE data were logarithmically transformed, Levene's test continued to be significant. The two groups were combined for PLE at baseline due to the robust nature of ANOVA and a non-significant F ratio.

Comparison of Baseline and Follow-Up Qualitative Data Between the 1995 and 1996 Dietetic Cohorts

Baseline and follow-up qualitative data from each cohort were compared to determine if the 1995 and 1996 cohorts were similar enough to be combined into one UW-Stout dietetic study sample. Responses to the following questions were analyzed for common themes: "Explain how your professional and personal goals will be met by preparing for a career in dietetics," "What enablers and obstacles do you feel will affect your ability to meet these goals?," "What advice would you give a student just beginning to study science, health, and nutrition on how to study?," and "In your view, what motivates the dietetic students at UW-Stout to learn?"

At baseline, the two cohorts identified three consistent professional and personal goals that would be met by a career in dietetics. These included the ability to help and

Table 10. Baseline comparison of cognitive and affective variables between 1995 and 1996 UW-Stout dietetic cohorts and combined results for UW-Stout study sample.

Variable	1995 Cohort	1996 Cohort	Statistic Multivariate Analysis	UW-Stout Study Sample
CBS Learning Processes				
MS[a] (Range 11-77)	53.83/7.26/41-68[b, 1]	47.56/5.66/39-56[2]	F 7.74, df 1, p .01	NA
CS[c] (Range 9-63)	47.17/6.47/34-58[1]	45.69/7.31/31-57[2]	F .39, df 1, p .54	46.47/6.81/31-58[3]
RS[d] (Range 6-42)	24.50/5.45/10-32[1]	24.12/5.07/14-34[4]	F .05, df 1, p .83	24.31/5.19/10-34[5]
Information Memorized and Retained (%)				
After 3 months	61.56/23.43/10-90[2]	57.94/20.08/20-95[4]	F .23, df 1, p .64	59.29/21.01/10-95[5]
After 1 year	45.63/20.16/5-75[2]	47.24/18.86/20-90[4]	F .06, df 1, p .76	45.97/19.12/5-90[6]
Devoted to Memorization	49.53/26.81/2-90[4]	54.71/19.64/15-90[4]	F .41, df 1, p .53	52.12/23.29/2-90[3]
Epistemological Beliefs (Range 1-7)[e] **1=Not at all descriptive** **7=Very descriptive**				
Ambiguous	3.89/1.05/2-5[4]	4.38/1.03/3-6[2]	F 1.85, df 1, p .18	4.12/1.04/2-6[6]
Definitive	5.06/.94/4-6[1]	4.33/.98/3-6[7]	F 4.68, df 1, p .04	NA
Stable	4.67/.69/3-6[1]	4.65/.86/3-6[4]	F .01, df 1, p .94	4.66/.76/3-6[5]
Approaches to Studying (%)				
Lectures	42.41/13.72/15-70[4]	37.14/18.37/10-75[8]	F .84, df 1, p .37	39.42/15.61/10-75[6]
Conf/Tutorials	2.82/4.29/0-15[4]	5.86/6.86/0-20[8]	F .03, df 1, p .87[f]	4.39/5.62/0-20[6]
Faculty	2.71/2.20/0-5[4]	4.92/4.39/0-15[8]	F 3.35, df 1, p .08	3.64/3.45/0-15[6]
Students	8.71/7.03/0-20[4]	10.57/7.69/0-30[8]	F .50, df 1, p .49	9.42/7.09/0-30[6]
Texts	26.18/11.66/5-45[4]	19.64/13.08/5-45[8]	F 2.16, df 1, p .15	23.18/12.30/5-45[7]
Articles	6.26/6.20/0-25[4]	9.57/9.10/0-30[8]	F 1.44, df 1, p .24	8.35/8.42/0-30[6]
Labs	10.62/7.07/0-25[4]	12.29/8.95/2-30[8]	F .34, df 1, p .57	11.44/7.86/0-30[6]
Other	.29/1.21/0-5[g, 4]	0.00/0.00/0[8]	F .82, df 1, p .37	0.15/0.87/0-5[6]

Table 10—Continued

Variable	1995 Cohort	1996 Cohort	Statistic Multivariate Analysis	UW-Stout Study Sample
PLES[h] (Range 9-63)	50.06/3.44/44-56[1]	49.18/5.42/41-59[4]	F .47, df 1, p .50[f]	49.63/4.47/41-59[5]
Self-Esteem (0=High; 6=Low)	1.28/.76/0-3[1]	1.44/1.36/0-5[2]	F .16, df 1, p .69	1.56/1.05/0-5[4]
Locus of Control (Range 0-23)	10.56/4.15/4-19[2]	10.00/4.32/1-16[2]	F .14, df 1, p .71	10.28/4.18/1-19[9]

[a] MS-Memorization Scale

[b] Each cell represents mean/standard deviation/range

[c] CS-Conceptualization Scale

[d] RS-Reflection Scale

[e] One component of epistemological beliefs focuses on how students view the nature of nutrition knowledge

[f] F ratios represent the log base 10 data values

[g] "Other" sources refer to volunteer experiences, friends, parents, dietitians, and television and radio documentaries.

[h] PLES-Positive Learning Experience Scale

[1] n=18, [2] n=16, [3] n=34, [4] n=17, [5] n=35, [6] n=33, [7] n=15, [8] n=14, [9] n=32

Table 11. Follow-up comparison of cognitive and affective variables between experienced 1995 and 1996 UW-Stout dietetic cohorts and combined UW-Stout dietetic study sample.

Variable	1995 Cohort	1996 Cohort	Statistic Multivariate Analysis/ Mann Whitney U	UW-Stout Dietetic Study Sample
CBS Learning Processes				
MS[a] (Range 11-77)	54.33/11.03/26-75[b, 1]	48.56/9.85/24-60[2]	F 2.56, df 1, p .12	51.62/10.74/24-75[3]
CS[c] (Range 9-63)	47.33/7.92/30-62[1]	48.75/9.26/28-61[2]	F .23, df 1, p .63	47.97/8.35/28-62[4]
RS[d] (Range 6-42)	24.61/5.00/17-37[1]	25.24/5.71/13-32[5]	F .12, df 1, p .73	24.91/5.28/13-37[4]
Information Memorized and Retained (%)				
After 3 months	51.38/25.55/10-89[2]	44.41/22.97/10-90[4]	F .68, df 1, p .42	47.79/24.13/10-90[6]
After 1 year	39.06/19.60/5-75[2]	36.76/23.38/10-90[5]	F .09, df 1, p .76	37.88/21.32/5-90[6]
Devoted to Memorization	60.59/26.81/10-95[5]	47.94/29.37/10-90[5]	F 1.89, df 1, p .18	53.66/27.01/10-95[4]
Epistemological Beliefs (Range 1-7)[e] 1=Not at all descriptive 7=Very descriptive				
Ambiguous	3.88/1.05/2-5[5]	3.75/1.39/1-6[2]	F .10, df 1, p .76	3.74/1.29/1-6[3]
Definitive	4.72/1.41/2-6[1]	4.60/1.12/3-7[7]	F .07, df 1, p .79	4.77/1.31/2-7[4]
Stable	4.11/1.08/2-6[1]	4.41/1.23/2-7[5]	F .59, df 1, p .45	4.26/1.15/2-7[4]
Approaches to Studying (%)				
Lectures	55.18/14.93/25-70[5]	48.21/12.34/20-65[8]	F 1.95, df 1, p .17	51.30/14.13/20-70[6]
Conf/Tutorials	1.59/2.03/0-6[4]	6.13/9.76/0-40[2]	F 2.48, df 1, p .15[f]	3.79/7.21/0-40[6]
Faculty	2.71/3.84/0-15[5]	5.71/4.78/0-15[8]	F 3.79, df 1, p .06	4.27/4.46/0-15[6]
Students	3.94/4.35/0-15[5]	8.57/4.35/0-20[5]	F 9.07, df 1, p .005	NA
Texts	23.71/15.40/5-50[4]	19.64/16.46/5-70[8]	F .50, df 1, p .48	21.15/15.52/5-70[6]
Articles	5.65/3.28/0-10[5]	3.93/3.34/0-10[8]	F 2.08, df 1, p .16	5.18/3.49/0-10[6]
Labs	6.88/3.37/2-15[5]	7.29/4.89/0-15[8]	F .07, df 1, p .79	7.09/3.98/0-15[6]
Other	.35/1.22/0-5[g, 5]	.71/2.67/0-10[h, 8]	F .25, df 1, p .62	.64/2.07/0-10[6]
PLES[i] (Range 9-63)	45.39/6.10/34-55[1]	44.65/ 6.51/34-59[5]	F .13, df 1, p .72[f]	45.03/6.05/34-59[4]

Table 11—Continued

Variable	1995 Cohort	1996 Cohort	Statistic Multivariate Analysis/ Mann Whitney U	UW-Stout Dietetic Study Sample
Self-Esteem (0=High; 6=Low)	1.39/.96/0-3[1]	1.7 5/1.34/0-4[2]	F 1.00, df 1, p .32	1.31/1.57/0-4[5]
Locus of Control (Range 0-23)	10.81/3.66/4-18[2]	10.81/4.20/3-17[2]	F .00, df 1, p 1.00	10.57/3.88/3-18[4]

[a] MS-Memorization Scale

[b] Each cell represents mean/standard deviation/range

[c] CS-Conceptualization Scale

[d] RS-Reflection Scale

[e] One component of epistemological beliefs focuses on how students view the nature of nutrition knowledge

[f] F ratios represent the log base 10 data values

[g] "Other" sources refer to dictionaries, handbooks, reports, and material from previous classes.

[h] "Other" sources refer to work experience, and one's own research.

[i] PLES-Positive Learning Experience Scale

[1] n=18, [2] n=16, [3] n=34, [4] n=35, [5] n=17, [6] n=33, [7] n=15, [8] n=14

educate others, to increase one's knowledge base, and to work/study in a field that was interesting. No recurring enablers were identified by either cohort, but support from others, self-motivation, and an interest in the field were mentioned by both groups. Time management, financial concerns, and programmatic issues were significant obstacles for these students. Three overwhelming tips of advice were apparent for both the 1995 and 1996 students. These tips related to help-seeking, time management, and reviewing/studying on a regular basis. The two cohorts did not differ with regard to perceived motivational stimuli for learning. An intrinsic interest in the field and support from others emerged as the top two motivating forces to learn.

Goals that would be met by 1995 and 1996 dietetic students at follow-up were to help others and obtain additional knowledge. Both groups of students identified themselves and others as aids to reaching their professional and personal goals. Barriers to goal attainment included programmatic issues, financial worries, and time management. The cohorts agreed on the advice they gave for studying, which focused on practicing good time management skills, help-seeking, reviewing/studying regularly, and reading texts. Competition emerged as a motivating factor to learning. Twice as many students from the 1995 cohort identified competition as motivating compared to the 1996 students. Additional motivating factors included having an interest in the field, self-motivation, and a desire to help others.

Aside from singularly expressed comments, shared responses were obvious among students from both cohorts of dietetic students, indicating that they could be pooled for analysis of baseline and follow-up qualitative data. A summary of the

subjective data is displayed in table 5 on page 87. A more detailed discussion of these results for the combined study sample follows.

A paired t-test was used to assess baseline with follow-up results for the cognitive and affective behaviors examined in this study. For the variables that were significantly different between cohorts, changes were analyzed separately. An independent t-test was used to compare the variables representing change for each cohort. No significant differences were found between the cohorts, as shown in table 12 on page 100. This strengthened the decision that 1995 and 1996 cohort could be collapsed into one study sample of UW-Stout dietetic students progressing through a DPD.

Baseline Professional and Personal Goals Met by the UW-Stout Dietetic Study Sample

A total of 30 of the 35 students identified goals that would be met by a career in dietetics. Three students did not return this portion of the survey set. Intrinsically oriented goals were predominant among dietetic students. Over half of the study sample (n=19) identified the ability to help and educate others as one of the main goals that would be met by preparing for a career in dietetics**,** exemplified by such comments as:

> "By having a career in Dietetics, I will meet my goals because I have always been interested in helping people and making a difference in people's lives. With dietetics I feel I can accomplish those goals."

> "My personal goals will be met by preparing me to help people in the way I feel is the most beneficial to many people—Helping them lead healthy lifestyles through good eating and exercise habits."

Table 12. Comparison of mean changes in cognitive and affective variables for continuing 1995 and 1996 UW-Stout dietetic cohorts.

Variable	1995 Cohort Change	1996 Cohort Change	Statistic Comparison Independent t-test
CBS Learning Processes			
MS[a]	.50/8.75/-16-17[b, 1]	1.00/10.94/-20-15[2]	t -.15, df 32, p .88
CS[c]	.17/1.27/-10-7 [1]	3.06/1.81/-18-24[2]	t -.97, df 21.42, p .34
RS[d]	.11/7.19/-11-19[1]	1.12/4.72/-7-11[3]	t -.49, df 33, p .63
Information Memorized and Retained (%)			
After 3 months	-10.19/19.30-50-15[2]	-13.53/17.57/-45-10[4]	t .52, df 31, p .61
After 1 year	-6.56/23.00/-45-55[2]	-10.47/15.04/-40-20[3]	t .58, df 31, p .57
Devoted to Memorization	11.06/26.64/-40-78[3]	-6.76/32.30/-65-45[3]	t 1.76, df 32, p .09
Epistemological Beliefs (Range 1-7)[e] 1=Not at all descriptive 7=Very descriptive			
Ambiguous	0.00/1.12/-3-2[3]	-.63/1.31/-3-2[2]	t 1.48, df 31, p .15
Definitive	-.33/.97/-2-1[1]	.27/1.16/-2-3[5]	t -1.62, df 31, p .12
Stable	-.56/1.20/-3-1[1]	-.24/1.20/-2-1[3]	t -.79, df 33, p .44
Approaches to Studying (%)			
Lectures	12.76/16.94/-25-50[3]	11.07/17.68/-15-40[4]	t .27, df 29, p .79
Conf/Tutorials	-1.24/4.45/-14-5[3]	.07/13.38-15-37[4]	t -.35, df 15.37, p .73
Faculty	.00/4.09/-5-13[3]	.79/6.53/-13-10[4]	t -.39, df 20.99, p .70
Students	-4.76/6.01/-18-5[3]	-2.00/10.21/-25-10[4]	t -.89, df 20.13, p .38
Texts	-2.47/14.14/-25-20[3]	0.00/14.81/-30-25[4]	t -.47, df 29, p .64
Articles	-.62/6.38/-15-8[3]	-5.64/10.14/-29-7[4]	t 1.68, df 29, p .10
Labs	-3.74/7.16/-15-7[3]	-5.00/10.48/-30-13[4]	t .40, df 29, p .69
Other	-.06/.24/0-1[3]	.71/2.67/0-10[4]	t -.91, df 13.18, p .38

Table 12—continued

Variable	1995 Cohort Change	1996 Cohort Change	Statistic Comparison Independent t-test
PLES[f] (Range 9-63)	-4.67/5.22-12-6[1]	-4.53/8.09/-22-9[3]	t -.06, df 33, p .95
Self-Esteem (0=High; 6=Low)	-.11/1.02/-2-2[1]	-.31/1.14/-2-2[2]	t .54, df 32, p .59
Locus of Control (Range 0-23)	.25/3.24/-7-5[2]	.81/2.51/-5-6[2]	t -.55, df 30, p .59

[a] MS-Memorization Scale

[b] Each cell represents the mean change/standard deviation/range of change

[c] CS-Conceptualization Scale

[d] RS-Reflection Scale

[e] One component of epistemological beliefs focuses on how students view the nature of nutrition knowledge.

[f] PLES-Positive Learning Experience Scale

[1] n=18, [2] n=16, [3] n=17, [4] n=14, [5] n=15

In addition, increasing one's knowledge base (n=14), and working/studying in field of interest (n=12) were two frequently cited goals that would be met by dietetic students, evident by comments like:

> "One of my goals is to enjoy what I am doing. I am interested in my classes that I am taking and like learning the subject material. I feel I will also enjoy the environment in which I can work in as a dietitian."

> "Becoming a dietitian will give me the knowledge I need to guide people toward a life of optimum nutrition."

Goals cited by only one or two students related to job environment (e.g., can work with others; work in the medical field), and career benefits, such as the ability to support oneself and/or a family, having a variety of job options, and opportunity for advancement. Singularly expressed goals included becoming a dietitian and identifying which area of dietetics to pursue.

Baseline Enablers and Obstacles to Goal Attainment by the UW-Stout Dietetic Study Sample

Thirty-one students identified enablers and obstacles to goal attainment. A total of 19 students identified both enablers and obstacles, eight students listed only obstacles, and one reported only enablers. Three students did not return this section of the survey set. Support from others (e.g., professors, family, other students, and friends) was the biggest enabler for dietetic students (n=8). These students saw themselves (n=7), in terms of their own motivation, confidence, attitude, and desire to succeed, in addition to an having an interest in the field (n=6) as a means toward goal attainment. Comments illustrating students' enablers included:

> "My greatest enabler that will someday let me reach my goals in in [*sic*] the dietetics profession is my enormous drive to suceed [*sic*] . . . Another enabler is my enjoyment of the subject, to me nutrition and its related subjects are very interesting and exciting, and working in this field the rest of my life would be very rewarding."
>
> "Right now the confidence I have in myself and the support I have behind me from other people such as family, friend [*sic*], and the UW-Stout staff are what is influencing me."
>
> "I feel that my motivation and great interest in dietetics will help me to succeed."

Two students reported their goals as enablers. Singularly expressed enablers were previous education as a dietetic technician, knowledge gained through dietetic studies, not hesitating to ask for help, and adequate "materials" (e.g., texts, labs).

Time management was the students' biggest concern in reaching their goals (n=10) (i.e., trying to balance school with family, friends, and work), exemplified by comments like:

> "Time management might be a problem because I have a hard time saying no to things I want to do when I have other things to do that need to be done."
>
> "One of my definite obstacles will be to learn how to manage my time wisely. . . I need to know when it is time to have fun and when it is time to study."

Financial worries (n=8) was also a concern among dietetic students. A third major obstacle related to programmatic issues, such as difficult classes, class scheduling and planning, inadequate texts, poor instructors, and a lack of congruency between material previously taught in one course to what's currently being taught in another course, the latter three each cited by one student. Although self-motivation was an enabler for some students, others believed they could be their own obstacle in terms of their lack of concentration, motivation, persistence, patience, negative thinking, and short attention

span (each reported by only one or two students). Comments reflecting dietetic students' obstacles were:

> "The biggest obstacle is the money factor. I know that I will not be able to pay for all of my college without taking out a loan or receiving scholarships."
>
> "I have a fear that this major will be too difficult, and I may not be able to handle it."
>
> "I sometimes feel that I have a difficult time in motivating myself to meet my goals. I have a difficult time learning things that are confusing to me because I tend to give up on things too easily."

Other obstacles, each cited by one student, included competition, job placement, fear of not having enough credits, being behind in credits and having to catch up, and not having a desirable G.P.A. One student also felt that not being taken seriously because he/she was not a "size 7" and his/her eating habits weren't consistent with what's being taught, was an obstacle. In other words, he/she didn't "practice what I preach."

Baseline Advice for Studying Given by the UW-Stout Dietetic Study Sample

To examine approaches to studying, students were asked what advice they would give a student just beginning to study science, health, and nutrition on how to study. Thirty-two students gave recommendations for studying. Two students indicated that they could not answer the question because they were too new to the program; there was one non-respondent. Except for one student, all gave more than one tip of advice for studying. Students were in overwhelming agreement concerning the advice they gave for studying science, health, and nutrition. Asking questions and seeking help from others, such as a professor, study group, tutor, or another student was predominant (n=17). Issues

related to time management, (e.g., set aside time to study, don't procrastinate) were reported by 11 students, illustrated by the comment:

> "The advice I would give to a student just beginning to study the above subjects [science, health, and nutrition] would be to keep up with the readings and take notes on the readings. Never allow yourself to get behind. It is very difficult to catch up and understand the material."

Studying and reviewing notes frequently was highly recommended (n=14). Students also suggested correlating material with other information learned, drawing pictures, observing one's own studying method, and connecting ideas with experience. Reading material (e.g., texts, articles) was less practiced, but regarded as an effective studying method.

The dietetic students also identified approaches not directly related to the studying process, such as taking good notes, attending class, paying attention and participating in class, and sitting in the first two rows of the classroom. Effective studying methods, each documented by one student, included using flash cards, having a positive attitude, and working hard. Typical points of advice for studying included:

> "Perhaps the most important point would be start studying right from the beginning. Make sure to attend most of the lectures (if not all) take notes carefully and review them daily. Other important keys for successful studying would be to ask questions, reading other materials related to the course, and forming study groups."

> "Study a little each day, cramming doesn't work. Go over & over the material and use examples and how everything relates to better remember material."

Baseline Motivating Factors to Learn by the UW-Stout
Dietetic Study Sample

Students were asked to identify what they believed motivates dietetic students at UW-Stout to learn. A total of 33 students responded to the question. One student did not answer, citing his/her newness to the program; there was one non-respondent. Intrinsically, an interest in the field (n=14) and a desire to help and educate others (n=6) motivated dietetic students at UW-Stout to learn. Self-motivation and knowledge attainment also promoted learning. Support from others emerged as an extrinsic motivating force to learn by the study sample (n=12. Other extrinsically oriented motivators related to career benefits, such as future career opportunities, and the prospect of being in a job that's successful and rewarding. Programmatic factors, such as a desire to graduate and complete the program in four years (n=4), and the challenging, and competitive nature of the program, a well organized educational plan, learning current information through courses, and the program's successful reputation, (the latter all singularly expressed comments), were also motivating. Two cited the expense of their education as a motivating force. Singularly identified motivators for learning were to be named to the Dean's list, and the potential for future failure. Comments illustrating dietetic students' greatest perceived motivators for learning included:

> "The dietetic students at UW-Stout are motivated by faculty, family, friends, and their own personal desire. The ability and talent to improve a person's life is a wonderful thing. These students are interested and excited about what they're doing and I believe that is the best kind of motivation."

> "I believe that the thing that makes a dietetic student learn is that they chose this career because they had an interest in it. Usually when you are interested in a certain thing you tend to try harder at suceeding." [*sic*]

> "What motivates the dietetic students at UW-Stout to learn is that they know that thier [*sic*] field pertains to the health and well being of the public. Students know that if they do not fully learn the material, that they can not fully help people meet thier [*sic*] nutritional needs and teach the public how to reach thier [*sic*] health goals."

Follow-Up Professional and Personal Goals Met by the UW-Stout Dietetic Study Sample

A total of 34 of 35 students identified professional and personal goals that would be met by preparing for a career in dietetics. At follow-up, the ability to help and educate others (n=15), and to enhance one's knowledge (n=12) were the top goals among dietetic students. Goals reflecting anticipation of program completion related to receiving a degree/graduating, furthering education into another field, obtaining an internship, and becoming a registered dietitian. Goals related to the job environment (e.g., can work with others), career benefits (e.g., can balance job and family, job advancement), and working/studying in a field of interested were cited. Comments reflecting the goals among experienced dietetic students included:

> "My overall professional goal is to build a career in the field of Dietetics that will allow me to make a difference in peoples lives and build strong relationships between my clients and fellow professionals."

> "A professional goal of mine is to be a positive contributing member of a health care team . . . By preparing for a career in dietetics, I will be able to work with physician's [*sic*], nurse's [*sic*], speech pathologist's [*sic*], social worker's [*sic*], pharmacist's [*sic*], etc."

> "My professional goals are to help others and build their knowledge of nutrition while also continuing to learn myself."

Follow-Up Enablers and Obstacles to Goal Attainment
by the UW-Stout Dietetic Study Sample

Of the 33 students who identified enablers and obstacle to goal attainment at follow-up, 15 listed enablers and obstacles, 12 only obstacles, and six only enablers. There were two non-responders. The dietetic students believed that they were the driving force behind reaching their professional and personal goals (n=11), in terms of their own motivation, confidence, and dedication, exemplified by a comment like: "The things that will enable me to meet my goals are my 100% commitment and dedication to this field . . ." . An interest in the field, support from others, personal goals, and education obtained, also emerged as enablers, but were cited less frequently. Enablers, each expressed by one student included financing one's education, field experience, and being assertive.

Programmatic issues, such as difficult classes, class scheduling, and poor teaching, was the largest obstacle to goal attainment for dietetic, indicated by the comment: "Set backs like not getting classes when you need them are also obstacles." Financial concerns, reflected by the remark: "Money is a big issue. This is the only obstacle that would affect my ability to meet my goals," and time management were also cited as obstacles. Feelings of poor self-worth, and the need for high grades/G.P.A. as obstacles were barriers to goal attainment for some students. Two dietetic students identified issues related to on-the job experience such as encountering persons who do not understand the necessity of nutrition, and the threat of individuals disseminating nutrition information, thus depleting him/her of a job and harming clients.

Other obstacles included being male, competition, lack of experience, and stress, each identified by one student.

Follow-Up Advice Given for Studying by the UW-Stout Dietetic Study Sample

All 35 students from the study sample gave advice for studying science, health, and nutrition. Practicing good time management (n=18) was highly recommended by dietetic students, followed by seeking help from others (e.g., professors, students, study group, tutor) (n=17), evident by the comments:

> "The most important advice I have to offer a student beginning to study science, health, and nutrition is not to procrastinate and to stay organized. Procrastination is an obstacle that new students must overcome. Staying on top of your homework is the key to success in this type of coursework . . . Neglecting to study prior to the night before an exam results in cramming and decreased retention of important material over time."

> "The best advice I can give is to never fall behind. As soon as you can after class review your notes and textbook. Don't be afraid to approach your professor for help, they are you best resource."

These students also believed that reading material (e.g., texts, articles), and reviewing and studying frequently were important for learning. Relating ideas to other classes and experiences, using visuals (e.g., diagrams, flashcards), and quizzing oneself were also practiced by these students. With regard to the use of memorization, two students suggested memorization, whereas another two students emphasized not to study by rote, noting that it would not promote retention of material. Tips of advice not directly related to the studying process suggested taking good notes, recording lectures, and attending, paying attention in, and participating in class.

Follow-Up Motivating Factors to Learn by the
UW-Stout Dietetic Study Sample

Each student from the dietetic study sample responded to the question at follow-up when asked what motivated him/her to learn science, health, and nutrition. Competition emerged as the driving force behind dietetic students' motivation to learn (n=14). The competitive environment was recognized by over half of the students from the 1995 cohort (n=10 of 18), versus four of 17 from the 1996 cohort, both from within the program and for internship placement. One student from the 1995 cohort commented that:

> "There is a lot of competition among dietetic students. I can't explain why. But we are always trying to one up one another. And not in a friendly rivalry kind of way, either. It is a vicious, stab-you-in-the-back kind of rivalry. I think that is what motivates students to try harder in the dietetics program."

In addition to competition, other extrinsic motivators included outside support, particularly from professors, the desire to get good grades/G.P.A., job benefits (e.g., money), and the reputation of the dietetics program. Intrinsically, these students were encouraged to learn by self-motivation, an interest in the field, to help others, and to increase one's knowledge base. An illustrating comment of the perceived motivators of dietetic students included:

> "I believe what motivates the dietetic students here at UW-Stout is the great support and enthusiasm that is shown by the faculty members. They are great encouragers . . . Their fellow classmates in the dietetic program are there for them for support and advice & are experiencing the same type of things. And the last thing I believe that motivates the dietetic students is the student themselves [*sic*]. They are the ones who enter the program knowing that they want to become a Dietitian."

The desire to become a registered dietitian, and fear, were singularly identified motivators.

Sample Representativeness of UW-Stout Dietetic Students to Program Drop-Outs, School X Dietetic Students, and UW-Stout Business Students

As previously noted, the 1995 and 1996 cohorts could be combined into one representative sample of dietetic students at UW-Stout, except for four traits examined. The two cohorts differed on their use of memorization and the definitive view of nutrition knowledge at baseline, and the use of students as sources of nutrition knowledge at follow-up.

For comparisons to UW-Stout program drop-outs, novice and experienced School X students, and novice and experienced UW-Stout business students, all novice and experienced data were pooled between the 1995 and 1996 cohorts. As noted earlier, School X dietetic students and UW-Stout business students were included in the study to ascertain if characteristics exemplified by UW-Stout students were unique to dietetic students or unique to UW-Stout students. Baseline data from the UW-Stout dietetic study sample were compared to the pooled program drop-outs from each cohort to determine if those students who dropped out of the program were significantly different from the continuing students. Using an independent t-test, no significant differences between the continuing students and program drop-outs were found for any of the cognitive and affective traits, as shown in table 13 on page 112**,** indicating that the program drop-outs were characteristic of the continuing UW-Stout dietetic students.

Table 13. Baseline comparison of cognitive and affective variables between UW-Stout dietetic study sample and program drop-outs.

Variable	Dietetic Study Sample	Program Drop-Outs	Statistic Independent t-test
CBS Learning Processes			
MS[a] (Range 11-77)	51.03/7.14/39-68[b, 1]	52.06/7.60/28-70[2]	t -.64, df 86, p .53
CS[c] (Range 9-63)	46.47/6.81/31-58[3]	43.87/6.95/28-60[4]	t 1.72, df 86, p .09
RS[d] (Range 6-42)	24.31/5.19/10-34[1]	23.83/4.85/16-38[2]	t .45, df 86, p .66
Information Memorized and Retained (%)			
After 3 months	59.29/21.01/10-95[1]	53.77/20.59/10-90[2]	t 1.22, df 86, p .23
After 1 year	45.97/19.12/5-90[3]	45.65/21.01/5-85[4]	t .07, df 86, p .94
Devoted to Memorization	52.12/23.29/2-90[3]	55.00/23.96/10-95[2]	t -.55, df 85, p .58
Epistemological Beliefs (Range 1-7)[e] **1=Not at all descriptive** **7=Very descriptive**			
Ambiguous	4.12/1.04/2-6[3]	3.98/1.06/1-6[5]	t .59, df 84, p .56
Definitive	4.73/1.01/3-6[6]	4.65/1.13/2-7[7]	t .30, df 80, p .76
Stable	4.66/.76/3-6[1]	4.47/1.10/2-7[2]	t .93, df 85.75, p .35
Approaches to Studying (%)			
Lectures	39.42/15.61/10-75[6]	40.52/18.98/8-90[8]	t -.27, df 79, p .79
Conf/Tutorials	4.39/5.62/0-20[6]	2.96/4.90/0-25[8]	t 1.22, df 79, p .23
Faculty	3.64/3.45/0-15[6]	3.94/4.62/0-15[8]	t -.32, df 79, p .75
Students	9.42/7.09/0-30[6]	8.07/7.53/0-30[8]	t .81, df 79, p .42
Texts	23.18/12.30/5-45[6]	24.07/12.17/3-60[8]	t -.32, df 79, p .75
Articles	8.35/8.42/0-30[6]	8.18/8.07/0-30[8]	t .09, df 79, p .93
Labs	11.44/7.86/0-30[6]	11.18/8.86/0-50[8]	t .14, df 79, p .89
Other	0.15/0.87/0-5[f, 6]	1.40/4.81/0-30[g, 8]	t -1.75, df 51.42, p .09

Table 13—Continued

Variable	Dietetic Study Sample	Program Drop-Outs	Statistic Independent t-test
PLES[h] (Range 9-63)	49.63/4.47/41-59[1]	48.72/6.31/32-60[4]	t .79, df 86.25, p .43
Self-Esteem (0=High; 6=Low)	1.56/1.05/0-5[3]	1.42/1.29/0-5[9]	t .54, df 87, p .59
Locus of Control (Range 0-23)	10.28/4.18/1-19[10]	9.94/3.82/3-18[2]	t .38, df 83, p .70

[a] MS-Memorization Scale

[b] Each cell represents mean/standard deviation/range

[c] CS-Conceptualization Scale

[d] RS-Reflection Scale

[e] One component of epistemological beliefs focuses on how students view the nature of nutrition knowledge.

[f] "Other" sources refer to dictionaries, handbooks, reports, material from previous classes, work experience, and one's own research.

[g] "Other" sources refer to volunteer experiences, friends, parents, dietitians, and television and radio documentaries.

[h] PLES-Positive Learning Experience Scale

[1] n=35, [2] n=53, [3] n=34, [4] n=54, [5] n=52, [6] n=33, [7] n=49, [8] n=48, [9] n=55, [10] n=32

Representativeness of Novice UW-Stout Dietetic Students to Novice School X Dietetic Students and Novice UW-Stout Business Students

To determine representativeness of novice UW-Stout dietetic students to novice dietetic students in general, and novice UW-Stout students, comparisons were made between UW-Stout dietetic students and novice dietetic students from two other schools in the UW-System, referred to as School A and School B, and novice UW-Stout business students, respectively.

School A dietetic students were instructed to pick up survey sets at the completion of a class lecture. The instructor of the course identified an inexact number of surveys picked up by the students, indicating approximately 10-20. Two of the 10-20 surveys from School A, and two of nine surveys administered to School B were returned. Because of the small sample size from School A and School B, their data were pooled for comparison to UW-Stout novice dietetic students, henceforth referred to as " School X." Due to the low response rate from School X and novice UW-Stout business students (n=5 of 50), a full statistical analysis could not be performed, therefore, only the mean and standard deviations for the cognitive and affective behaviors are reported on table 14 on page 115. Due to small sample sizes of these two cohorts, caution is warranted in interpreting these findings.

Comparison of Objective Cognitive and Affective Behaviors Between Novice UW-Stout Dietetic Students and Novice School X Dietetic Students

Compared to novice School X dietetic students, dietetic students at UW-Stout utilized greater memorization, remembered and retained more information three

Table 14. Baseline comparison of cognitive and affective variable means and standard deviations of UW-Stout dietetic students to School X dietetic students and UW-Stout business students.

Variable	UW-Stout Dietetic Baseline Mean	School X Baseline Mean[1]	UW-Stout Business Baseline Mean
CBS Learning Processes			
MS[a] (Range 11-77)	51.03/7.14[b, 2]	44.25/6.45	53.00/4.08[1]
CS[c] (Range 9-63)	46.47/6.81[3]	54.25/4.19	47.80/1.64[4]
RS[d] (Range 6-42)	24.31/5.19[2]	25.25/3.59	20.20/7.85[4]
Information Memorized and Retained %)			
After 3 months	59.29/21.01[2]	52.50/15.55	54.00/28.63[4]
After 1 year	45.97/19.12[3]	32.50/8.66	42.60/25.42[4]
Devoted to Memorization	52.12/23.29[3]	45.00/12.91	33.40/32.61[4]
Epistemological Beliefs (Range 1-7)[e] **1=Not at all descriptive** **7=Very descriptive**			
Ambiguous	4.12/1.04[3]	2.75/1.26	4.75/.96[1]
Definitive	4.73/1.01[5]	4.25/1.89	5.25/.50[1]
Stable	4.66/.76[2]	4.50/1.73	4.75/2.63[1]
Approaches to Studying (%)			
Lectures	39.42/15.61[5]	41.25/2.50	33.75/13.77[1]
Conf/Tutorials	4.39/5.62[5]	6.25/9.46	3.75/2.50[1]
Faculty	3.64/3.45[5]	1.25/2.50	7.50/8.66[1]
Students	9.42/7.09[5]	2.50/2.89	8.75/6.29[1]
Texts	23.18/12.30[5]	24.75/22.95	20.00/10.80[1]
Articles	8.35/8.42[5]	1.50/2.38	5.00/4.08[1]
Labs	11.44/7.86[5]	18.75/18.87	8.75/14.36[1]
Other	0.15/0.87[f, 5]	3.75/7.50[g]	12.50/25.00[h, 1]
PLES[i] (Range 9-63)	49.63/4.47[2]	49.00/6.38	39.60/8.35[4]
Self-Esteem (0=High; 6=Low)	1.56/1.05[3]	1.75/2.87	3.50/2.08[1]

Table 14—Continued

Variable	UW-Stout Dietetic Baseline Mean	School X Baseline Mean[1]	UW-Stout Business Baseline Mean
Locus of Control Range (0-23)	10.28/4.18[6]	8.00/2.95	14.75/3.95[1]

[a] MS-Memorization Scale

[b] Each cell represents mean/standard deviation

[c] CS-Conceptualization Scale

[d] RS-Reflection Scale

[e] One component of epistemological beliefs focuses on how students view the nature of nutrition knowledge.

[f] "Other" refers to volunteer experiences, friends, parents, dietitians, and television and radio documentaries.

[g] "Other" sources refer to one's personal experience with health issues, and dietitians at a state hospital.

[h] "Other" sources refer to job experience and "my own ability."

[i] PLES-Positive Learning Experience Scale

[1] n=4, [2] n=35, [3] n=34, [4] n=5, [5] n=33, [6] n=32

months and one year after completing a course, and devoted more time to memorization. UW-Stout students also viewed the nature of nutrition knowledge as more ambiguous, definitive, and stable than their School X counterparts. Dietetic students at UW-Stout sought greater knowledge from faculty, other students, and articles than School X dietetic students did. The two groups of dietetic students regarded their learning experience essentially the same, with UW-Stout students viewing it as slightly more positive. A higher self-esteem and more external locus of control existed among dietetic students at UW-Stout compared to School X novice dietetic students.

Comparison of Objective Cognitive and Affective Behaviors Between Novice UW-Stout Dietetic Students and Novice UW-Stout Business Students

Novice UW-Stout business students used greater memorization compared to novice UW-Stout dietetic students. These students also reported to remember more after three months. Business students viewed the nature of their knowledge as more ambiguous, definitive, and stable compared to the dietetic students. They also used more faculty and "other" as sources of knowledge. The business students felt more negatively about their learning experience and had a much lower self-esteem and an external locus of control compared to novice UW-Stout dietetic students.

Comparison of Professional and Personal Goals Met Between Novice UW-Stout Dietetic Students and Novice School X Dietetic Students

Goals cited among the small study sample from School X (n=4) were similar to UW-Stout dietetic students. All four students identified the ability to help and educate others as a goal that would be met by a career in dietetics. Working in a field of interest

was reported by three of the four students. Singularly expressed goals were to increase one's current knowledge base, and goals related to job benefits, such as the ability to support oneself, have a job that allowed for some freedom, was less structured, and offered medical insurance. Despite the small sample, the three major goals cited by UW-Stout dietetic students were addressed by School X students.

Comparison of Professional and Personal Goals Met Between Novice UW-Stout Dietetic Students and Novice UW-Stout Business Students

Goal data were available for four of the five business students. One student did return this section of the survey set. These students exhibited goals that were much more extrinsic in nature when compared to novice dietetic students. Goals that would be met by students preparing for a career in business were related to job benefits, such as the the ability to afford material goods and to live comfortably, each cited by one student. Students also indicated that preparing for a career in business would allow him/her to be an influential businessperson, get "my foot in the door," and to be successful (each mentioned by one student). One student stated that he/she would meet his/her goals by working hard.

Comparison of Enablers and Obstacles to Goal Attainment Between Novice UW-Stout Dietetic Students and Novice School X Dietetic Students

Three of the four students from School X recognized themselves as an enabler to meeting their professional and personal goals. Enablers cited each by one student included family support, a strong knowledge base, and being open-minded. Three of the four students identified obstacles. All mentioned by one student, these included time

management, difficult classes and finding the right job, and staying current and trying to influence others to change their lifestyle. Like the UW-Stout dietetic students, personal motivation was a driving force, and time management and difficult classes were regarded as an enabler and obstacles, respectively, for goal attainment.

Comparison of Enablers and Obstacles to Goal Attainment Between Novice UW-Stout Dietetic Students to Novice UW-Stout Business Students

Two business students identified enablers and obstacles to achieving their goals, two listed only obstacles, and one student did not return this section of the survey set. Similar to dietetic students, business students recognized personal motivation and support from others, in particular professors, as enablers to meeting their goals (each identified by one student). One student acknowledged the co-op office and his/her learning experiences (e.g., field experience, conferences), as aids to goal attainment, which were not mentioned by UW-Stout dietetic students. With one exception of an unrecognized need for a certain specialization and a lack of employers visiting campus for this specialization, other obstacles cited by business students were identified by UW-Stout dietetic students. These included a lack of confidence and job availability, each cited by one student.

Comparison of Advice Given for Studying Between Novice UW-Stout Dietetic Students and Novice School X Dietetic Students

Frequent tips of advice for studying were given by the four students from School X. All students gave more than one tip of advice. Like Stout dietetic students, these students gave advice related to time management, such as not falling behind in the

workload and not waiting to the last minute to study, visualizing what's being learned, and connecting ideas to experiences and to each other.

Comparison of Advice Given for Studying Between Novice UW-Stout Dietetic Students and Novice UW-Stout Business Students

Four business students gave more than one tip of advice for studying. One student did not respond to this question. Two students recommended completing all assignments. Singularly reported items advised not getting behind, asking questions, seeking help from professors, attending and paying attention in class, and reading the material. Each tip of advice given by business students was also suggested by novice UW-Stout dietetic students.

Comparison of Motivating Factors to Learn Between Novice UW-Stout Dietetic Students and Novice School X Dietetic Students

Each motivating factor cited by School X dietetic students was also recognized by UW-Stout dietetic students for learning. Three of the four students identified more than one motivating factor to learn. Self-motivation, an interest in nutrition, enthusiastic professors, the need to teach and share knowledge, the availability of jobs, a desire to succeed, and a fear of failure were mentioned as motivating forces.

Comparison of Motivating Factors to Learn Between Novice UW-Stout Dietetic Students and Novice UW-Stout Business Students

Unlike the strong intrinsic motivation to learn displayed by UW-Stout dietetic students, business students (n=4 of 5; one non-respondent) are extrinsically motivated to learn to obtain a high paying job, the career that awaits following graduation, and by

previous graduates' success stories. Intrinsic and singularly cited items included working in career that will provide happiness, and learning "new methods."

Representativeness of Experienced UW-Stout Dietetic Students to Other Experienced Dietetic Students

To determine if the UW-Stout dietetic study sample was representative of dietetic students in general at the completion of their academic program, comparisons were made with experienced dietetic students from two schools in the UW-system, referred to as School A and School B. Because of the low response rate from School B dietetic students (n=4 of 17), their results were combined with School A dietetic students (n=14 of 30), henceforth referred to as School X, for analysis with experienced UW-Stout dietetic students.

Comparison of Demographic Traits Between Experienced UW-Stout Dietetic Students and Experienced School X Dietetic Students

Concerning demographics, no statistically significant difference in gender (x^2 .006, df 1, p .94), transfer status (x^2 .45, df 1, p .50), G.P.A. (x^2 1.17, df 2, p .56), or age (t -.81, df 70, p .42) were observed between UW-Stout dietetic students and School X dietetic students. Comparison of demographic frequencies of gender, transfer status, and G.P.A. between experienced UW-Stout dietetic students, and experienced School X dietetic students and experienced UW-Stout business students, respectively, is presented in table 3 on page 83. The mean age for the UW-Stout dietetic sample was 23.30 years (SD 5.98); ages ranged from 19-50 years. The mean age for the School X cohort was 24.64 years (SD 6.25); ages ranged from 21-44 years. Age frequencies are displayed in

table 8 on page 91. Data comparing experienced UW-Stout dietetic and experienced UW-Stout business students are presented later in the chapter.

Comparison of Objective Cognitive and Affective Behaviors Between Experienced UW-Stout Dietetic Students and Experienced School X Dietetic Students

Findings indicated that UW-Stout dietetic students sought greater knowledge from other students than their School X counterparts. In addition, the UW-Stout dietetic students viewed the nature of nutrition knowledge as significantly more definitive than School X dietetic students Comparison of cognitive and affective variables between UW-Stout dietetic students and School X dietetic students is presented in table 15 on page 123.

Comparison of Professional and Personal Goals Met Between Experienced UW-Stout Dietetic Students and Experienced School X Dietetic Students

School X dietetic students and UW-Stout dietetic students did not differ with regard to the goals that would be met by preparing for a career in dietetics. A total of 15 students from the cohort identified goals. Three students failed to respond to the question. Similar to UW-Stout dietetic students, School X dietetic students believed their goal of helping and educating others, receiving a good knowledge base, working in an enjoying and interesting field, becoming a dietitian, and obtaining an internship, would all be met by a career in dietetics. Interestingly, three students from School X were unsure whether dietetics was the right career for them, or what they would do next. UW-Stout dietetic students did not mention these concerns. Singularly expressed goals

Table 15. Comparison of cognitive and affective variables between experienced UW-Stout and experienced School X dietetic students.

Variable	Experienced UW-Stout	Experienced School X	Statistic Planned Contrast and Mann Whitney U
CBS Learning Processes			
MS[a] (Range 11-77)	51.62/10.74/24-75[b, 1]	53.25/7.13/42-68[2]	t -.61, df 70, p .55
CS[c] (Range 9-63)	47.97/8.35/28-62[3]	46.83/4.82/38-56[4]	t .53, df 74, p .60
RS[d] (Range 6-42)	24.91/5.28/13-37[3]	22.24/3.33/17-28[5]	t 1.76 df 72, p .08
Information Memorized and Retained (%)			
After 3 months	47.79/24.13/10-90[6]	48.61/18.54/15-70[4]	t -.13, df 72, p .90
After 1 year	37.88/21.32/5-90[6]	37.50/16.83/10-60[4]	t .07, df 72, p .95
Devoted to Memorization	53.66/27.01/10-95[3]	58.22/24.73/20-90[4]	t -.62, df 74, p .54
Epistemological Beliefs (Range 1-7)[e] **1=Not at all descriptive** **7=Very descriptive**			
Ambiguous	3.74/1.29/1-6[1]	3.59/1.58/1-7[5]	t .37, df 72, p .71
Definitive	4.77/1.31/2-7[3]	3.50/1.34/1-5[4]	t 3.41, df 74, p .001
Stable	4.26/1.15/2-7[3]	3.83/1.47/1-6[4]	t 1.12, df 74, p .27
Approaches to Studying (%)			
Lectures	51.30/14.13/20-70[6]	58.63/19.03/25-93[2]	t -1.35, df 69, p .18
Conf/Tutorials	3.79/7.21/0-40[6]	2.06/3.57/0-10[2]	t .93, df 69, p .35
Faculty	4.27/4.46/0-15[6]	2.97/3.98/0-10[2]	t .95, df 69, p .34
Students	6.58/5.28/0-20[6]	3.13/4.29/0-15[2]	u 162.5, p .03
Texts	21.15/15.52/5-70[6]	20.75/14.53/0-60[2]	t .08, df 69, p .94
Articles	5.18/3.49/0-10[6]	5.41/3.51/0-10[2]	t -.21, df 29.62, p .84
Labs	7.09/3.98/0-15[6]	7.06/6.32/0-25[2]	t .02, df 69, p .99
Other	.64/2.07/0-10[f, 6]	0.00/0.00/0[g, 2]	t 1.76, df 32, p .09
PLES[h] (Range 9-63)	45.03/6.05/34-59[3]	45.88/7.45/30-54[5]	t -.42, df 72, p .68
Self-Esteem (0=High; 6=Low)	1.31/1.57/0-4[3]	.89/.90/0-3[4]	t 1.47, df 42.74, p .15
Locus of Control (Range 0-23)	10.57/3.88/3-18[3]	10.31/3.20/5-17[2]	t .25, df 71, p .81

Table 15—Continued

[a] MS-Memorization Scale

[b] Each cell represents mean/standard deviation/range

[c] CS-Conceptualization Scale

[d] RS-Reflection Scale

[e] One component of epistemological beliefs focuses on how students view the nature of nutrition knowledge.

[f] "Other" sources refer to dictionaries, handbooks, reports, material from previous classes, work experience, and one's own research.

[g] "Other" sources were not cited by these students.

[h] PLES-Positive Learning Experience Scale

[1] n=34, [2] n=16, [3] n=35, [4] n=18, [5] n=17, [6] n=33,

included working in the health field, having academic connections, providing a sense of personal worth and accomplishment, and obtaining a Master's degree. Illustrating comments from School X experienced dietetic students included:

> "Although I still have much to learn, I will leave here with a good foundation of knowledge. I believe I'll be able to reflect and draw on what I've learned as I apply it in practice in an internship and/or in a job situation."

> "My personal goal is to help individuals understand their body and learn ways to improve their health. The science & nutrition coarse [*sic*] I have taken has provided me c [with] an excellent background.

Comparison of Enablers and Obstacles to Goal Attainment Between Experienced UW- Stout Dietetic Students and Experienced School X Dietetic Students

School X dietetic students identified similar enablers and obstacles to UW-Stout dietetic students. A total of 15 students responded to the question, with three non-respondents. Eleven students identified both enablers and obstacles and three students gave only obstacles to goal attainment. One student reported that he/she did not have any obstacles. Enablers mentioned by School X dietetic students were like those of UW-Stout dietetic students. No frequently cited enabler emerged among these students. Support from others, (e.g., professors, friends, family) was the most frequently recognized enabler (n=6), followed by self-motivation. In addition, these students identified contacts and work experience as enablers, which were not mentioned by UW-Stout dietetic students. Singularly expressed enablers included diverse courses, one's education, good communication skills, and a wide selection of internships. Exemplifying comments included:

> "My goals will be met because I will have a good base of knowledge to where I can branch off and basically do whatever I want."
>
> "My professors are enabling me to meet my professional goals. Many of them have expressed their willingness to help students especially if the internship route is not possible."

With regard to obstacles, the two groups of dietetic students identified similar obstacles, but differed proportionately by the number or respondents to each obstacle. The biggest obstacle for School X students was related to the dietetic internship. Six of the 15 students who identified obstacles were concerned about not getting an internship, with four referencing poor grades as a possible influential factor. One student viewed the financial burden of an internship as an obstacle and another student had to delay his/her internship as a result of having a child. Only two of 27 students from UW-Stout reported concerns relating to internships. Programmatic issues were predominant among UW-Stout students (n=11), where only two students from School X identified program issues as obstacles (e.g., emphasis on academics, boring classes). Apart from the internship, only one School X student worried about money, compared to seven from the UW-Stout group. Time management was also a concern among UW-Stout dietetic students, which was not mentioned by School X dietetic students. Two students cited a lack of passion for the field of dietetics or desire to become a dietitian as obstacles. UW-Stout dietetic students did not mention this as an obstacle. Obstacles, each cited by one student, included difficult patients and co-workers, lack of knowledge, finding a job of interest, lack of self-motivation, and an inability to relocate because of family ties.

Comparison of Advice Given for Studying Between Experienced UW-Stout Dietetic Students and Experienced School X Dietetic Students

The advice students gave for studying did not differ by dietetic cohort. A total of 17 students gave advice for studying. One student did not respond to this question. Each student gave more than one point of advice. School X dietetic students did not frequently recommend one tip of advice. Practicing good time management skills (n=7) and reviewing frequently (n=6) were regarded as the most effective studying methods by these students, followed closely by seeking help from others, and memorizing. Comments illustrating this advice included:

> "It is very important to keep up on all the material. It is very easy to fall behind. Try & read as much outside nutrition information so you can keep up with & relate it to what you are learning."
>
> "Talk to instructors and/or TAs regularly . . . Meet with other students to study and discuss the material."

Time management and seeking help from others were predominant among Stout dietetic students, in addition to reviewing material often and reading texts. Less than half the students from School X mentioned time management related to studying, and five students recommended seeking help from others. Only two students from School X suggested reading the text as effective. In addition to reviewing material frequently, these students also suggested utilizing diagrams, relating knowledge and ideas to current practices, and learning concepts, and practicing continuous learning (the latter two cited by one student). Further advice included attending class, and paying attention in class, and taking notes (the latter two cited by one student).

Comparison of Motivating Factors to Learn Between Experienced UW-Stout Dietetic Students and Experienced School X Dietetic Students

The 17 dietetic students from School X who responded to this question identified no significant motivating force. Competition within the program and for internship placement was the most frequently cited (n=6), and an interest in the field was cited by four students as motivating to learn, which were both motivating forces addressed by UW-Stout dietetic students. In addition, supportive professors, and personal goals, were motivating, which were also all identified by UW-Stout dietetic students. One difference between the cohorts was the recognition of self-motivation by UW-Stout dietetic as a motivating force to learn. Although only 8 of 35 students identified themselves as motivating, only one student from School X saw his/herself as motivating. These students were also motivated to learn by the prospect of getting a job, and an interest in the field. Singularly expressed motivating factors were to obtain knowledge, becoming a dietitian, and tough classes. Illustrating comments included:

> "We're motivated to learn to get good grades to make it into an internship and/or Grad school. It's also nice to see an 'A' on a test rather than a 'C'."

> "I think there are a number of factors that motivate dietetic students @ UW-_____. One is the professors. Each of my nutrition/food service instructors enjoys their field of expertise and are very knowledgeable & excited. It rubs-off on the students. The second motivating factor is the competitiveness of the university. To do well, you have to put a lot of work into it. The last motivating factor is each students own personal goals."

Representativeness of Experienced UW-Stout Dietetic Students to Experienced UW-Stout Business Students

UW-Stout business students were invited to participate in the study to identify if UW-Stout dietetic students were characteristic of UW-Stout students near the conclusion of their academic program. A total of 24 of 25 surveys sets administered were returned.

Comparison of Demographic Traits Between Experienced UW-Stout Dietetic Students and Experienced UW-Stout Business Students

The UW-Stout dietetic study sample and business cohort did not differ statistically by gender (x^2 1.89, df 1, p .17), G.P.A. (x^2 2.71, df 2, p .26), transfer status (x^2 .09, df 1, p .77), or age (t -.98, df 73, p .33). The mean age for the business students was 24.65 years (SD 4.17); ages ranged from 22-42 years. Frequencies for gender, transfer status, and G.P.A. are shown in table 3 on page 83. Age frequencies for the business cohort are presented in table 8 on page 91. Transfer status was not identified by one student.

Comparison of Objective Cognitive and Affective Behaviors Between Experienced UW-Stout Dietetic Students and UW-Stout Business Students

Comparisons of cognitive and affective behaviors between experienced UW-Stout dietetic and business students are displayed in table 16 on page 130. Concerning CBS learning processes, dietetic students at UW-Stout utilized significantly more conceptualization thinking skills than the business students, in addition to a greater, but non-significant use of reflective thinking (t 1.96, df 72, p. 054) and memorization (t .66, df 70, p .51). UW-Stout business students relied significantly more on lectures as a source of information, and reported remembering significantly less one-year after taking a final exam than the dietetic students.

Table 16. Comparison of cognitive and affective variables between experienced UW-Stout dietetic students and experienced UW-Stout business students.

Variable	Experienced Dietetic Cohort	Experienced Business Cohort	Statistic Planned Contrast
CBS Learning Processes			
MS[a] (Range 11-77)	51.62/10.74/24-75[b, 1]	50.04/6.48/40-61[2]	t .66, df 70, p .51
CS[c] (Range 9-63)	47.97/8.35/28-62[3]	43.63/7.61/29-60[4]	t 2.21, df 74, p .03
RS[d] (Range 6-42)	24.91/5.28/13-37[3]	22.22/5.94/10-32[2]	t 1.96, df 72, p .054
Information Memorized and Retained (%)			
After 3 months	47.79/24.13/10-90[5]	37.92/19.72/5-75[4]	t 1.71, df 72, p .09
After 1 year	37.88/21.32/5-90[5]	27.33/18.46/2-60[4]	t 2.02, df 72, p .047
Devoted to Memorization	53.66/27.01/10-95[3]	55.21/23.80/20-90[4]	t -.23, df 74, p .82
Epistemological Beliefs (Range 1-7)[e] 1=Not at all descriptive 7=Very descriptive			
Ambiguous	3.74/1.29/1-6[1]	4.13/1.19/2-7[4]	t -1.10, df 72, p .28
Definitive	4.77/1.31/2-7[3]	4.83/1.20/2-7[4]	t -.18, df 74, p .86
Stable	4.26/1.15/2-7[3]	4.58/1.38/2-7[4]	t -.95, df 74, p .35
Approaches to Studying %)			
Lectures	51.30/14.13/20-70[5]	40.04/21.42/10-80[2]	t 2.33, df 69, p .02
Conf/Tutorials	3.79/7.21/0-40[5]	4.04/5.56/0-20[2]	t -.15, df 53.40, p .88
Faculty	4.27/4.46/0-15[5]	5.17/4.85/0-15[2]	t .95, df 69, p .99
Students	6.58/5.28/0-20[5]	8.78/8.36/0-30[2]	t -1.12, df 34.12, p .27
Texts	21.15/15.525-70[5]	22.61/18.21/5-75[2]	t -.31, df 69, p .74
Articles	5.18/3.49/0-10[5]	6.78/5.05/0-15[2]	t -1.32, df 36.27, p .20
Labs	7.09/3.98/0-15[5]	6.26/6.77/0-30[2]	t .55, df 69, p .58
Other	.64/2.07/0-10[f, 5]	6.30/13.92/0-50[g, 2]	t -1.94, df 22.7, p .07
PLES[e] (Range 9-63)	45.03/6.05/34-59[3]	41.65/7.71/27-54[2]	t 1.82, df 72, p .07

Table 16—Continued

Variable	Experienced Dietetic Cohort	Experienced Business Cohort	Statistic Planned Contrast
Self-Esteem (0=High; 6=Low)	1.31/1.57/0-4[3]	1.42/1.64/0-5[4]	t -.26, df 38.37, p .79
Locus of Control (Range 0-23)	10.57/3.88/3-18[3]	10.78/3.00/5-16[2]	t -.23, df 71, p .82

[a] MS-Memorization Scale

[b] Each cell represents mean/standard deviation/range

[c] CS-Conceptualization Scale

[d] RS-Reflection Scale

[e] One component of epistemological beliefs focuses on how students view the nature of nutrition knowledge.

[f] "Other" sources refer to dictionaries, handbooks, reports, material from previous classes, work experience, and one's own research.

[g] "Other" sources refer to homework/assignments, group study/tutor, and work.

[h] PLES-Positive Learning Experience Scale

[1] n=34, [2] n=23, [3] n=35, [4] n=24, [5] n=33

Comparison of Professional and Personal Goals Met Between Experienced UW-Stout Dietetic Students and UW-Stout Business Students

A total of 21 students identified goals that would be met by preparing for a career in business. Three students did not respond to this question. No recurring goal was cited by the business students. Unlike the dietetic students' strong intrinsic goal to help others, the major goal that would be met for business students related to extrinsic career benefits, which included financial security, a job with variety, ability to afford material goods, and a job with flexibility. Only three of the 34 dietetic students identified goals pertaining to extrinsic career benefits (e.g., balancing family with career, job advancement). The second goal that would met by a career in business was increasing one's knowledge base, which was also the second most frequently cited goal of dietetic students. Four students felt that preparing for a career in business would meet their goal of getting a job in general, having the opportunity to be successful and contribute to the success of a company, and receiving a degree. Singularly expressed goals were increasing one's marketability, and enhanced attention and problem-solving skills. Comments illustrating business students' goals included:

> " A goal I have is to be able to afford the things I want in life. I also want to be in position of respect and that people are able to come to me. The career I am choosing will satisfy Both goals."

> "Personally I would like to reach a high level of success. Having a college degree and a background in business will help me prepare for this."

Comparison of Enablers and Obstacles to Goal Attainment Between Experienced UW-Stout Dietetic Students and Experienced UW-Stout Business Students.

Sixteen of 24 business students identified enablers and obstacles to goal attainment. One student noted that he/she did not have any enablers or obstacles; there were seven non-responders. Only four of the 16 students listed both enablers and obstacles to reaching their goals, eleven identified just obstacles, and one student cited only enablers. Each enabler was identified by no more than 1-2 students. These included support from others, job related experiences, self-motivation and confidence, education, a will to better the environment, technology, and having a strong direction, desire to succeed, and great attitude. Support from others, job related experiences, self-motivation, and education were all cited by dietetic students. Technology was not mentioned by dietetic students. Illustrating comments included:

> "My education, positive outlook, personal motivation, will to better my environment, and support from my family & friends will enable me to meet my goals."

> "- My background: (the things my parents have taught me, classes have taught, real life experiences)
> - A strong direction, focus. The "want" to succeed.
> - A great attitude, to never say die so to speak."

Programmatic issues, financial concerns, and time management were the most recurring obstacles cited by dietetic students, however, business students did not see either of these as obstacles. Only one student identified issues related to time management as an obstacle, with no students addressing financial concerns. The business students' obstacles were very heterogeneous. Lack of experience, evident by the comment: "One major obstacle I have is I will be entering a career in management and I have no management experience.", and being female, indicated by the remark: " . . . I'm

young & a woman will be an obstacle for me. I think that it will be difficult for a 50 year old man who has been doing his job for 20 years to take me seriously.", were seen as obstacles. Obstacles, each mentioned by one student, were targeted more toward job-related problems, such as the uncertainty of the job market, having an unmotivated boss, competition in the job market, geographic location, balancing family with career, and inability to apply skills to the job. One student cited a lack of motivation, and another the inability to speak in public without getting nervous as obstacles. Compared to business students, dietetic students appeared to view their obstacles more within the present context (e.g, programmatic issues, time management), rather than anticipating future obstacles.

Comparison of Advice Given for Studying Between Experienced UW-Stout Dietetic Students and Experienced UW-Stout Business Students

A total of 23 of the 24 students gave advice for studying. One student did not respond to this question. Although not as frequently cited, like the dietetic students, UW-Stout business students believed asking questions and seeking help from others was the top recommendation for studying (n=6 of 23). Other suggestions included reading the text and related articles, going to class, taking good notes, managing time wisely, and participating in class, with singularly expressed advice including reviewing material, relating material to one's own experience, and avoiding memorization. These tips of advice were also given by their dietetic counterparts. Recommendations not relayed by dietetic students included outlining chapters, finding good professors, using laboratories, practicing good listening skills, and demonstrating the ability to work in a group. In

addition, dietetic students suggested the use of pictures/diagrams, flashcards, and recorders, and quizzing oneself, which were not cited by business students. Comments reflecting business students' advice for studying included:

> "When studying try to keep up with the readings and assignments. If you get behind you no longer have a good base of knowledge to build on . It becomes difficult to reinforce the lost knowledge with the knowledge that comes after it."

> "Go to every class, don't skip. Be sure to ask lots of questions. Don't be afraid to approach instructors before/after or at their office for questions."

Comparison of Motivating Factors to Learn Between Experienced UW-Stout Dietetic Students and Experienced UW-Stout Business Students

Twenty-three of 24 business students identified what they perceived to be motivating factors to learn. Fourteen of the 23 students believed business students were more motivated by more than one force. Not one tip of advice was prevalent among business students. These students listed similar motivators to learn to UW-Stout dietetic students. Business students were motivated to learn by others, in particular faculty members, to maintain a good G.P.A. and get good grades, by an interest in the field/classes, to gain knowledge, to make money, and to help people (the latter cited by one student). Competition, which was the major motivating force among dietetic students, was not acknowledged by any business students as motivating. In addition, business students were motivated by the prospect of getting a job, hearing of the success of others, by the "outside business world," and to finish projects (the latter two each cited by one student). One student remarked that students were there to just "put in their time." Comments illustrating what motivated business students included:

"Good professors who want their students to learn and take interest in their students

work and grades!"

"We all want to graduate and make money. I believe these are why we learn. In my opinion unless you get lucky, you got to get a high paying job in order to 'make it' in today's world. And to get those jobs you must have a business degree."

"The thing that motivates UW-Stout students to learn in business is the goal of one day being able to be in big business. There's always something new to learn in business."

Longitudinal Changes by the UW-Stout Dietetic Study Sample

To examine the cognitive and affective changes among dietetic students advancing through the dietetics program at UW-Stout, the 1995 and 1996 cohorts were combined for 17 of the 20 variables. Table 17 on page 137 summarizes the changes that dietetic students experienced over the course of their education.

Changes in Cognitive Behavior by the UW-Stout Dietetic Study Sample

Changes in Cognitive Learning Processes by the UW-Stout Dietetic Study Sample

Because the 1995 and 1996 cohorts differed significantly on their use of memorization at baseline (F 7.74, df 1, p .01), the change in memory use is reported separately for each cohort. Mean memorization scale scores remained high, and increased non-significantly from 53.83 (SD 7.26) to 54.33 (SD 11.03) (t -.24, df 17, p .81) for the 1995 cohort, and increased from 47.56 (SD 5.66) to 48.56 (SD 9.85) (t -.37, df 15, p .72) for the 1996 cohort. During program involvement, non-significant increases in the use of conceptual and reflective thinking were observed among the dietetic study sample.

Table 17. Longitudinal changes in cognitive and affective behaviors by UW-Stout dietetic students.

Variable	Baseline Mean	Follow-Up Mean	Statistic Paired t-test
CBS Learning Processes			
CS[a] (Range 9-63)[1]	46.47/6.81[b]	48.00/8.47	t -1.06, df 33, p .30
RS[c] (Range 6-42)[2]	24.31/5.20	24.91/5.28	t -.59, df 34, p .56
Information Memorized and Retained (%)			
After 3 months[3]	59.70/21.50	47.79/24.13	t 3.76, df 32, p .001
After 1 year[3]	46.45/19.21	37.88/21.33	t 2.58, df 32, p .02
Devoted to Memorization[1]	52.12/23.29	54.26/27.17	t -.41, df 33, p .68
Epistemological Beliefs (Range 1-7)[d] 1=Not at all descriptive 7=Very descriptive			
Ambiguous[3]	4.12/1.05	3.82/1.21	t 1.41, df 32, p .17
Stable[2]	4.66/.77	4.26/1.15	t 1.98, df 34, p .06
Approaches to Studying (%)			
Lectures[4]	40.03/15.93	52.03/14.05	t -3.93, df 30, p <.0001
Conf/Tutorials[4]	4.19/5.71	3.55/7.36	t .38, df 30, p .71
Faculty[5]	3.71/3.50	4.06/4.48	t -.38, df 30, p .71
Texts[4]	23.23/12.55	21.87/15.75	t .53, df 30, p .60
Articles[4]	7.76/7.70	4.87/3.36	t 1.89, df 30, p .07
Labs[4]	11.37/7.88	7.06/4.06	t 2.76, df 30, p .01
Other[4]	.16/.90	.52/1.99	t -1.10, df 30, p .28
PLES[e] (Range 9-63)[2]	49.63/4.47	45.03/6.05	t 4.08, df 34, p <.0001

Table 17—Continued

Variable	Baseline Mean	Follow-Up Mean	Statistic Paired t-test
Self-Esteem[1] (0=High; 6=Low)	1.56/1.05	1.35/1.15	t 1.13, df 33, p .27
Locus of Control (Range 0-23)[6]	10.28/4.18	10.81/3.87	t -1.05, df 31, p .30

[a] CS-Conceptualization Scale

[b] Each cell represents mean/standard deviation

[c] RS-Reflection Scale

[d] One component of epistemological beliefs focuses on how students view the nature of nutrition knowledge.

[e] PLES-Positive Learning Experience Scale

[1] n=34, [2] n=35, [3] n=33, [4] n=31, [5] n=30, [6] n=32

Changes in Information Memorized and Retained
by the UW-Stout Dietetic Study Sample

In accordance with the high use and increase in memorization, UW-Stout dietetic students devoted a greater, but non-significant percentage of their study time to memorization as they advanced in their academic studies. These students also indicated that they remembered significantly less, three months, and one year after taking final exams for their science, health, and nutrition courses at follow-up than at baseline. A significant interaction between class and transfer status on the amount of information retained after three months was observed (F 4.31, df 1, p .047), but this effect disappeared when simple main effects for class and transfer status were analyzed.

When the change in information retained after three months and one year was examined, however, the non-transfer students from the study sample reported remembering significantly less three months (t 5.13, df 19, $p < .0001$) and one year (t 3.76, df 19, p .001) after completing a final exam. A mean decrease from 63.25 (SD 17.87) to 44.90 (SD 23.34) and from 48.40 (SD 18.49) to 36.75 (SD 19.69) after three months and one year, respectively, was observed. The transfer students, by contrast, exhibited no change in information remembered after three months; mean 54.23 (t .41 df 12, p .69), but did acknowledge retaining less after one year, decreasing from 43.46 (SD 20.65) to 39.62 (24.36), although the change was not significant (t .55, df 12, p.59).

Changes in Epistemological Beliefs by the
UW-Stout Dietetic Study Sample

Students' perceptions of the ambiguous and stable nature of nutrition knowledge decreased while they progressed through the DPD**.** The two groups were analyzed individually for the change of definitive nature of nutrition knowledge because they differed significantly at baseline (F 4.68, df 1, p .04). The 1995 cohort perceived nutrition knowledge as becoming less definitive over time, with a mean decrease from 5.06 (SD .94) to 4.72 (SD 1.41) (t 1.46 df 17, p .16). Although the 1996 cohort viewed nutrition knowledge as more definitive, with a mean increase from 4.33 (SD .98) to 4.60 (SD 1.12) (t -.89, df 14, p .39), they still felt nutrition knowledge was less definitive than their 1995 counterparts did at baseline.

Changes in Approaches to Studying by the UW-Stout Dietetic Study Sample

At follow-up, the 1995 and 1996 cohorts differed significantly on their use of students (F 9.07, df 1, p .005) as a source of nutrition knowledge, therefore, changes in student use is reported separately for each cohort. Dietetic students progressing through their academic program reported gaining a significantly greater amount of knowledge from lectures (t -3.93, df 30, p <.0001), in addition to a non-significant increase of "other" (e.g., work experience). Conversely, as students used more lectures and "other" sources for knowledge, their use of labs significantly decreased, along with non-significant decreases in the use of conferences/tutorials, faculty, textbooks, and articles.

Both cohorts deferred seeking out other students as a source of information as they neared the completion of the dietetics program, with the 1995 cohort seeking significantly less knowledge from students than their 1996 counterparts. Mean use of

students as a source of knowledge significantly decreased from 8.71% (SD 7.03) to 3.94% (SD 4.35) (t 3.27, df 16, p .005) among the 1995 cohort, while the 1996 mean decreased from 10.57% (SD 7.69) to 8.57% (SD 4.15) (t .73, df 13, p .48).

Changes in the Description of the Learning Experience by the UW-Stout Dietetic Study Sample

Dietetic students reported their learning experience to be significantly less positive as they advanced through the DPD at UW-Stout. The nine items comprising the Positive Learning Experience Scale (PLES) were examined to determine which items most negatively described the learning experience. In particular, dietetic students found their learning experience to be significantly less enjoyable (t 3.50, df 34, p .001) and significantly more tedious (t 4.33, df 34, p <.0001) at follow-up than they did at baseline. A positive correlation between positive learning experience and the use of conceptualization and reflection, respectively, have been reported in the literature (Mitchell 1994, 166). At baseline, a significant correlation between positive learning experience and reflection was observed (r .42, df 35, p .01). Conceptualization was positively correlated, but did not reach significance (r .21, df 34, p .23). Although positively correlated, PLE was not significantly associated with reflection (r .32, df 35, p .06) or conceptualization (r .26, df 35, p .13) at follow-up. Memorization was not associated with PLE at baseline (r .09, df 35, p .61) or at follow-up (r -.02, df 34, p .92). Describing the learning experience as enjoyable at baseline was not correlated with conceptualization (r .08, p .64), reflection (r .17, p .32), or in defining learning as

motivating (r .23, df 35, p .18). However, at follow-up, perceiving the learning experience as enjoyable was significantly associated conceptualization (r .45, df 35, p .007), reflection (r .40, df 35, p .02), and motivation (r .40, df 35, p .02).

Further examination into the perceived negativity indicated that at follow-up, the non-transfer students were significantly more likely to be unhappy with their learning experience than the transfer students (F 7.16, df 1, p .01). When the change in overall PLE was examined, the non-transfer students from the dietetic study sample became significantly less positive over the course of their studies with a decrease from 49.68 (SD 4.89) to 43.05 (SD 5.17) (t 5.39, df 21, $p < .0001$), compared to the transfer students, who demonstrated a non-significant decrease in PLE from 49.54 (SD 3.82) to 48.38 (SD 6.12) (t .61, df 12, p .56) during program involvement.

Changes in Affective Behavior by the UW-Stout Dietetic Study Sample

Changes in Self-Esteem and Locus of Control by the UW-Stout Dietetic Study Sample

Dietetic students at UW-Stout demonstrated a non-significant increase in self-esteem, and became more externally oriented during participation in the DPD. These results were evident by a decrease in self-esteem scale score and an increase in internal-external locus of control scale score, respectively, as shown in table 17 on page 136**.**

Changes in Subjective Cognitive and Affective Behavior by the UW-Stout Dietetic Study Sample

Changes in Professional and Personal Goals Met by the UW-Stout Dietetic Study Sample

Two of the three goals students identified as being met by a career in dietetics did not change during program involvement. Helping others was the main goal that would be at baseline (n=19 of 30) and follow-up (n=15 of 34), followed by increasing one's knowledge base (n=14 of 30 at baseline) (n=12 of 34 at follow-up). Working in a field of interest/enjoyment was cited by 12 of 30 students as goal that would be met at baseline. Only three of 34 students reported this interest in the field at follow-up. With anticipation of nearing the end of the program and entering the job arena, goals focused on becoming a registered dietitian, working with others, and obtaining a degree and an internship were addressed.

Changes in Enablers and Obstacles to Goal Attainment by the UW-Stout Dietetic Study Sample

With regard to enablers to goal attainment, support from others and self-motivation remained as the top two enablers from baseline to follow-up. Support from others was the top enabler at baseline (n=8 of 31), succeeded by self-motivation (n=7 of 31). At follow-up, self-motivation was the biggest enabler (n=11 of 33), with five of 33 students crediting others as a means toward goal attainment.

Obstacles did not change during program involvement. At baseline, the most frequently cited obstacles were time management (n=10 of 31), programmatic issues (n=9 of 31), and financial concerns (n=8 of 31). Programmatic issues (n=10 of 33),

finances (n=7 of 33) , and time management (n=6 of 33) remained as the top obstacles at follow-up.

Changes in Advice Given for Studying by the UW-Stout Dietetic Study Sample

At baseline, dietetic students repeatedly recommended seeking help from others (n=17 of 32), practicing good time management skills (n=16 of 32), and studying and reviewing material frequently (n=14 of 32). Seeking help from others (n=17 of 35) and practicing good time management skills (n=18 of 35) remained as the top two tips advice given by dietetic students at follow-up. Continually studying/reviewing material was not regarded as effective of a studying method at follow-up (n=8 of 35) than it was at baseline.

Changes in Motivators to Learn by the UW-Stout Dietetic Study Sample

At the inception of their studies, dietetic students were motivated to learn by an interest in the field (n=14 of 33) and to help others (n=12 of 33). During progression through the DPD at UW-Stout, dietetic students continued to be motivated to learn by their interest in the field (n=8 of 35) and concern with helping others (n=8 of 35). Competition, however, emerged as the strongest motivating force to learn among these students (n=14 of 35). Only one student identified competition as motivating at baseline. A slightly greater number of students (n=8 of 35) believed self-motivation fostered learning, versus three of 32 students at baseline.

Comparison of UW-Stout Dietetic Student Behavior Changes to School X Changes and UW-Stout Business Changes

Although longitudinal data are not available for School X dietetic students and UW-Stout business students, and discretion is warranted in interpreting these findings, a comparison of the changes in objective and subjective cognitive and affective behaviors was made between UW-Stout dietetic students and School X dietetic students, and UW-Stout business students, respectively, to determine the generalizability of UW-Stout dietetic student findings to School X dietetic students and UW-Stout business students. A summary of the novice and experienced objective cognitive and affective behaviors for each study group is displayed in table 4 on page 85 . A summary of the subjective data for each study group is presented in table 5 on page 87 .

Comparison of Behavior Change Between UW-Stout Dietetic Students and School X Dietetic Students

Changes observed in cognitive and affective behaviors among UW-Stout dietetic students were similar to changes from both School X dietetic students and UW-Stout business students. UW-Stout dietetic students were like School X dietetic students because they both demonstrated gains in the use of memorization, although School X dietetic students demonstrated almost a ten-fold gain compared to the 1995 and 1996 cohorts. Both groups of dietetic students also reported remembering less three months after completing a course, devoted more studying to memorization, sought greater knowledge from lectures, and less from conference/tutorials, texts, and labs. The change in learning experience among School X dietetic students was virtually identical to UW-

Stout dietetic students. Both dietetic groups exhibited greater self-esteem and became more external in orientation.

With regard to qualitative data, the goals, and enablers to goal attainment remained consistent for both groups of dietetic students. Working/studying in a field of interest declined for the Stout group, whereas School X students were less concerned about gaining knowledge. Enablers were similar, but shifted in the opposite direction. Outside support decreased among UW-Stout dietetic students, but School X experienced dietetic students acknowledged more outside support as enabler than novice School X students. Obstacles tended to vary between the two groups. Finances was a major obstacle throughout the DPD for UW-Stout students. Finances did not emerge for either group of School X dietetic students, rather concerns related to the internship surfaced for these students. Time management was also less cited among the experienced School X students versus experienced Stout students.

Advice for studying remained fairly stable among Stout students, while reviewing material was recommended more frequently by School X dietetic students at the end of their program than it was at the beginning. Competition emerged for both groups of experienced dietetic students, in addition to an interest in the field as motivating factors to learn. Outside support also declined for both groups.

Comparison of Behavior Change Between UW-Stout Dietetic Students and UW-Stout Business Students

Like School X dietetic students, UW-Stout dietetic students displayed changes in their behavior similar to UW-Stout business students. Both groups exhibited small gains

in reflective thinking, and remembered less three months and one year after completing a final exam, however, the business students appear to remember even less than the UW-Stout dietetic students. Business students also devoted more time to memorization when studying, even more so than Stout dietetic students. Lecture use as a source of knowledge increased for both groups of UW-Stout students, with a corresponding decrease in lab use. Article use by experienced UW-Stout business students was higher than novice students, whereas experienced UW-Stout dietetic students used articles less than the novice dietetic students. The business students, compared to the dietetic students, viewed their experience as slightly more positive closer to program completion, but still remained lower than the dietetic students, despite the significant decrease in PLE by the dietetic study sample. These students also gained more self-esteem, but shifted toward an internal locus of control, rather than an external shift like their dietetic counterparts.

Because the goals differed dramatically between the novice and experienced business and dietetic students, respectively, a comparison between these changes is limited. One difference related to enablers to goal attainment. Dietetic students at UW-Stout perceived outside support to be less of enabler as they progressed through the program. Experienced business students, however, acknowledged outside support as an enabler, whereas no novice business students mentioned support from others as an enabler. The dietetic students at UW-Stout became more externally motivated by competition at follow-up, similar to the business students who continued to be extrinsically motivated, even more so at the end of their studies.

CHAPTER V

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Discussion

Introduction

Changes in the dietetics profession have prompted dietetic educators to re-examine and re-define their role to ensure that dietetics education is producing competent graduates who demonstrate the ability to perform successfully as dietetic practitioners (Haschke and Maize 1984, 210). Accordingly, the opportunity to think critically and innovatively are the most important skills dietetics education can provide its students (Owen and Rinke 1986, 377). To assist dietetic educators in providing an educational climate that facilitates critical thinking and problem solving skills, and fosters an emotional environment conducive to learning, the cognitive and affective behavior changes among dietetic students progressing through a didactic program in dietetics (DPD) were investigated.

Dietetic students enrolled in a *Dietetics as a Profession* course were administered survey sets in fall 1995 and 1996, which included the Cognitive Behavior Survey, Rosenberg Self-Esteem Survey, Rotter Internal-External Locus of Control Scale, and a Goal Analysis Questionnaire. Continuing students from each cohort were re-administered survey sets plus a demographic data form in fall 1997 and 1998. To determine if study findings of UW-Stout dietetic students were discipline or institution specific, survey sets were administered to novice and experienced dietetic students from School X, and novice and experienced business students at UW-Stout, respectively. A

description of the arrangement of the discussion section is needed to assist the reader in understanding the basis for the layout. An interpretation of the differences observed between the 1995 and 1996 cohorts is presented first, followed by a discussion of plausible explanations for the differences found between UW-Stout dietetic students, and School X dietetic students and UW-Stout business students, respectively. A discussion of the longitudinal changes is displayed lastly, because in an attempt to justify the changes that occur among dietetic students progressing through a DPD, reference is made to the findings presented in the aforementioned discussions.

Discussion of the Differences in Baseline and Follow-Up Cognitive and Affective Behaviors Between the 1995 and 1996 Dietetic Cohorts

At baseline, the 1995 cohort utilized significantly more memorization, and viewed the nature of nutrition knowledge as significantly more definitive than their 1996 counterparts. Transfer status was not a determinant for the difference in memorization at baseline between the 1995 and 1996 cohorts. In addition, the qualitative data was not a source of explanation for the observed difference in memory use. The mean baseline memorization score of the 1996 cohort (47.7) is similar to the memorization score of undergraduate dietetic students (UDS) (49.3) in a study conducted by Bayard (1994, 117). These findings suggest that the differences in the use of memory may indicate a variation in teaching style or type of assessments the two cohorts were exposed to.

The 1995 cohort viewed nutrition knowledge as significantly more definitive than the 1996 students did. Interactions between class and transfer status, age, learning strategy, and positive learning experience, respectively, were analyzed as possible

reasons for this difference. Qualitative data was not a source of explanation. This difference, therefore, cannot be explained by study findings.

At follow-up, the 1995 cohort was significantly less likely to use students as a source of knowledge compared to the 1996 cohort. One reason for the decrease in the use of students as a source of knowledge may be the result of the increased sense of competition that emerged as the driving force behind dietetic students' motivation to learn. Competition was also cited as a problem and an area of concern among students in studies conducted by Beck et al. (1997, 185), Bjorksten et al. (1983, 761), and the early work of Edwards and Zimet (1976, 625). The competitive environment was recognized by over half of the students from the 1995 cohort (n=10 of 18), versus four of 17 from the 1996 cohort. Students cited competition from within the program and for internship placement. This finding is of concern because students who are motivated by the desire to out perform others are more likely to resort to learning methods that do not support sustained retention over time (Ames 1992, 265), and will sacrifice learning and choose moderately easy tasks to avoid appearing incompetent (Elliot and Dweck 1988, 6).

Furthermore, with this increased feeling of competition, one might be less likely to seek help from others because it will imply inadequacy to their peers. Karabenick (1987, 7) suggested that students might not seek help when they need it because of its eminent threat to self-esteem. Karabenick and Knapp (1991, 224) observed an inverse relationship between help-seeking threat to self-esteem and seeking assistance from students. In other words, students who perceived help-seeking as a threat to their self-esteem were less likely to seek help when they needed it. The association between self-

esteem and the use of students as a source of knowledge was examined among the 1995 cohort, respectively. No relationship between student use and self-esteem was observed (r -.04, df 17, p .88). One might expect the dietetic students to seek more knowledge from students because their self-esteem remained high during program involvement. Student use decreased for both cohorts, however.

Another explanation for the significant difference in student use may relate to learning strategy. Karabenick and Knapp (1991, 226) found that student use of the learning strategies elaboration (i.e., drawing analogies, relating new information to old) and metacognition (i.e., reflecting on one's learning) were significantly associated with help-seeking when it was needed. In an earlier study, Karabenick (1987, 5) found a significant and inverse relationship between rehearsal (i.e., memorization), and obtaining help. Because the 1995 cohort utilized a non-significant, but greater amount of memorization at follow-up, one might speculate that they would not seek out help when the need arises. At follow-up, memorization was inversely, but not significantly associated with the use of students as a knowledge source (r -.32, df 17, p .20) among the 1995 group; reflection correlated positively with student use (r .46, df 17, p .07) among the 1995 cohort, and was significantly associated with the use of students as a source of knowledge among the 1996 cohort (r .63, df 16, p .01). Furthermore, the change in reflection was significantly related to the use of students at follow-up (r .57, df 17, p .02) by the 1995 cohort. In other words, the use of students as a source of nutrition knowledge at follow-up may be influenced by a student's change in reflective thinking. Further research is needed in dietetics education on the relationship between student

learning strategy and the types of resources students utilize to supplement those strategies. The association between the use of students as a source of nutrition knowledge and reflection was not observed by the 1996 cohort (r .32, df 16, p .23). However, when the change in reflection was compared between the two cohorts, no significant difference was observed (t -.49, df 33, p .63). Because the changes in reflection were not different between the cohorts, this suggests that the change in reflection did not have a large influence on the use of students as a source of nutrition knowledge at follow-up. If this were true, one would have expected a greater decline in student use by the 1996 cohort as well. This difference in student use may reflect the interaction of the competitive learning environment perceived by the 1995 cohort on the change in reflection and student use at follow-up.

It should be mentioned that even though memorization increased for the 1996 cohort, their mean score at follow-up remained lower than the 1995 cohort's baseline memory mean. Ames (1992, 262) reported that competitively oriented environments do not support retention of material over time, and consequently, conceptual learning can be compromised when there are direct consequences for oneself.

Variances of the baseline positive learning experience (PLE) scale scores were not homogeneous for the 1995 and 1996 cohorts according to Levene's test, and continued to be so when the data were logarithmically transformed. However, due to the robust nature of ANOVA (SPSS Inc. 1997, 299), the two cohorts were combined into one sample for baseline PLE scores. The practical significance of non-homogeneous

variances for baseline PLE scores is questionable, and further analysis of PLE data is needed.

Discussion of the Comparison of Cognitive and Affective Behaviors Between UW-Stout Dietetic Students to School X Dietetic Students and UW-Stout Business Students

Comparisons of cognitive and affective behaviors were made between UW-Stout dietetic students and School X dietetic students and UW-Stout business students, respectively. The purpose of these comparisons was to determine if study findings from novice and experienced UW-Stout dietetic students were like those of other novice and experienced dietetic students and other novice and experienced UW-Stout students. In other words, were study findings discipline or institution specific.

Discussion of the Comparison of UW-Stout Dietetic Students to Novice School X Dietetic Students and Novice UW-Stout Business Students

Due to the small sample sizes of novice School X students and novice UW-Stout business students, their data are not an adequate depiction of the two groups. Consequently, caution should be taken in interpreting these findings.

Comparison of Objective Cognitive and Affective Behavior Between Novice UW-Stout Dietetic Students and Novice School X Dietetic Students and Novice UW-Stout Business Students

With regard to the objective cognitive and affective traits, novice UW-Stout dietetic students were more representative of novice UW-Stout business students than other novice dietetic students at other institutions at the inception of their academic studies. Novice UW-Stout dietetic students demonstrated similar results to novice UW-

Stout business students in their use of memorization and conceptualization, and for the amount of information retained three months and one year after completing a course. The ambiguous, definitive, and stable view of discipline related knowledge was shared by the dietetic and business students, respectively. UW-Stout students also agreed on the amount of information they sought from conferences/tutorials, other students, articles, and labs.

The level of reflective thinking was alike for the novice dietetic students. School X dietetic students also sought a similar amount of knowledge from lectures, faculty, and texts. Both groups of dietetic students viewed their learning experience from a relatively positive standpoint. A high self-esteem and an internal locus of control were present by UW-Stout and School X dietetic students.

Comparison of Subjective Cognitive and Affective Behaviors Between Novice UW-Stout Dietetic Students and Novice School X Dietetic Students and Novice UW-Stout Business Students

Unlike the objective data, where novice UW-Stout dietetic students were more representative of novice business students, novice UW-Stout dietetic students were more representative of novice School X dietetic students with regard to goals, enablers and obstacles to goal attainment, advice for studying, and motivation for learning. The goals, enablers and obstacles to goal attainment, advice for studying, and motivation for learning identified by UW-Stout students were cited by novice School X students. The UW-Stout dietetic students were like business students with regard to enablers and obstacles to goal attainment and advice for studying, but differed with respect to the

professional and personal goals that would be met by preparing for a career in their discipline, and motivations for learning.

Discussion of the Comparison of Cognitive and Affective Behavior Between Experienced UW-Stout Dietetic Students and Experienced School X Dietetic Students

The experienced dietetic students at UW-Stout sought significantly greater knowledge from students and viewed their knowledge as significantly more definitive compared to experienced School X dietetic students. These findings were also observed between the two groups at baseline. Competition was cited as a possible contributing factor to the decrease in student use among the UW-Stout dietetic study sample, specifically among the 1995 cohort. Competition was also apparent among School X dietetic students as a motivating factor to learn, with students emphasizing the need to get good grades for internship placement. Although the two dietetic cohorts were combined to compare the use of students as a source of knowledge between UW-Stout and School X, the mean percent knowledge sought from other students by School X remained lower than that of the 1995 cohort at follow-up even after a significant reduction in the use of students as a source of knowledge from 8.71 to 3.94 was observed. As discussed earlier, a combination of competition and learning strategy may explain the difference in the use of students as a knowledge source among the two groups of dietetic students. Although the difference was non-significant, School X dietetic students had a higher overall use of memorization compared to the UW-Stout study sample (range 42-68; mean 53.25; median 54; range 24-75; mean 51.62; median 53, out of 77 possible), respectively. School X students also practiced less reflective thinking (mean 22.24 versus 24.91) than

their UW-Stout counterparts. One could suggest that School X dietetic students sought less help because their use of learning strategies shown to be associated with help-seeking (e.g., reflection) was less practiced, and the learning strategy associated with less help-seeking (e.g., memorization) was more apparent compared to UW-Stout dietetic students. Correlation between students as a knowledge source and learning strategy among School X students, however, did not explain the difference in the use of students as a source of knowledge between the two groups. Reflection was positively, but not significantly associated with the use of students as a source of nutrition knowledge (r .39, df 15, p .15) among School X students. Memorization was not associated with student use (r -.12, df 14, p .69). These findings suggest that the difference in the use of students as a source of nutrition knowledge between the two groups may likely be the result of a more competitive learning environment at School X than that experienced by UW-Stout dietetic students, rather than a difference in learning strategy.

Another difference in student use as a knowledge source may relate to the advice each group gave for studying. Almost half (n=17 of 35) of the dietetic study sample suggested seeking help from others to assist with learning, versus only five of 17 students from School X. In addition, the fact that School X dietetic students sought less support from others as sources of knowledge, and for studying, may further support the possibility of a more competitive learning environment. Failure to advise help-seeking, however, did not necessarily suggest that School X dietetic students were not doing this, they just did not recommend it.

The difference in help-seeking from other students for nutrition information may also be a result of the quality of the help received. According to Karabenick and Knapp (1991, 226), the degree of help-seeking depends on the level of help needed, the reason for requesting help, and how successful the assistance from the source was at reducing the level of need.

UW-Stout dietetic students also indicated that their nutrition knowledge was significantly more definitive than their School X counterparts. Study findings cannot adequately explain this relationship. The greater definitive view by UW-Stout dietetic students may simply reflect differences in teaching styles, types of assessments, or course requirements between the two schools, however, these specific differences were not investigated in this study and leave room for alternative explanations.

Enablers were similar among both groups of dietetic students. Although support from others declined as an enabler among UW-Stout dietetic students, UW-Stout dietetic students viewed outside assistance as an enabler more often than their School X counterparts. If School X dietetic students perceived outside assistance as less of an enabler to goal attainment, they may be less likely to use outside help as a knowledge source. This may explain why UW-Stout dietetic students utilized significantly greater knowledge from students during progression through the DPD. Even though UW-Stout dietetic students utilized students less as a source of nutrition knowledge, they still regarded students as more of an enabler to goal attainment than School X dietetic students.

Obstacles tended to vary between the two groups. Programmatic issues (e.g., class scheduling, difficult classes), was the major obstacle among UW-Stout students, whereas obstacles focusing on securing a dietetic internship predominated among School X students (e.g., not having good enough grades/G.P.A). One possible explanation for the observed difference in perceived obstacles could relate to time management. Noted previously, UW-Stout dietetic students identified greater concerns related to time management as an obstacle for goal attainment (e.g., difficulty managing classes with work, family, friends). If UW-Stout dietetic students have more difficulty managing their time, programmatic issues, such as class scheduling, and the perception of difficult classes may be more apparent. As balancing outside responsibilities and commitments (e.g., jobs, family) with school become more demanding, complications may be more likely to arise. Beck et al. (1997, 185) found that the amount and difficulty of class material, and lack of free time were three of the top 10 stressors among second, third, and fourth year nursing, pharmacy, medical, and social work students.

The fact that School X dietetic students identified issues related to the dietetic internship as an obstacle (e.g., not having good enough grades) may reflect a greater competitive environment, as described earlier, with accompanying extrinsic motivation. As students become more extrinsically motivated (i.e., to get good grades, establish superiority over others), obstacles that impede goal attainment are more likely to imply failure (Elliot and Dweck 1988, 6). In other words, if obtaining an internship is an avenue to goal attainment (i.e., the ability to help others), and receiving good grades is perceived to facilitate internship placement, then if students do not obtain the academic

success necessary, this is likely to imply failure toward goal attainment, and thus be regarded as an obstacle.

The difference in obstacles may also relate to the timing of the surveys. According to the dates on some of the returned survey sets from School X, students were completing survey materials near the date when internship placement results are returned. Concerns about securing an internship may have been more prevalent as students contemplated the possibility of not receiving an internship.

Practicing good time management skills was identified by both groups of dietetic students as effective for studying, although the UW-Stout dietetic study sample recommended it more than School X dietetic students. Dietetic students at UW-Stout identified time management as a problem in terms of reaching their professional and personal goals. They also advocated time management as effective for studying science, health, and nutrition. One could speculate that if the dietetic students at Stout practiced sound time management skills, it would be seen as less of an obstacle to goal attainment. School X dietetic students in this study did not believe time management hindered goal attainment. This in turn suggests that time management may not be a problem for these students when studying, indicated by fewer students recognizing it as effective for studying. However, does a lack of recognition of time management as instrumental for studying denote that students are not practicing these skills, or are students practicing sound time management skills and simply do not advise it? This appears to be an area where further research is needed, in particular, looking at time management from a quantitative, rather than qualitative perspective to more fully evaluate the influence of

time management on learning, that is, examining what specific time management strategies are effective for dietetic students for learning.

Discussion of the Comparison of Cognitive and Affective Behaviors Between Experienced UW-Stout Dietetic Students and Experienced UW-Stout Business Students

Dietetic students at UW-Stout utilized significantly more conceptual thinking than experienced business students. They also used more reflective thinking skills. The difference in the use of conceptualization (and reflection), may be evidenced by the advice students gave for studying. The dietetic students suggested studying approaches indicating greater conceptual and reflective thinking skills, such as, relating new information to old, using pictures, diagrams, and flashcards, reviewing material, and integrating material from other sources/experience to current practices. Very few business students suggested conceptual or reflective thinking practices.

Despite the fact that dietetic students regarded their learning experience as significantly less positive over the course of the program, they continued to view their experience as more positive than the business students. That is, the dietetic students had a higher mean PLE scale score. The difference in PLE between the dietetic and business students was not significant, however. Conceptualization and reflection have been shown to be significantly associated with positive learning experience (PLE) (Mitchell 1994, 166), and because these students viewed their learning experience more negatively than the dietetic students, this may have resulted in the difference in learning strategies associated with higher PLE scale scores. A significant correlation was found between the use of reflection and PLE (r .43, df 22, p .045) among the business students;

conceptualization did not correlate with PLE (r .13, df 23, p .54). The significant relationship between PLE and reflection indicates the importance of promoting a positive learning environment to foster deep learning strategies. If the business students felt more positively about their learning experience, their use of reflective thinking skills were likely to be promoted. As noted earlier, students who find their learning experience more enjoyable, are more likely to engage in learning to understand the material (Mitchell 1994, 166).

The goals business students cited as being met, and what motivated them to learn, may also illustrate the difference in learning strategy between the two groups. The business students identified goals and motivations highly extrinsic in nature (e.g., to get a high paying job, job flexibility), compared to the intrinsically oriented goals and motivations of dietetic students (e.g., to help others, increase one's knowledge base). Ainley (1993, 397) reported that intrinsic motivation is grounded on deep learning strategies, whereas extrinsic motivation is associated with the achieving and surface approaches. In other words, with outside reinforcement, the focus of understanding is held as a means to an end. Internal reinforcement, consequently, generates a commitment to learning (Nolen 1988, 271).

UW-Stout dietetic students reported remembering significantly more one year after completing a final exam than the business students. Conceptualization and PLE have been shown to correlate at statistically significant levels with the amount of material remembered one year after completing a course (Mitchell 1994, 167). That is, the more conceptualization utilized, and the more positive one feels toward the learning

environment, the greater the retention of material after one year. For this study, however, the association between conceptualization and the amount of material remembered after one year was not found (r -.13, df 23, p .54) among experienced business students. Regarding the learning experience as positive did correlate with the amount of material remembered after one year, but it did not reach significance (r .32, df 23, p .13). This suggests, as noted previously, that learning environments that are more enjoyable are more likely to induce methods for improved retention. This may be one reason why the dietetic students reported remembering significantly more after one year, because despite the significant decrease in PLES score, they still felt more positive about their learning environment compared to the business students. Of note, the distribution of scores, pertaining to the amount of information students reported remembering after one year, was much larger among the dietetic students than the business students, with a greater amount of variability: mean 37.88, SD 21.33, median 40, range 5-90; mean 27.33, SD 18.46, median 25, range 2-60, respectively.

The dietetic students at UW-Stout sought significantly more knowledge from lectures than their business counterparts. One explanation may relate to the overall use of resources as a knowledge source by each cohort. Due to decreases in other students, conferences/tutorials, texts, articles, and labs as knowledge sources among the dietetic study sample, students had to seek knowledge elsewhere, thus increasing their use of lectures. With the exception of labs, the business students sought greater knowledge from all other sources (e.g., students, faculty, articles, texts, and “other”) compared to dietetic students.

The difference in lecture use may also relate to the competitive environment found among the dietetic students. As described earlier, the decline in student use as a knowledge source may be a consequence of the competitive environment. Competition was also cited by School X dietetic students, who utilized significantly less students than UW-Stout dietetic students. Competition was not addressed by any of the business students. The change in student use as a knowledge source and the change in lecture use was significantly associated for both the 1995 and 1996 cohorts (r -.49, df 17, p .045) (r -.60, df 14, p .02), respectively, suggesting that as lecture use increased, the use of students as a knowledge source might decrease. Since a competitive environment was not a concern for the business students, lectures may not have been a major source of knowledge because they felt more comfortable turning to other students. Finally, the difference in lecture use may simply reflect a difference in teaching styles, evaluation measures, and structure of the curriculum.

The top obstacles to goal attainment cited by dietetic students were programmatic issues, finances, and time management. With the exception of one business student identifying time management as an obstacle, business students did not mention the other dietetic student obstacles. One explanation may relate to the timing of the survey sets. Three-fourths of the dietetic students in the study sample were surveyed during enrollment in one of the more time consuming courses in the dietetics program, which requires extensive study. Although employment data were not obtained from the dietetic students, one could speculate that students who are trying to balance coursework with a job and other outside commitments may be more apt to report difficulties with time

management, finances, and issues related to the program (i.e, difficult classes, class scheduling). Dietetic students may be concerned about finances because they are forgoing work to accommodate the increased demands of their coursework. On the flip side, dietetic students who are working to make money, because it is an obstacle to goal attainment, do not recognize it as an enabler because it takes up valuable study time. Perhaps the business students had easier class loads or less conflict with work commitments.

Generalizability of Study Findings to School X Dietetic Students and UW-Stout Business Students

School X dietetic students and UW-Stout business students were included in this study for the sole purpose of determining if study findings observed among UW-Stout dietetic students were institution or discipline specific. Concerning representativeness of experienced UW-Stout dietetic students to experienced School X dietetic students, UW-Stout findings are generalizable to other experienced dietetic students, with the exception of viewing nutrition knowledge as definitive, and using students as a source of nutrition knowledge. For the most part, UW-Stout and School X dietetic students identified the same variety of goals, enablers to goal attainment, advice for studying, and motivators to learn, but did differ proportionately in responses. Obstacles to goal attainment identified by UW-Stout dietetic students were not characteristic of School X dietetic students, however.

Conversely, UW-Stout dietetic student findings were not generalizable to experienced UW-Stout business students. Noticeable difference existed between the two

UW-Stout groups. Extrinsic interest and motivation fueled the business students, where intrinsic interests and motivation endured among dietetic students, despite the undesirable emergence of competition at follow-up. In addition, the business students demonstrated less favorable learning practices than the dietetic students (i.e., significantly lower conceptualization, and lower reflection), and perceived their learning experience more negatively in spite of the decrease in PLE among the dietetic students. The obvious differences between the dietetic and business students were not surprising considering the nature of each profession. Dietetics is a health related discipline concerned with helping and educating others, evident by the goals cited by dietetic students, unlike the business field where the focus is for financial rewards and success, according to the ambitions and motivations of the business students in this study. Like School X dietetic students, the business students at Stout did not perceive finances, programmatic issues, or time management as obstacles to goal attainment, suggesting that these obstacles may not be institution or discipline specific, but unique to dietetic students at UW-Stout.

One aspect that cannot be overlooked as a possible contributing factor to the differences between UW-Stout dietetic students and School X dietetic students and UW-Stout business students, respectively, is the structure and learning environment of the respectable programs (i.e., types of assessments, teaching style). Karabenick and Collins-Eaglin (1996, 3) found that critical thinking, metacognition (i.e., self-reflection), and elaboration (i.e., relating material to one's previous knowledge) strategies were enhanced in classes that encouraged cooperative activity and de-emphasized grades. Critical thinking was also more apparent in courses where grades were based on group

performance. Furthermore, the authors noted that classrooms that accentuate mastery goals (i.e., increasing one's ability) and individual and cooperative motives will facilitate higher learning strategy use compared to classes that accentuate performance goals (i.e., outperform others) and competition.

Another explanation for the observed differences in behavior among the study groups could be the timing of the surveys. One could speculate that students surveyed during participation in a difficult course, during exam time, or in the midst of completing a major project, would be likely to respond differently than students who had a relatively easier class load and no upcoming exams or major projects. Effort was made to administer the survey sets at a time that would facilitate survey completion and prevent bias, but not all factors could be controlled for. In addition, maturation cannot be solely disregarded as an explanation for the observed differences, as well as the effect of instrumentation, described earlier, and a lack of adequate sample sizes.

Discussion of Longitudinal Changes by the UW-Stout Dietetic Study Sample

Changes in Objective Cognitive and Affective Behavior by the UW-Stout Dietetic Study Sample

An examination of the changes in cognitive and affective behaviors among the UW-Stout dietetic study sample revealed some disturbing findings. The most notable of findings was the decrease in positive learning experience scale (PLES) score, from 49.63 to 45.03. The mean PLES scale score among the dietetic study sample at baseline was not unlike other dietetic students. Undergraduate dietetic students taking part in a study by Bayard (1994, 175) had a mean PLES scale score of 49.5, very similar to the baseline

PLES score among the dietetic study sample. Although a positive outlook remained (45 out of 63 possible points), the dietetic students at UW-Stout viewed their learning experience as significantly less positive over the course of their education. The significant decrease was also apparent when the 1995 and 1996 cohorts were analyzed separately (t 3.79, df 17, p .001) (t 2.31, df 16, p .04), respectively.

Specifically, the study sample viewed the learning experience as significantly less enjoyable (t 3.50, df 34, p .001) and significantly more tedious (t 4.33, df 34, p <.0001) over the two-year period. Furthermore, at follow-up, regarding the learning experience as enjoyable was significantly associated conceptualization (r .45, df 35, p .007), reflection (r .40, df 35, p .02), and whether the learning experience was motivating (r .40, df 35, p .02). Mitchell (1994, 166) also found a significant relationship between conceptualization and reflection with PLE (r .28, < .01) (r .48, p <.001), respectively. The change in students' viewing the learning experience as enjoyable was significantly associated with the change in reflection (r .40, df 35, p .02) and the change in conceptualization (r .38, df 34, p .03). In other words, as the learning experience became more or less enjoyable, the use of reflection and conceptualization might be affected.

Accordingly, the fact that the dietetic students in this study were significantly less positive about their learning experience near program completion, and very little change was observed in conceptual and reflective learning strategies, with a high use of memorization, indicates the adverse impact the learning environment has on the learning process. The change in PLE was significantly associated with the change in reflection (r .46, df 35, p .005). The change in PLE was also positively associated with the change in

conceptualization, but it did not reach significance (r .32, df 34, p .07). Memory change for the 1995 cohort was significantly associated with PLE, but very unexpectedly in the opposite direction (r .63, df 18, p .004); memory change by the 1996 cohort was not associated with the change in PLE (r .-.09, df 16, .75). In other words, as students used more reflection, one could speculate that they would view the learning experience more positively. An environment that fosters deep learning strategies will result in a more enjoyable learning experience (Mitchell (1994, 166). Despite the fact that the dietetic study sample continued to practice a high level conceptualization, and relatively stable use of reflection, the negative learning environment may have hindered any strengthening of those skills. For positive learning outcomes to occur, the environment in which learning takes place must be positive (Biddle, Smith, & Tremonti 1985, 628). If the use of conceptual and reflective thinking, and the motivational and enjoyable nature of the experience are determinants in how students viewed their learning experience, these relationships suggest that perhaps PLE failed to increase because fewer students practiced greater conceptual and reflective thinking skills, and less perceived the experience as motivating and enjoyable.

This perceived negativity observed among dietetic students over the course of their education is not totally unexpected for a medical related profession. Medical students enrolled in a traditional curricula versus those enrolled in a problem-based curricula found their learning experience to be significantly less positive (48.8 to 44.7 out of 63 possible points on the PLES) over the course of the year (Lieberman et al. 1997, S14-5), very similar to the decrease from 49.63 to 45.03 among the dietetic students in

this study. West et al. (1982, 190) documented an increased cynicism among first year medical students in a traditional curricula, indicating that students found the educational experience less stimulating and relevant. Lancaster et al. (1997, S11-2), who studied first-year medical students' perceptions of the learning environment in a traditional and two, problem-based curricula, reported that traditional students found their learning environment significantly less meaningful over the first year. Moore-West et al. (1989, 156) evaluated the perceptions of first-year medical students enrolled in a problem-based and traditional curricula. Although both curricula reported a less favorable decline in the emotional climate of the learning environment, the decrease was greater for the traditional students.

Another explanation for the decrease in PLE among the dietetic sample may relate to transfer status. The non-transfer students became significantly less positive over the course of their studies (t 5.39, df 21, $p < .0001$) compared to the transfer students (t .61, df 12, p .56), who exhibited a non-significant decrease in PLE. Perhaps the transfer students were not as unhappy with the program because they came from a learning environment that did not fulfill their needs, therefore they were more receptive and appreciative of the program and learning environment at UW-Stout.

Another explanation could relate to the competition that emerged as a factor influencing their learning. One could speculate that an environment in which students are constantly trying to out perform others would foster a less positive learning environment.

Finally, one could postulate that the decrease in PLE might purely reflect burnout of curriculum content among these students. This may also explain why dietetic students

no longer fulfilled a goal of working/studying in a field of interest as they advanced through the program, and found the experience significantly more tedious.

The dietetic students in this study demonstrated no significant changes in learning strategy during program involvement. Although conceptualization remained high, it increased non-significantly, in addition to non-significant increases in memorization, and reflection. The mean baseline (24.3) and follow-up (24.9) reflection scale scores among the dietetic study sample were very comparable to the mean reflection score (24.4) of UDS participating in a study by Bayard (1994, 120). In addition, conceptualization and reflection were significantly correlated at baseline (r .50, df 34, p .003) and at follow-up (r .56, df 35, $p < .0001$). These relationships between conceptualization and reflection were similar to those observed by Mitchell (1994, 166) (r .39, $p < .001$). The change in conceptualization and the change in reflection were significantly related (r .37, df 34, p .03). These findings suggest that as students used one learning strategy, the other might be expected to increase as well. This may explain why conceptualization or reflection failed to increase, because fewer students increased their use of conceptual and/or reflective thinking to produce a desirable change.

The decline in favor of conceptual and reflective thinking skills among the dietetic study sample may be associated not only with the decline in positive learning experience as previously described, but also a result of how dietetic students are approaching the studying process. Interestingly, when students were asked to give advice on how to study, although sound tips of advice were given, the major recommendations students gave for studying at baseline and follow-up focused on practices to enhance

learning (e.g., practice good time management, seek help from others), but gave little attention to characteristics specific to the learning strategies investigated in this study (e.g., synthesizing content, model building, and assessing one's understanding, are attributes of conceptual thinking). At baseline, 15 of the 32 students reported some practice of reflective thinking by reviewing material frequently, in addition to correlating material with other information learned, drawing pictures, observing one's own studying method, and connecting ideas with experience (the latter two each cited by one student).

At follow-up, only four students suggested reviewing information continuously and relating material with other information; two suggested drawing pictures. These findings, combined with a high use of memorization, and an increase in time devoted to memorization, suggest that dietetic students may be relying too heavily on memorization as a learning style, rather than focusing on utilizing conceptual and reflective learning approaches. These findings are remarkable because students who rely on rote learning are more likely to develop a superficial level of understanding (Newble & Entwistle 1986, 165), and find the learning experience less enjoyable and rewarding (Mitchell 1994, 166).

It is disturbing that a desirable change in learning strategy was not observed among UW-Stout dietetic students. One would expect students to develop greater critical thinking skills (i.e., reflection, conceptualization) as knowledge is gained and information becomes more vocationally relevant. As students advance through the dietetics program, information presented in one course is intended to supplement and facilitate information taught in succeeding courses, requiring students to recall and relate previous knowledge

to current knowledge. Based on both objective and subjective findings, dietetic students do not appear to be utilizing the critical thinking skills expected.

Although the increase in memorization was non-significant in this study, and results are over a two-year period, this finding is similar to that of Coles (1985, 308-9) who found an increase in the use of reproducing orientation (memorization) among first year medical students enrolled in a conventional curriculum. A significant decrease in meaning orientation (deep learning) was also observed by Coles (1985, 308-9), unlike the findings reported here where the deep learning processes of reflection and conceptualization increased non-significantly. Regan-Smith et al. (1994, 1380) reported that medical students in a traditional curriculum acknowledged doing less rote learning during year three compared to years one and two. This finding was not observed among dietetic students, who demonstrated a non-significant, but greater reliance on memorization after two years.

The dietetic study sample reported remembering significantly less three months and one year after taking a final exam. Mitchell (1994, 167) reported a statistically significant relationship between the use of conceptualization and PLE to the amount of material remembered after three months and one year, respectively, that is as students find their learning experience enjoyable, retention is likely to be improved. These relationships were not observed in this study among the dietetic study sample. This decrease in reported retention could be influenced by transfer status. The non-transfer students (n=22) from the study sample reported remembering significantly less three months (t 5.13, df 19, $p < .0001$) and one year (t 3.76, df 19, p .001) after completing a

final exam, unlike the transfer students who exhibited no change in information remembered after three months (t .41 df 12, p .69), but did report retaining less after one year, although the change was not significant (t .55, df 12, p.59). The significant decrease in reported retention by the non-transfer students may be related to the view of the learning experience. An increase in PLE is associated with an increase in retention, therefore, because the non-transfer viewed their experience as significantly less positive, a decrease in retention might be expected. No significant findings were observed among the changes in PLE and reported retention after three months and one year, respectively. An examination of learning strategy in relation to reported retention did not explain these findings. The changes in reported retention may indicate changes in teaching styles or measures of assessment within the program. The significant decrease in reported retention cannot be sufficiently explained by study findings. Due to the small sample size of the transfer students these results should be taken with some caution, but do pose concern for dietetics education.

A significant decrease in the use of laboratory experience as a source of science, health, and nutrition was found among dietetic students. This decrease was expected, and likely reflected the sequencing of the dietetics program, which is located in appendix E. During the first two years in the dietetics program, laboratory experience is abundant in such courses as Chemistry, Physiology and Anatomy, Advanced Physiology, Microbiology, Food Science, and Management of Food Production. Laboratory experience declines after the second year. The only courses with laboratory experience in

the third and fourth years are Experimental Foods, Multicultural Foods, and Quantity Food Production.

Lecture use, by contrast, significantly increased during program involvement, in addition to a non-significant increase in faculty use. The change in student use as a source of nutrition knowledge might be a reflection of an increase in lecture use. The change in the use of students as a source of nutrition knowledge was significant, and inversely associated with the change in lectures by the 1995 (r -.49, df 17, p .045) and 1996 (r -.60, df 14, p .02) cohorts. These relationships may indicate the interaction of competition. As indicated earlier, student use may have decreased as a result of the emergence competition. As the use of students as a source of nutrition knowledge decreases, lectures may become a greater source of knowledge for these students. This relationship is left for speculation, however. The increase in lecture use may simply denote different teaching and assessment styles students were exposed to during progression through the DPD.

When learning strategy and lecture use were examined, the change in lecture use was significantly associated with the change in memory (r .62, df 13, p .02) among the 1996 cohort. No relationship between memory and lecture use was observed by the 1995 cohort (r -.17, df 17, p .52), however. The lack of association for the 1995 cohort cannot be adequately explained by study findings. The 1995 and 1996 cohorts did not differ on mean changes in lectures or memory. One would have expected a similar association by the 1995 cohort. As noted previously, this association is worthy of alternate explanations, and may reflect variations in teaching style and evaluation methods.

Another explanation may relate to transfer status. The non-transfer students utilized significantly more lectures as a source of knowledge (t –5.04, df 17, p < .0001) during progression through the DPD with an increase from 34.50 (SD 12.78) to 52.67 (SD 11.24) compared to the transfer students who demonstrated a non-significant increase from 47.69 (SD 17.15) to 51.15 (SD 17.70) (t -.78, df 12, p .45). Of note, the transfer students used significantly more lectures at baseline compared to the non-transfer students (F 6.90, df 1, p .01), but did not differ significantly in their use of lectures at follow-up (F .07, df 1, p .79). This finding was not totally unexpected since the transfer students were already exposed to lectures prior to coming into the dietetics program, whereas the non-transfer students had little, if any exposure to lectures in the college setting.. The change in lecture use among the transfer students may not be as apparent because they used a high amount of lectures to begin with. It is not unexpected that lectures were the major source of knowledge for students.

Figure 1 on page 177 illustrates the proposed relationships between learning strategy, learning approach, and positive learning experience. The p values indicate the significance of the relationship between the change variables. According to figure 1, as dietetic students advance through the DPD at UW-Stout, the change in student use as a knowledge source was significantly associated with the change in lecture use, that is, as the dietetic students sought less knowledge from students, one might expect lecture use to increase. Among the 1996, in particular, the change in lecture use was inversely associated with the use of students at follow-up. As lecture use increased, one could speculate that memorization would increase, specifically among the 1996 students. With

an increase in reflection, regarding the learning experience more positively might be expected. Furthermore, how enjoyable students perceived their learning environment might influence their use of conceptual and reflective thinking skills. The one very unexpected finding was the significant relationship between memory change and the change in PLE by the 1995 cohort. Further examination of the data could not explain this unanticipated finding. As indicated earlier, the relationships between the changes in cognitive and affective behaviors are worthy of alternative explanations and may simply indicate difference in teaching styles and measures of assessment. Future studies in dietetics education need to focus on the relationships between learning strategy, resources used to supplement learning, and their effect on the learning environment.

Self-esteem remained high among dietetic students progressing through the DPD at UW-Stout. The high self-esteem observed among dietetic students was not found among medical students according to Edwards and Zimet (1976, 625) who documented *self-esteem needs* (e.g., being treated as irresponsible and immature) as a concern among senior medical students. Although locus of control scale scores shifted in the external direction, an internal perception of control remained. This shift toward an external locus of control is supported by remarks of Zeldow, Daugherty, and Leksas (1987, 993) in a

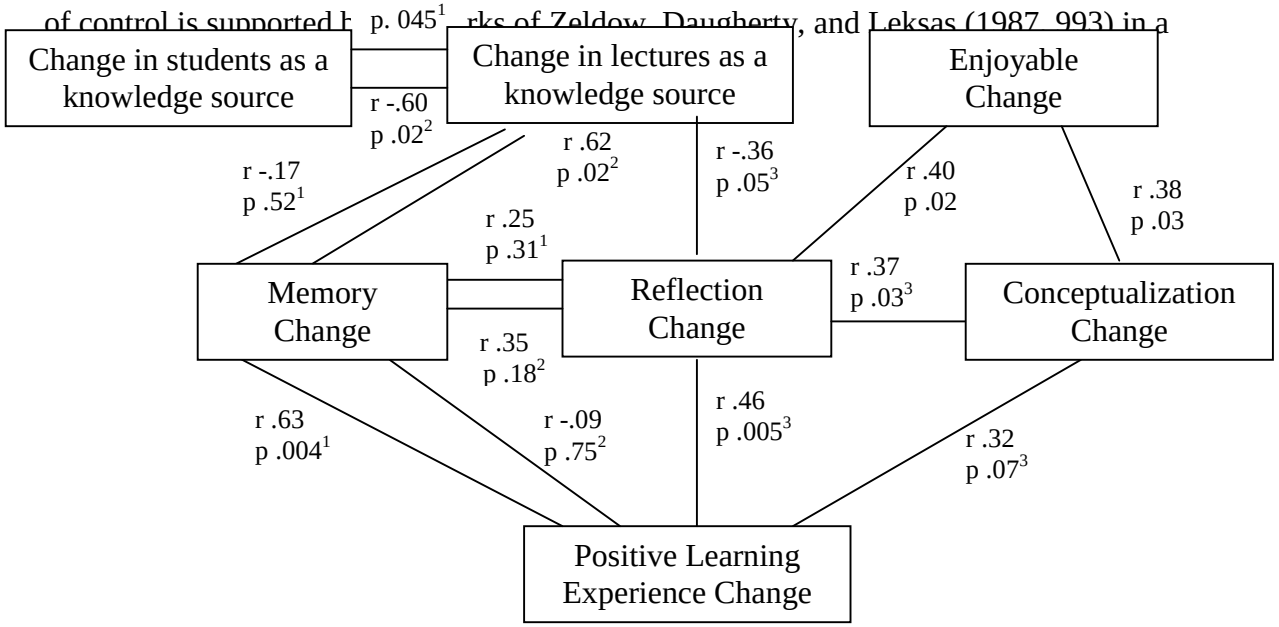

Figure 1. Illustration of proposed relationships between learning strategy, learning approach, and positive learning experience by the UW-Stout dietetic students.
[1] 1995 cohort change; [2] 1996 cohort change; [3] Combined study sample;
+ indicates a positive correlation; - indicates an inverse correlation

four-year longitudinal study of medical students, and by Grover and Smith (1981, 733) who studied first-year medical students. The value of these findings has implications for dietetics education. Bhagat and Chassie (1978, 322) observed that students who have high self-esteem were more likely be satisfied with their academic program and have higher levels of academic performance. As dietetic student self-esteem increased, positive learning experience was more likely to increase, but the association was weak and not significant (r -.27, df 34, p .12) (a decrease in self-esteem score indicating and increase in global self-esteem). Joe (1971, 625) reported that internally oriented individuals have a stronger desire for achievement, and internals will seek out information regarding college academics more than externals (Prociuk and Breen 1971, 310 & Batilis 1978, 243). Locus of control scale score was negatively correlated with PLE, but the association was also weak (r -.22, df 32, p .22). Because dietetic students found their experience significantly less positive, but continued to have high self-esteem and an internal locus of control, this further implicates the negativity toward the learning environment to a cognitive behavior, rather than dramatic personality changes.

Changes in Goals, Enablers and Obstacles to Goal Attainment, Advice for Studying, and Motivators to Learning by the UW-Stout Dietetic Study Sample

With regard to the change in goals that would be met by a career in dietetics, the desire to help others and to gain knowledge remained consistent during program involvement. These goals were similar to goals mentioned by students from other health-related disciplines. Rascati (1990, 52) found that nursing students chose their profession most often because of the desire to help others. Wanting to help others also influenced students to choose a career in occupational therapy (Cooperstein and Schwartz (1992, 536 & Rozier, Gilkeson, and Hamilton 1992, 629), in addition to having a job with variety and the opportunity to work in the healthcare setting (Cooperstein and Schwartz 1992, 536). Pharmacy students also mentioned that they entered the profession for the chance to work in the health care field (Rascati 1990, 52). Having a job with variety and the opportunity to work in health care were also mentioned by the dietetic students.

At the inception of their dietetic studies, UW-Stout dietetic students indicated that preparing for a career in dietetics would meet their goal of working/studying in a field that was interesting. At follow-up, however, fewer students identified working/studying in a field of interest as a goal that would be met by a career in dietetics. This decline in perceiving dietetics as fulfilling an area of interest may be related to the negativity with the learning environment. The desire to gain knowledge may be there, but if the environment that fosters learning is not positive, interest and enjoyment may not endure. Decreases in *breadth of interest*, defined as "the extent to which students are encouraged to develop or sustain their activities outside regular coursework," and *emotional climate*,

defined as “the way in which students’ undergraduate experience influences the affective, as distinct from the cognitive, domain,” (Clarke, Feletti, and Engel 1984, 322) were observed among first year medical students in a traditional curriculum by Lieberman et al. (1997, S14) and Lancaster et al. (1997, S11). Clarke, Feletti, and Engel (1984, 32) found that *breadth of interest* and *emotional climate* decreased over a three year period among medical students. The importance of this finding among dietetic students is that a significant and positive relationship between interest and deep learning (e.g., elaboration, critical thinking) has been documented in the literature. By contrast, a significant inverse association between interest and surface learning (i.e., memorization) has been reported (Schiefele 1991, 311). This further supports the notion that the dietetic study sample may not be utilizing sufficient critical thinking skills. As their interest declined, the use of learning strategies associated with heightened interest was less practiced.

Enablers to goal attainment did not change during progression through the DPD at UW-Stout. Self-motivation continued to foster goal attainment. The number of respondents who identified support from others and an interest in the field remained small, and slightly declined. It is not surprising, given the intrinsic nature of the aforementioned goals (e.g., to gain knowledge, help others), that dietetic students believed self-motivation was an enabler to goal attainment. Deci et al. (1991, 328), reported that a person who engages in a behavior out of interest, to perform an activity for enjoyment, to display ability, or gain skill, is regarded as intrinsically motivated because there is no external reward or purpose behind the action. According to Schiefele (1991, 316), behaviors that are intended for the purpose to provide enjoyment, to gain

knowledge, or fulfill an interest, are grounded on intrinsic motivation, and a person's interest and their level of intrinsic motivation will be heightened when he/she finds the learning process personally significant.

Like the enablers to goal attainment, obstacles did not change during progression through the dietetics program. Time management, programmatic issues, and financial concerns remained as barriers to goal attainment among UW-Stout dietetic students. Lack of time for recreation and for family and friends was one of the top three concerns among all classes of medical students, in an early study by Edwards and Zimet (1976, 622). Accordingly, Bjorksten et al. (1983, 761) found that time management was a severe problem among first and second year medical students, as well as third and fourth year students. This finding is of concern because Vitaliano et al. (1984, 734) observed that little time for personal activities was significantly predictive of anxiety among first and second year medical students. Furthermore, time management can impact the learning experience. Hulick and Higginson (1989, 15) studied the learning and study strategies by college freshman and found that students who practiced less time management found college to be significantly more difficult than students who practiced better time management skills. As previously noted, when students are under time constraints, they are more likely to resort to rote learning, thus decreasing the likelihood of retaining material over time (Newble and Entwistle 1986, 168), which might explain a high use of memory among UW-Stout dietetic students.

Like the dietetic students in this study who identified concerns related to the academic program, Bjorksten et al. (1983, 762) found that a major problem for second

year medical students was feeling the quality of the education was poor. Edwards and Zimet (1976, 622) found that academic pressures (e.g., preparing for and taking exams) was one of the major concerns among first and second year medical students. Beck et al (1997, 185) noted similar concerns among third, and fourth year nursing, medical, pharmacy, and social work students. Common stressors among these students were lack of free time, financial burdens, amount and difficulty of class work to be learned, exams and grades, and long study hours. Although findings were based on first year medical students, concerns about the curriculum and environment significantly increased throughout the first year of medical school, in a study by Stewart et al. (1997, 166). Furthermore, these obstacles were significantly correlated with depression.

Seeking help from others and practicing sound management skills prevailed as the top recommendations for studying science, health, and nutrition. Despite the fact that students recommended seeking outside help (e.g., students, faculty, tutors), they reported using less students, and regarded outside support as less of an enabler to goal attainment. This indicates that even though they are recommending it for studying, it is not actually being sought or deemed helpful. As noted earlier, the degree of help-seeking depends on the level of help needed, the reason for requesting help, and how successful the assistance from the source was at reducing the level of need (Karabenick and Knapp 1991, 226). For example, if a dietetic student seeks the aid of a tutor or a fellow student for help, but that help does not prove to be effective, the student may be less likely to seek that help again, but would still recommend it as a study tool.

These students may be encouraging others to practice sound time management

because they recognize it as a factor inhibiting goal attainment. As noted earlier, if students learn and practice sound time management skills related to studying, time management may be less of an obstacle or area of concern to meeting their goals. Two interesting questions emerge from these results. Does a recommendation of seeking help from others and managing time wisely indicate that these are successful processes being practiced, and in turn are relayed as effective, or do students encourage others to do these things because they have difficulty adopting these practices, but do recognize them to be important for studying? This appears to be an area where further research is needed, that is, the congruency between recognizing time management as effective for studying and actually practicing or utilizing sound time management skills.

Reviewing material frequently, which is associated with a reflective pattern of thinking (Mitchell 1994, 165) was regarded as effective at baseline, however, this recommendation declined by follow-up. This may explain why the dietetic students did not demonstrate significant gains in reflective thinking, and may be associated with the perceived negativity with the learning experience, because students who utilize more reflective thinking will perceive learning as an enjoyable and gratifying experience (Mitchell 1994, 166). Therefore, as learning became less enjoyable, one would expect the use of reflective thinking approaches to be less practiced, or vice versa. Again, the decrease in the number of students who recommended reviewing material frequently cannot be completely construed as a decrease in reflective thinking, but simply a decrease in the number who recommended it.

As documented earlier, competition surfaced as a driving force behind dietetic students' motivation to learn. An interest in the field and a desire to assist others continued to motivate these students, but did decline. The decrease in interest as motivating likely reflects the decrease in students identifying interest as a goal that would be met by a career in dietetics, and as an enabler to goal attainment, in addition to possible burnout, a more tedious learning environment, and competition.

An explanation for the egress of competition among the dietetic students at follow-up is very possibly the result of the increased attention on internship acceptance. At this stage in the academic program, students are beginning the application process for internships. The emphasis on good grades/G.P.A., and having work experience and a knowledge base to effectively practice in the internship setting are consistently discussed by students and reinforced by faculty members. The importance of proving oneself as a desirable candidate is imperative. This competition is an area of concern because students who are motivated by mastery goals, (i.e., to increase one's knowledge, master a task) versus students who are motivated by performance related goals (i.e., to do better than others), are less likely to see failures as obstacles, be less anxious and defensive, not be diverted from the intrinsic rewards derived from a valued task (Elliot and Dweck 1988, 6), practice deeper learning strategies (Ames 1992, 262 & Nolen 1988, 270), and their self-concept of ability significantly moderates cognitive, affective, and behavioral variables (Ames 1992, 263).

Conclusions

The purpose of this investigation was to discern the cognitive and affective behavior changes that occurred among dietetic students progressing through a didactic program in dietetics (DPD) at the University of Wisconsin-Stout. Cognitive behavior focused on learning processes, approaches to studying, information memorized and retained, learning experience, epistemological beliefs, advice for studying, and motivators to learning. Self-esteem and locus of control were variables comprising affective behavior. Additional measures evaluated student goals and their perceived enablers and obstacles to goal attainment. This study also investigated the representativeness of novice and experienced UW-Stout dietetic students to other novice and experienced dietetic students from two universities in the Wisconsin system, and to novice and experienced business students at UW-Stout, respectively, to determine if findings were specific to the dietetics field, or to UW-Stout.

With regard to cognitive behavior, although a positive outlook remained, dietetic students at UW-Stout found their learning experience significantly less positive over the course of their education. This finding, based on the results of this study, and the literature review, is associated with less positive outcomes (Biddle, Smith, & Tremonti 1985, 632), and possibly less utilization of deep learning strategies (Mitchell 1994, 166). An examination of the learning strategies among the dietetic students at UW-Stout implicated the decline in favor of critical thinking strategies (i.e., reflection, conceptualization) as one cause of the perceived negativity with the learning environment, in addition to transfer status and possible burnout, although these findings were not conclusive. These students placed less emphasis on conceptual and reflective

learning strategies as effective methods for studying science, health, and nutrition. The enjoyable nature of the learning experience influenced students' use of conceptual and reflective thinking skills. Reviewing information and relating current knowledge to previous knowledge, for example, were frequent practices among UW-Stout dietetic students at the inception of their studies, but declined with program involvement. As noted earlier, although conceptualization use was high and did increase non-significantly, the same was true for the use of memorization. Reflective thinking use was moderate and essentially unchanged. Reflection appeared to be the most influential learning strategy over students' view of their learning experience, and their approaches to learning (e.g., use of students, lectures). On the contrary, memorization did not play as big of role as expected, while the effect of conceptualization was moderate.

Behaviors suggested to be associated with the utilization of less critical thinking skills were apparent among the dietetic students at UW-Stout, and included less help-seeking from students as a source of science, health, and nutrition knowledge, an emergence of performance oriented goals (i.e., competition to outperform others), and decreased interest. When the affective variables of self-esteem and locus of control were examined, they remained high and internal, respectively, suggesting that the negativity toward the learning environment may not have been the result of student personality changes, but to cognitive behavior, and transfer status.

Transfer status had a significant impact on some of the changes in cognitive and affective behavior examined in this study. A student who did not transfer into the dietetics program was more likely to view their experience less positively, remember

significantly less three months and one-year after completing a final exam, and use a significantly greater use of lectures as a source of nutrition knowledge. One might conclude that the reason the transfer students did not demonstrate the same characteristics as their non-transfer counterparts is because these students had prior exposure to a college learning environment. Their learning strategies and perceptions toward learning may already be established, whereas students just starting out in a college setting have yet to discover which strategies work best for them and what are the best resources. One cannot assume that the unfavorable changes observed among the non-transfer students is a reflection of the dietetics program, because similar findings would have been noted for the transfer students as well, but this findings does have significant implications for dietetics education.

Implications for Dietetics Education

If the goal of dietetics education is to produce graduates who demonstrate the ability to think critically and innovatively (Owen and Rinke 1986, 377), dietetic educators need to provide learning environments that enhance the cognitive and affective behaviors of their students. Educators who fail to provide a learning environment that encourages reflective and conceptual thinking, and collaboration among their students, are at risk of encouraging learning strategies that support decreased retention over time, fostering competition, and producing a less enjoyable and rewarding learning experience. In addition, with the increased reliance on lectures as a knowledge source, which was significantly and inversely associated with the use of memorization, and significantly and

positively associated with the use of reflection, closer attention to the structure of the curriculum (i.e., type of instruction, assessment), is needed.

One recommendation for dietetics education would be to incorporate more problem-based learning into the dietetics curriculum. Due to its student centered, case driven approach, problem-based learning (PBL) is shown to produce learning environments that encourage the use of deep learning strategies (Coles 1985, 309, Albanese and Mitchell 1993, 54). In addition, when compared to traditional lecture-based curricula, students enrolled in PBL report greater satisfaction with their curriculum (Kaufmann and Mann 1996a, S54; Kaufmann and Mann 1996b, S1098), indicating that it provides for a more meaningful learning experience, improved emotional climate (Lancaster et al. 1997, S11 & Lieberman et al. 1997, S14), is more stimulating and enjoyable (Kaufmann and Mann 1996a, S54; Kaufmann and Mann 1996b, 1098, and faculty are more likely to excite their curiosity (Kaufman and Mann 1996b, 1098; Kaufmann and Mann 1997, 180). Green (1996, 135) found that dietetic students enrolled in PBL found their experience enjoyable and meaningful. Bayard (1994, 198) reported that PBL could be incorporated into the undergraduate dietetic curriculum with the expected result of decreased reliance on memory and enhancement of reflective thinking.

In addition to re-examining the curriculum structure, the traits of dietetic students, in particular the transfer students versus the non-transfer students should be examined. As seen in this study, transfer status had a remarkable impact on the changes in cognitive and affective behavior that occurred among the dietetic students at UW-Stout. The non-transfer students, in particular, are at a vulnerable state as they adjust to the college

setting. Attentiveness to the behaviors of these students at the inception of their dietetic studies can better predict future behaviors and indicate where possible changes in curriculum instruction are needed to facilitate desirable behaviors as students progress through the program.

Finally, dietetic educators also need to take a closer look at the congruency between student and curriculum goals. According to the competencies set forth by the Commission on Accreditation/Approval of Dietetics Education (CAADE), dietetics education, for example, must produce entry-level professionals who demonstrate the ability to communicate effectively, both written and orally, collaborate with others, apply critical thinking skills, interpret current research, and execute managerial functions (CAADE 1997). The goals that would be met by a career in dietetics among dietetic students in this study focused largely on the ability to help and educate others, to work/study in a field of interest, and to gain knowledge. Although these goals are noteworthy, they are not compatible with the goals of the dietetics program. For example, if a goal of dietetics education is to produce graduates who can effectively communicate, and students enter the dietetics program with the hopes of being able to help others, giving little attention to enhancing his/her communication skills, these students may perceive the learning experience as more negative because the goals of the program are not congruent with their own. To narrow this incongruence between professional and personal goals of students attracted to the dietetics profession, greater focus on marketing the dietetics profession is essential. This appears to be an area where further research is definitely warranted.

Hypothesis Generation

The following three hypotheses surfaced based on the qualitative findings from this study: (1) Dietetic students exposed to a learning environment that promotes critical thinking skills and collaboration will find their learning experience enjoyable and rewarding, seek help when needed, and exhibit a heightened interest in the learning process; (2) Time management, programmatic issues, and financial concerns are unique obstacles for UW-Stout dietetic students; (3) The emergence of competition as a motivating factor for learning influences dietetic students' use of learning strategies, and the types of resources sought for nutrition knowledge.

Recommendations for Future Research

Findings from this investigation indicate the need for further research into the cognitive and affective behaviors of dietetic students and in dietetics education.

1. This study was conducted on dietetic students enrolled in a traditional curriculum. Longitudinal studies comparing these behaviors among dietetic students in traditional and problem-based curricula would lend further insight into the effects of curriculum structure on these behaviors.

2. Changes in cognitive and affective behavior were examined during progression through an undergraduate dietetics program. Research extending the focus to graduate school and the dietetic internship is needed to evaluate the full scope of the educational process on these behaviors.

3. Representativness of the dietetic study sample was determined by comparisons with other dietetic students and other UW-Stout students. Obvious differences between UW-Stout dietetic students and UW-Stout business students were apparent. Further comparisons between dietetic students to students from other disciplines are required to determine whether the findings reported here are unique to UW-Stout students.

4. Further examination into the congruency between student and curriculum goals in dietetics education is needed to evaluate its effect on students learning and their perception of the learning environment. That is, will dietetic students who possess goals compatible with those of the dietetics program exhibit greater satisfaction and enjoyment with the learning experience compared to students whose goals are not compatible with the dietetics program?

5. An analysis of the difference in variance found between 1995 and 1996 cohort PLE scores and the impact on study findings needs to be pursued.

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APPENDIX A

Instruments

DEMOGRAPHIC DATA FORM FOR THE EXPERIENCED
1995 UW-STOUT DIETETIC COHORT

I.D.# _____ Date _____

Gender: Male _____ Female _____

Date of Birth: _____/_____/_____

Are you a transfer student? Yes _____ No _____

If you are a transfer student, what was your first semester of dietetics study at U.W.-Stout?

Please circle: Spring Summer Fall

Please circle: 1994 1995 1996 Other: _____

Current G.P.A. is in the following range:

Please circle: 4.0-3.5 3.49-3.0 2.99-2.5 $\leq$ 2.49

DEMOGRAPHIC DATA FORM FOR THE EXPERIENCED
1996 UW-STOUT DIETETIC COHORT

I.D.# _____ Date _____

Gender: Male _____ Female _____

Date of Birth: _____/_____/_____

What is your current class standing? (Please check one)

_____ Second semester sophomore
_____ First semester junior
_____ Second semester junior
_____ First semester senior
_____ Second semester senior
_____ Other: Please specify _____

Have you taken or are you currently taking Advanced Nutrition?

Yes _____ No _____

Are you a transfer student? Yes _____ No _____

If you are a transfer student, what was your first semester of dietetics study at U.W.-Stout?

Please circle: Spring Summer Fall

Please circle: 1995 1996 1997 Other: _____

Current G.P.A. is in the following range:

Please circle: 4.0-3.5 3.49-3.0 2.99-2.5 $\leq$ 2.49

DEMOGRAPHIC DATA FORM FOR EXPERIENCED SCHOOL A DIETETIC STUDENTS

I.D.# _____ Date _____

Gender: Male _____ Female _____

Date of Birth: _____/_____/_____

Please circle your current class standing: Freshman Sophomore Junior Senior

Are you currently enrolled in the Coordinated Undergraduate Program (CUP)?

Yes _____ No _____

Are you a transfer student? Yes _____ No _____

If you are a transfer student, what was your first semester dietetics study at U.W. _____?

Please circle: Spring Summer Fall

Please circle: 1994 1995 1996 Other: _____

Current G.P.A. is in the following range:

Please circle: 4.0-3.5 3.49-3.0 2.99-2.5 $\leq$ 2.49

DEMOGRAPHIC DATA FORM FOR NOVICE SCHOOL A DIETETIC STUDENTS

I.D.# _____ Date _____

Gender: Male _____ Female _____

Date of Birth: _____/_____/_____

Please circle your current class standing: Freshman Sophomore Junior Senior

Are you a dietetics major? Yes _____ No _____

Are you a transfer student? Yes _____ No _____

If you are a transfer student, what was your first semester dietetics study at U.W. _____?

Please circle: Spring Summer Fall

Please circle: 1995 1996 1997 Other: _____

Current G.P.A. is in the following range:

Please circle: 4.0-3.5 3.49-3.0 2.99-2.5 $\leq$ 2.49

DEMOGRAPHIC DATA FORM FOR NOVICE AND EXPERIENCED SCHOOL B DIETETIC STUDENTS

I.D.# _____ Date _____

Gender: Male _____ Female _____

Date of Birth: _____/_____/_____

Please circle your current class standing: Freshman Sophomore Junior Senior

Are you a transfer student? Yes _____ No _____

If you are a transfer student, what was your first semester dietetics study at U.W. _____?

Please circle: Spring Summer Fall

Please circle: 1994 1995 1996 Other: _____

Current G.P.A. is in the following range:

Please circle: 4.0-3.5 3.49-3.0 2.99-2.5 $\leq$ 2.49

DEMOGRAPHIC DATA FORM FOR EXPERIENCED UW-STOUT BUSINESS STUDENTS

I.D.# _____ Date _____

Gender: Male _____ Female _____

Date of Birth: _____/_____/_____

Are you a business major? Yes _____ No _____

Please circle your current class standing: Freshman Sophomore Junior Senior

Are you a transfer student? Yes _____ No _____

If you are a transfer student, what was your first semester studying business at U.W.-Stout?

Please circle: Spring Summer Fall

Please circle: 1994 1995 1996 Other: _____

Current G.P.A. is in the following range:

Please circle: 4.0-3.5 3.49-3.0 2.99-2.5 $\leq$ 2.49

DEMOGRAPHIC DATA FORM FOR NOVICE
UW-STOUT BUSINESS STUDENTS

I.D.# _____ Date _____

Gender: Male _____ Female _____

Date of Birth: _____/_____/_____

Are you a business major? Yes _____ No _____

Please circle your current class standing: Freshman Sophomore Junior Senior

Are you a transfer student? Yes _____ No _____

If you are a transfer student, what was your first semester studying business at U.W.-Stout?

Please circle: Spring Summer Fall

Please circle: 1995 1996 1997 Other: _____

Current G.P.A. is in the following range:

Please circle: 4.0-3.5 3.49-3.0 2.99-2.5 $\leq$ 2.49

SAMPLE COGNITIVE BEHAVIOR SURVEY

ID #_____/DATE_____

COGNITIVE BEHAVIOR SURVEY

The purpose of this survey is to obtain information on how you learn for science, health, and nutrition courses. The responses to this survey will be used **only** for research purposes and are considered confidential. Your answers will not affect any grades, recommendations, or performance reviews. Throughout the survey, the terms **memorization, and visualization** are used to describe learning behavior.

- **Memorization** refers to rote learning.
- **Visualization** is defined as a learning process characterized by mental construction of a picture to represent the information.

Items 1 through 10 concern the importance of each of these behaviors in your learning in science, health, and nutrition courses. Please circle the number which best corresponds to your use of each action listed.

	Very Rarely						**Very Frequently**
1. Memorization of the important features of the process.	1	2	3	4	5	6	7
2. Establishment of a conceptual model for the general understanding of how the mechanism works.	1	2	3	4	5	6	7
3. Establishment of an overview of the process (i.e. formulate a general impression).	1	2	3	4	5	6	7
4. Drawing a visual representation of the process e.g. a diagram.	1	2	3	4	5	6	7
5. Using analogies or metaphors.	1	2	3	4	5	6	7
6. Constructing a flow chart.	1	2	3	4	5	6	7
7. Initially, learn the details of a process, then construct a general picture of the process.	1	2	3	4	5	6	7

Reference: Mitchell, R. 1994. The development of the Cognitive Behavior Survey to assess medical student learning. *Teaching and Learning in Medicine* 6, no. 3: 161-7.

8. Creating a mnemonic device such as an acronym.	1	2	3	4	5	6	7
9. Discussing a scientific process or concept with other students.	1	2	3	4	5	6	7
10. Reading other texts on the same material.	1	2	3	4	5	6	7

How important has each of the following behaviors, listed in items 11 through 17, been to your success in science, health, and nutrition courses?

	Little Importance						**Major Importance**
11. The ability to memorize large amounts of material in a short period of time.	1	2	3	4	5	6	7
12. The ability to read quickly with accurate comprehension.	1	2	3	4	5	6	7
13. The ability to remember a large number of details.	1	2	3	4	5	6	7
14. The ability to construct effective classification systems for large amounts of details.	1	2	3	4	5	6	7
15. The ability to formulate conceptual models which explain the cause-effect relationships of different processes.	1	2	3	4	5	6	7
16. The ability to construct visual images (mental pictures) to represent information.	1	2	3	4	5	6	7
17. The ability to remember information which you have either read or heard only once or twice.	1	2	3	4	5	6	7

In terms of the way you read a science, health, or nutrition textbook or paper, how representative are the statements in items 18 through 26?

	Not Representative						**Very Representative**
18. As I read, I underline or highlight.	1	2	3	4	5	6	7
19. As I read, I make notes in the margins.	1	2	3	4	5	6	7
20. As I read, I make an outline of the important material.	1	2	3	4	5	6	7
21. As I read descriptions of physiological mechanisms, I try to construct a mental image of the process.	1	2	3	4	5	6	7
22. As I read, I try to memorize the key points.	1	2	3	4	5	6	7
23. As I read, I relate the material to what I have previously learned.	1	2	3	4	5	6	7
24. As I read, I identify information which I will memorize later.	1	2	3	4	5	6	7
25. As I read, I analyze the relevant diagrams or pictures.	1	2	3	4	5	6	7
26. As I read, I make notes of points I do not understand to research at a later time.	1	2	3	4	5	6	7

27. On the average, what percent of the total amount of material covered in a course do you learn by the end of the course? _____%

28. At the end of a course, estimate the average percent of your knowledge which is the result of rote memorization? _____%

29. One year after completing a course, what percent of what you learned for the final exam do you still remember? _____%

30. After three months, what percent of what you learned for a final exam do you still remember? _____%

31. For the exams you've taken in your science, health, and nutrition courses, what percent of your knowledge was the result of cramming? _____%

32. For your science, health, and nutrition courses, what percent of your study time has been devoted to memorization? _____%

33. For your science, health, and nutrition courses, what percent of your study time has been wasteful or ineffective? _____%

For your science, health, and nutrition courses, why do you memorize?

		Minor Reason					**Major Reason**	
34.	It is an effective way to learn.	1	2	3	4	5	6	7
35.	It is a fast way to learn.	1	2	3	4	5	6	7
36.	There is too much to learn by any other method.	1	2	3	4	5	6	7
37.	It is easy.	1	2	3	4	5	6	7
38.	It is necessary to establish a basic fund of knowledge.	1	2	3	4	5	6	7

For your science, health, and nutrition courses:

		Seldom						Frequently
39.	How often do you study with other students prior to an exam or evaluation?	1	2	3	4	5	6	7
40.	Do you study with another student(s) on a regular basis?	1	2	3	4	5	6	7
41.	Excluding your preparation for exams or evaluations, do you ever discuss with other students material which is conceptually confusing?	1	2	3	4	5	6	7

On the average, what percent of your science, health, and nutrition knowledge has come from the following sources? Your total must add up to 100%.

42. Lectures _____%

43. Conferences/tutorials _____%

44. Faculty outside of class _____%

45. Other students outside of class _____%

46. Textbooks _____%

47. Articles _____%

48. Labs _____%

49. Other (please specify) _____%

100%

	Never						Always
50. How frequently do you construct relationships among material covered within a course to build larger and larger concepts?	1	2	3	4	5	6	7
51. How often during a course do you review material covered earlier in a course?	1	2	3	4	5	6	7
52. How often during a course do you integrate the material with material covered in a previous course?	1	2	3	4	5	6	7
53. How frequently do you discuss learning or study methods with other students?	1	2	3	4	5	6	7
54. To improve your understanding of material, do you read and study background material?	1	2	3	4	5	6	7
55. Do you ever reflect on how you learn?	1	2	3	4	5	6	7
56. When reading a text, do you construct variations of pictures or diagrams presented in the text?	1	2	3	4	5	6	7

To what extent do the following words and phrases describe your learning experience in science, health, and nutrition classes?

	Not at all						Very descriptive
57. Meaningful	1	2	3	4	5	6	7
58. Enjoyable	1	2	3	4	5	6	7
59. Stressful	1	2	3	4	5	6	7
60. Stimulating	1	2	3	4	5	6	7
61. Uneventful	1	2	3	4	5	6	7
62. Sense of closure	1	2	3	4	5	6	7
63. Tedious	1	2	3	4	5	6	7
64. Sense of discovery	1	2	3	4	5	6	7
65. Rewarding	1	2	3	4	5	6	7
66. Motivating	1	2	3	4	5	6	7
67. Leads to new questions	1	2	3	4	5	6	7

To what extent do the following words and phrases describe your view of nutrition knowledge?

	Not at all						**Very descriptive**
68. Fallible	1	2	3	4	5	6	7
69. Descriptive	1	2	3	4	5	6	7
70. Contradictory	1	2	3	4	5	6	7
71. Stable	1	2	3	4	5	6	7
72. Ambiguous	1	2	3	4	5	6	7
73. Definitive	1	2	3	4	5	6	7
74. Precise	1	2	3	4	5	6	7

Rank order the following statements in terms of their importance. Six (6) represents the most important statement and one (1) represents the least important statement.

My level of understanding of nutrition and nutrition-related issues is (or will be):

75. the result of my cognitive abilities. _____

76. the result of the quality of teaching. _____

77. the result of the quality of textbooks. _____

78. determined by what I decide to learn. _____

79. the result of the cohesiveness of the curriculum. _____

80. the result of personal motivation. _____

Please think carefully about the following questions, then express your ideas in at least 1 to 2 paragraphs.

81. What advice would you give a student just beginning to study science, health, and nutrition on how to study?

82. In your view, what motivates the dietetic students at UW-Stout to learn?

Thank you for taking the time to provide this important information!

ROSENBERG SELF-ESTEEM SCALE

ID# _____ DATE _____

For each statement, please select the one response that most clearly matches how you feel.

I feel that I'm a person of worth, at least on an equal plane with others.
1. _____Strongly agree
2. _____Agree
3. _____ Disagree
4. _____ Strongly disagree

I feel that I have a number of good qualities.
1. _____ Strongly agree
2. _____ Agree
3. _____ Disagree
4. _____ Strongly disagree

All in all, I am inclined to feel that I am a failure.
1. _____ Strongly agree
2. _____ Agree
3. _____ Disagree
4. _____ Strongly disagree

I am able to do things as well as most other people.
1. _____ Strongly agree
2. _____ Agree
3. _____ Disagree
4. _____ Strongly disagree

I feel I do not have much to be proud of.
1. _____ Strongly agree
2. _____ Agree
3. _____ Disagree
4. _____ Strongly disagree

I take a positive attitude toward myself.
1. _____ Strongly agree
2. _____ Agree
3. _____ Disagree
4. _____ Strongly disagree

On the whole, I am satisfied with myself.
1. _____ Strongly agree
2. _____ Agree
3. _____ Disagree
4. _____ Strongly disagree

I wish I could have more respect for myself.
1. _____ Strongly agree
2. _____ Agree
3. _____ Disagree
4. _____ Strongly disagree

I certainly feel useless at times.
1. _____ Strongly agree
2. _____ Agree
3. _____ Disagree
4. _____ Strongly disagree

At times I think I am no good at all.
1. _____ Strongly agree
2. _____ Agree
3. _____ Disagree
4. _____ Strongly disagree

ROTTER INTERNAL-EXTERNAL LOCUS OF CONTROL SCALE

ID# _____ DATE _____

For each item please select the choice that most closely matches your opinion. Remember, your choice may not be your *exact* opinion, but it is more likely your opinion than the alternate choices. Please do not circle both responses, circle only one choice.

1. a. Children get into trouble because their parents punish them too much.
   b. The trouble with most children nowadays is that their parents are too easy on them.

2. a. Many of the unhappy things in people's lives are partly due to bad luck.
   b. People's misfortunes result from the mistakes they make.

3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.
   b. There will always be wars, no matter how hard people try to prevent them.

4. a. In the long run people get the respect they deserve in this world.
   b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

5. a. The idea that teachers are unfair to students is nonsense.
   b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

6. a. Without the right breaks one cannot be an effective leader.
   b. Capable people who fail to become leaders have not taken advantage of their opportunities.

7. a. No matter how hard you try some people just don't like you.
   b. People who can't get others to like them don't understand how to get along with others.

8. a. Heredity plays the major role in determining one's personality.
   b. It is one's experiences in life which determine what they're like.

9. a. I have often found that what is going to happen will happen.
   b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

10. a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
    b. Many times exam questions tend to be so unrelated to course work that studying is really useless.

ID# _____ DATE _____

11. a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
    b. Getting a good job depends mainly on being in the right place at the right time.

12. a. The average citizen can have an influence in government decisions.
    b. The world is run by the few people in power, and there is not much the little guy can do about it.

13. a. When I make plans, I am almost certain that I can make them work.
    b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyway.

14. a. There are certain people who are just no good.
    b. There is some good in everybody.

15. a. In my case getting what I want has little or nothing to do with luck.
    b. Many times we might just as well decide what to do by flipping a coin.

16. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
    b. Getting people to do the right thing depends upon ability; luck has little to do with it.

17. a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.
    b. By taking an active part in political and social affairs the people can control world events.

18. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
    b. There really is no such thing as "luck".

19. a. One should always be willing to admit mistakes.
    b. It is usually best to cover up one's mistakes.

20. a. It is hard to know whether or not a person likes you.
    b. How many friends you have depends upon how nice a person you are.

21. a. In the long run the bad things that happen to us are balanced by the good ones.
    b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22. a. With enough effort we can wipe out political corruption.
    b. It is difficult for people to have much control over the things politicians do in office.

23. a. Sometimes I can't understand how teachers arrive at the grades they give.
    b. There is a direct connection between how hard I study and the grades I get.

24. a. A good leader expects people to decide for themselves what they should do.
    b. A good leader makes it clear to everybody what their jobs are.

25. a. Many times I feel that I have little influence over the things that happen to me.
    b. It is impossible for me to believe that chance or luck plays an important role in my life.

ID# _____ DATE _____

26. a. People are lonely because they don't try to be friendly.
    b. There's not much use in trying too hard to please people, if they like you, they like you.

27. a. There is too much emphasis on athletics in high school.
    b. Team sports are an excellent way to build character.

28. a. What happens to me is my own doing.
    b. Sometimes I feel that I don't have enough control over the direction my life is taking.

29. a. Most of the time I can't understand why politicians behave the way they do.
    b. In the long run the people are responsible for bad government on a national as well as on a local level.

SAMPLE GOAL ANALYSIS QUESTIONNAIRE

ID #_____/Date_____

Please answer these questions in the space provided. You may use a word processor, but be sure to include your ID# on the form.

1) Explain how your professional and personal goals will be met by preparing for a career in dietetics.

ID#_____Date_____

2) What enablers and/or obstacles do you feel will affect your ability to meet these goals?

APPENDIX B

Consent Forms

CONSENT FORM FOR UW-STOUT DIETETIC STUDENTS

You were selected to participate in this research project because you are a student majoring in the Dietetics program at the University of Wisconsin-Stout, Menomonie, WI 54751.

We are interested in studying the affective and cognitive changes that occur during participation in the Dietetics program at UW-Stout. These changes will be measured with the use of questionnaires at a minimum of three stages in your preparation for a degree in dietetics. These questionnaires will assess your learning and thinking styles, as well as attitudes and feelings about yourself and your career goals. Although there are no direct benefits to you as a participant, the long term benefit may be an improved dietetics program and a better understanding of the challenges and concerns facing the dietetic students at UW-Stout. The risks of this study are minimal to nonexistent.

Any information about you will be held in the strictest confidence and will not be a part of any permanent record. All responses will be made using an identifier whose code is known only by a staff member of the School of Human Environmental Sciences; this staff member will have no responsibilities for assigning grades or preparing progress reports regarding your class-related performance. Responses will be kept in a location accessible only to the principal investigator(s). In addition, at the conclusion of this study all records that identify participants will be destroyed.

Upon request by the participant, the findings of this study will be provided. Your participation in this study is strictly voluntary. You may discontinue your participation at any time without affecting your education in any way.

Before signing this consent form, please ask any questions you may have regarding this research project. You may contact the principal investigator, Barbara Lohse Knous, PhD, RD at 715-232-1994 or Kim Shafer, a graduate student in the Department of Food and Nutrition at 715-232-2183.

I, _____, have read the above and have decided to participate in the research project described above. My signature also indicates that I have received a copy of this consent form.

Signature_____Date_____
(participant)

CONSENT FORM FOR EXPERIENCED SCHOOL A AND NOVICE AND EXPERIENCED SCHOOL B DIETETIC STUDENTS

You were invited to participate in this research project because you are a student majoring in the Dietetics program at the University of Wisconsin-_____.

We are interested in studying the affective and cognitive behaviors that occur during participation in the Dietetics program at UW-_____, and comparing these behaviors with those that occur among dietetic students at UW-Stout. These behaviors will be measured with the use of questionnaires. These questionnaires will assess your learning and thinking styles, as well as attitudes and feelings about yourself and your career goals. Although there are no direct benefits to you as a participant, the long term benefit may be an improved Dietetics program and a better understanding of the challenges and concerns facing the dietetics students at UW-_____ and UW-Stout. The risks of this study are minimal to nonexistent.

Any information about you will be held in the strictest confidence and will not be a part of any permanent record. All responses will be made using an ID number. Responses will be kept in a location accessible only to the principal investigator(s). In addition, at the conclusion of this study all records that identify participants will be destroyed.

Upon request by the participant, the findings of this study will be provided. Your participation in this study is strictly voluntary. You may discontinue your participation at any time without affecting your education in any way.

Before signing this consent form, please ask any questions you may have regarding this research project. You may contact the principal investigator, Barbara Lohse Knous, PhD, RD at 715-232-1994 or Kim Shafer, a graduate student in the Department of Food and Nutrition at 715-232-2183.

I, _____, have read the above and have decided to participate in the research project described above. My signature also indicates that I have received a copy of this consent form.

Signature_____Date_____
(participant)

COVER LETTER ATTACHED TO SCHOOL A NOVICE DIETETIC STUDENT SURVEYS

You were invited to participate in this research project because you are a student majoring in dietetics at the University of Wisconsin-_____.

We are interested in studying the affective and cognitive behaviors that occur during participation in the dietetics program at UW-_____ to determine the representativeness of UW-Stout dietetic students with respect to beginning dietetic students. These behaviors will be measured with the use of questionnaires. These questionnaires will assess your learning and thinking styles, as well as attitudes and feelings about yourself and your career goals. Although there are no direct benefits to you as a participant, the long term benefit may be an improved dietetics program and a better understanding of the challenges and concerns facing the dietetic students at UW-_____. The risks of this study are minimal to non-existent.

Any information about you will be held in the strictest of confidence and will not be part of any permanent record. All responses will be made using an identifier code, which is written at the top of each survey. At the conclusion of this study all records that identify participants will be destroyed.

Upon request by the participant, the findings of this study will be provided. Your participation in this study is strictly voluntary. You may discontinue your participation at any time without affecting your education in any way.

If you have any questions regarding this research project, you may contact the principal investigator, Barbara Lohse Knous, PhD, RD, CD, at 715-232-1994 or Kimberly Shafer, a graduate student in the Department of Food and Nutrition at 715-232-2183.

By completing and returning the attached surveys, you are granting permission to use the data in this research project.

Directions for Completing and Returning the Surveys:

1. Please complete and respond honestly to every item on each survey. Remember, you cannot be identified in any way.

2. When you have completed the surveys, mail the materials in the attached self-addressed-stamped envelope.

3. You may want to write down your ID number in case you have any future questions regarding your surveys.

Thank you for your participation in this research project!

CONSENT FORM FOR EXPERIENCED UW-STOUT BUSINESS STUDENTS

You were invited to participate in this research project because you are a student majoring in the Business program at the University of Wisconsin-Stout.

We are interested in studying the affective and cognitive behaviors that occur during participation in the Business program at UW-Stout, and comparing these behaviors with those that occur among dietetic students at UW-Stout. These behaviors will be measured with the use of questionnaires. These questionnaires will assess your learning and thinking styles, as well as attitudes and feelings about yourself and your career goals. Although there are no direct benefits to you as a participant, the long term benefit may be an improved Business program and a better understanding of the challenges and concerns facing the business and dietetic students at UW-Stout. The risks of this study are minimal to nonexistent.

Any information about you will be held in the strictest confidence and will not be a part of any permanent record. All responses will be made using an ID number. Responses will be kept in a location accessible only to the principal investigator(s). In addition, at the conclusion of this study all records that identify participants will be destroyed.

Upon request by the participant, the findings of this study will be provided. Your participation in this study is strictly voluntary. You may discontinue your participation at any time without affecting your education in any way.

Before signing this consent form, please ask any questions you may have regarding this research project. You may contact the principal investigator, Barbara Lohse Knous, PhD, RD at 715-232-1994 or Kim Shafer, a graduate student in the Department of Food and Nutrition at 715-232-2183.

I, _____, have read the above and have decided to participate in the research project described above. My signature also indicates that I have received a copy of this consent form.

Signature_____Date_____
(participant)

COVER LETTER ATTACHED TO UW-STOUT
NOVICE BUSINESS STUDENT SURVEYS

You were invited to participate in this research project because you are a student majoring in the Business program at the University of Wisconsin-Stout.

We are interested in studying the affective and cognitive behaviors that occur during participation in the Business program at UW-Stout to determine the representativeness of UW-Stout dietetic students with respect to beginning business students. These behaviors will be measured with the use of questionnaires. These questionnaires will assess your learning and thinking styles, as well as attitudes and feelings about yourself and your career goals. Although there are no direct benefits to you as a participant, the long term benefit may be an improved Business program and a better understanding of the challenges and concerns facing the business and dietetic students at UW-Stout. The risks of this study are minimal to non-existent.

Any information about you will be held in the strictest of confidence and will not be part of any permanent record. All responses will be made using an identifier code, which is written at the top of each survey. At the conclusion of this study all records that identify participants will be destroyed.

Upon request by the participant, the findings of this study will be provided. Your participation in this study is strictly voluntary. You may discontinue your participation at any time without affecting your education in any way.

If you have any questions regarding this research project, you may contact the principal investigator, Barbara Lohse Knous, PhD, RD, CD, at 715-232-1994 or Kimberly Shafer, a graduate student in the Department of Food and Nutrition at 715-232-2183.

By completing and returning the attached surveys, you are granting permission to use the data in this research project.

Directions for Completing and Returning the Surveys:

1. Please complete and respond honestly to every item on each survey. Remember, you cannot be identified in any way.

2. When you have completed the surveys, return the materials in the attached envelope through inter-campus mail.

3. You may want to write down your ID number in case you have any future questions regarding your surveys.

Thank you for your participation in this research project!

APPENDIX C

Instructional Letters

INSTRUCTIONAL LETTER SENT TO SCHOOL A DIETETICS PROFESSOR

Dear Dr. _____:

My name is Kimberly Shafer and I am the graduate student working on the research project that Dr. Barbara Knous contacted you about. I would like to thank you for your participation in this study; it is greatly appreciated! Dr. Knous and I are interested in studying the cognitive and affective behaviors that occur during participation in the didactic dietetic program at UW-_____ and how these behaviors compare with those that occur among dietetic students at UW-Stout. These behaviors will be measured with the use of questionnaires that will assess the students' learning and thinking styles, as well as their attitudes and feelings about themselves and their career goals.

This study is strictly voluntary and confidential. Per your e-mail contact with Dr. Knous, each student was assigned an ID number, beginning with UWCAP###, by _____, a disinterested third party at UW-_____, who has no responsibility for assigning grades. ____ will check the names of the students who return a signed consent form to her and then mail those consent forms back to me. After we receive the completed surveys, we will contact ____ with those ID numbers so she can complete a cross-check to verify that those students who returned surveys also signed a consent form. We are not requesting a copy of the ID numbers. We anticipate that the long-term goal of this study will be an improved dietetic program at UW-_____ and UW-Stout. The students' participation in this study will require approximately 45 minutes to complete a set of surveys.

Enclosed are the consent forms and survey materials. Each individual survey set includes:

1) 1 page demographic form
2) 8 page Cognitive Behavior Survey
3) 1 page, 10 item self-esteem survey
4) 2 page, 29 item force choice survey
5) 2 page goal analysis survey

A large, stamped envelope addressed to myself is also enclosed. This envelope should be given to ____. She will then mail all the returned, signed consent forms, NOT STUDENT SURVEYS, to me. Attached to each set of surveys is a single, stamped, envelope, also addressed to myself, which students will use to return his/her completed set of surveys.

Guidelines for distributing the consent forms and surveys are as follows:

1. Hand out consent forms and read through with the students.

2. Obtain slips of paper with each individual student's name and their concealed ID number from ____, and then hand them out to the students.

3. Hand out a set of surveys to each student. Explain to the students that everyone will receive a survey whether they agree to participate or not. (For those who choose not to participate, he/she can discard the survey).

4. Tell the students that their ID number, written next to their name on the attached slip of paper, is the number to write on the surveys, **(NOT THEIR UW-_____ STUDENT ID NUMBER!)**. Their ID number for the study will begin with UWCAP###.

5. In the space marked DATE, tell the students to write Spring 1998.

6. Tell students that if they are willing to participate in the study to sign their consent form and return it to _____. The consent forms cannot be returned to you because this could infer instructor bias for those students who choose not to participate).

7. Direct the students to mail his/her completed set of surveys in the attached, self-addressed, stamped envelope, but to **KEEP** the slip with their name and ID number.

8. Please stress to the students the importance of completing every question and being honest in their responses.

9. Tell the students to return their consent forms and surveys **AS SOON AS POSSIBLE!**

When we receive all the surveys, the ID numbers will be compared with the returned consent forms ____ received to assure that consent was given by each student who returned a survey.

Thank you very much for your time and your participation in the study!

I look forward to sharing my results with you!

Sincerely,

Kimberly Shafer

INSTRUCTIONAL LETTER SENT TO SCHOOL B DIETETICS PROFESSOR

Dear Dr. _____:

My name is Kimberly Shafer and I am the graduate student working on the research project that Dr. Barbara Knous contacted you about. I would like to thank you for your participation in this study; it is greatly appreciated! Dr. Knous and I are interested in studying the cognitive and affective behaviors that occur during participation in the didactic dietetic program at UW-_____ and how these behaviors compare with those that occur among dietetic students at UW-Stout. These behaviors will be measured with the use of questionnaires that will assess the students' learning and thinking styles, as well as their attitudes and feelings about themselves and their career goals.

This study is strictly voluntary and confidential. Subjects will be identified by an ID number, which will be kept in the possession of Dr. Knous and myself. The department secretary will check the names of the students who return a signed consent form to her and then mail those consent forms back to me, after she has collected all of them. After we receive the completed surveys, we will contact your department secretary with those ID numbers so she can complete a cross-check to verify that those students who returned surveys also signed a consent form. We anticipate that the long term goal of this study will be an improved dietetic program at UW- _____ and UW-Stout. The students' participation in this study will require approximately 45 minutes to complete a set of surveys.

Enclosed are the consent forms and survey materials. Each individual survey set includes:

1) 1 page demographic form
2) 8 page Cognitive Behavior Survey
3) 1 page, 10 item self-esteem survey
4) 2 page, 29 item force choice survey
5) 2 page goal analysis survey

A large, stamped envelope addressed to myself is also enclosed. This envelope should be given to the department secretary. She will then mail all the returned, signed consent forms, NOT STUDENT SURVEYS, to me. Attached to each set of surveys is a single, stamped, envelope, also addressed to myself, which students will use to return his/her completed set of surveys.

Guidelines for distributing the consent forms and surveys are as follows:

1. Hand out consent forms and read through with the students.

2. Hand out a set of surveys, with an attached ID number, to each student. Explain to the students that everyone will receive a survey whether they agree to participate or not. (For those who choose not to participate, he/she can discard the survey).

3. Tell the students that their ID number on the attached slip of paper is the number to write on the surveys, **(NOT THEIR UW-_____ STUDENT ID NUMBER**). Their ID number for the study will begin with __###-98.

4. In the space marked DATE, tell the students to write Spring 1998.

5. Tell students that if they are willing to participate in the study to sign their consent form and return it to the department secretary. (The consent forms cannot be returned to you because this could infer instructor bias for those students who choose not to participate).

6. Direct the students to mail his/her completed set of surveys in the attached, self-addressed, stamped envelope, but to **KEEP** the slip with the ID number.

7. Please stress to the students the importance of completing every question and being honest in their responses.

8. Tell the students to return their consent forms and surveys **AS SOON AS POSSIBLE!**

When we receive all the surveys the ID numbers will be compared with the returned consent forms the department secretary received, to assure that consent was given by each student who returned a survey.

Thank you very much for your time and your participation in the study!
I look forward to sharing my results with you!

Sincerely,

Kimberly Shafer

APPENDIX D

Description of Qualitative Data Analysis

QUALITATIVE DATA ANALYSIS

Qualitative data were analyzed by the methods of coding and pattern coding. Coding involves the process of assigning meaning to descriptive information through the application of labels or tags. These labels or tags can be applied to words, phrases, sentences, or whole paragraphs (Miles and Huberman 1994, 56). Coding aids the researcher by uncovering emerging themes or patterns that might otherwise be camouflaged by the overwhelming quantity of information. Furthermore, the retrieval and analysis of data is facilitated by the means of coding (Miles and Huberman 1994, 65). Creating codes can be achieved through a number of methods: (1) the creation of a conditional start-up list of codes prior to gathering and analyzing data according to generated hypotheses, research questions, problem areas, and/or key variables of interest to the researcher; (2) a "grounded" approach in which the researcher collects data and determines how many variety of codes there are, in other words, the data ultimately forms its own codes (Glaser and Strauss 1967), as referenced by Miles and Huberman (1994, 58); (3) the development of a qualitative category card typically containing a written and reviewed paragraph of initial data that is categorized by labels, eventually creating a more abstract category attributed to a number of observations (Miles and Huberman 1994, 58) citing Strauss and Corbin (1990).

Pattern coding is a method of identifying emerging themes, explanations, or configurations, and combining the information into more meaningful and centralized sets, themes, or constructs. Four important functions of pattern coding exist (Miles and Huberman 1994, 69): (1) large quantities of data are reduced to smaller analytical units;

(2) the researcher becomes immersed in data collection, thereby facilitating greater concentration in future fieldwork; (3) it aids the researcher in the development of a cognitive map for greater understanding of local events and interactions; and (4) cross-scale analysis of multi-case studies can be conducted by producing conventional and directional processes. The key to pattern coding is to take "loosely held" fragments of meaning and regroup them as the data take shape, and reconstruct emerging themes (Miles and Huberman 1994, 70). Due to the subjective nature of coding qualitative data, however, Mishler (1986) cited by Miles and Huberman (1994, 64), recommends two researchers code the same data to assure greater acuity of the data set, resulting in an unambiguous, shared vision between the researchers regarding the meaning applied to each code.

A "grounded" approach was the preferred method of qualitative data analysis for this study. Each set of qualitative data collected was first photocopied to avoid alteration of the original data set. The text was then examined to distinguish consistent themes. For practicability of code identification, recurring themes were color-coded. Following the identification of all possible codes, pattern coding was utilized to consolidate several distinct codes into more significant and unified themes. A clean sample of the coded data sets were coded again by a second party, who was blinded to the assigned codes of the first party, to verify concurrence of data analysis.

APPENDIX E

Dietetics Sequencing Chart

DIETETICS SEQUENCING CHART