

EVALUATING EFFECTIVENESS OF AN UNDERGRADUATE DIETETICS
CURRICULUM

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EVALUATING EFFECTIVENESS OF

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ABSTRACT

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Assessment is necessary in many programs to be certain that expected outcomes are being met. Without curriculum evaluation, higher education faculty would be unaware if students are competent in the skills and knowledge that the faculty thought they were teaching. New curriculum competencies related to dietetics are introduced every five to seven years from the Commission on Accreditation for Dietetics Education (CADE). CADE establishes the minimum requirements of foundation knowledge, skills, and competencies for institutions to train entry level dietitians. Even though a variety of criteria have been proposed to evaluate curricula, no common model or format is used because of the differences in each program, college, or university. The purpose of this study is to evaluate North Dakota State University's (NDSU) dietetics program through students' understanding and knowledge as demonstrated by the change in pretest and posttest scores to ensure they are meeting competencies. The Dietetics Program Assessment Test is made up of questions contributed by each instructor in the dietetics program at NDSU regarding their particular area of expertise.

The effectiveness was assessed by comparing students' Dietetics Program Assessment pretest scores, taken during sophomore year, with their posttest scores, taken during senior year. This evaluation was used to determine if pretest scores predict program course grades or if high pretest results indicate a more successful student. Therefore, the scores could be used as a selection criterion for acceptance into the dietetics program if there is a strong correlation. Results from students in the Coordinated Program in Dietetics

(CPD) were compared to those in the Didactic Program in Dietetics (DPD) and those not accepted into either program to see if there is a difference between the groups. The test was also divided into dietetics core content areas (community nutrition, medical nutrition therapy/clinical, food service, basic nutrition/lifespan, and management) to see if there was an area in which students were scoring poorly.

Pretests were taken by 122 pre-dietetics students; of these, 46 were admitted into the CPD, 29 were admitted into the DPD, and 47 were not admitted into either program. A paired t-test found there to be a significant difference ($p < 0.0001$) between individual mean pretest scores and posttest scores, which means students' knowledge about the area of dietetics had greatly improved through courses throughout each program. A t-test found there was not a significant difference between either the pretest scores ($p = 0.9847$) or the posttest scores ($p = 0.4263$) of those in the CPD and DPD programs. In all of the core dietetics content areas the average percentage of correct questions improved from the pretest to the posttest, and each content area had a similar improvement, roughly a 25 percentage point increase. Using an exact Kendall's Tau Test to examine the association between pretest score and final course grades, no significant difference was found in all of the core dietetics courses except for Food Selection and Preparation Principles (HNES 261) ($p = 0.0324$).

In conclusion, since no one content area on the posttest appears to be lacking more than any other, it would appear that the students are learning from all courses. Due to the lack of association between all core dietetics course grades and pretest scores along with the small sample size, pretest scores should not currently be used alone or as one of the selection criterion for admittance into either dietetics programs.

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DEDICATION

This thesis is dedicated to my husband, Scott, along with my parents, for all of their support, patience, and encouragement throughout my graduate studies.

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CHAPTER 1.

INTRODUCTION

A curriculum is the related set of courses that make-up a specific area of study. The success of a curriculum is characterized by the way in which it meets stated needs and expectations of society (Thompson, Harver, & Eure, 2009). There are several reasons why curriculum evaluation is necessary. Curriculum evaluation assists in assessing the quality of educational experiences and demonstrates whether or not a program is meeting its educational goals and objectives. Because evaluation allows for feedback from learners, data obtained from formal evaluation can identify the changes needed to improve the program for future students (Dobbie, Rhodes, Tysinger, & Freeman, 2004).

Assessment is necessary in many programs to be certain that expected outcomes are being met. Evaluation of curriculum examines the extent to which content and outcomes are determined (Prideaux, 2007). Without curriculum evaluation, higher education faculty would be unaware if students are competent in the skills and knowledge that the faculty thought they were teaching. Evaluation is especially important for curricula in the ever-changing health care field. Nutrition is one of these areas in which change is particularly constant and inaccurate information is increasingly common. Many are concerned that an excessive number of dietetic programs are producing graduates of substandard quality (Pender & de Looy, 2004). Because of these reasons, new curriculum competencies are introduced every five to seven years from Commission on Accreditation for Dietetics Education (CADE). CADE establishes the minimum requirements of foundation knowledge, skills, and competencies for institutions to train entry level dietitians (Shafter & Knous, 2001). For dietetics, entry level competence is made up of 46

competencies, which are divided into eight areas: communications, physical and biological science, social sciences, research, food, nutrition, management, and health care systems (American Dietetic Association, 2011).

Even though a variety of criteria have been proposed to evaluate curricula, no common model or format is used because of the differences in each program, college, or university (Chen, Hsu, & Wu, 2009). Several collegiate faculty use a final examination to evaluate students' knowledge of a course. However, it is extremely difficult to assess a student's ability to apply knowledge in a "real world" situation by means of a multiple choice exam (Thompson et. al., 2009). It has also been suggested that the reason curriculum evaluation is necessary is because final exam grades are not adequate indicators of skills learned that can be transferred into practice (Spiel, Schober, & Reimann, 2006).

Another assessment technique frequently used is course evaluations. Course evaluations are one of the most common ways that college faculty evaluate their own instruction and the course. Student ratings do provide a common base for judging quality; however, there are several reasons why this strategy may be an ineffective means of curriculum evaluation. Some instructors feel that students are unqualified to give valid assessments of their instruction and think that students do not take the evaluations seriously (Nasser-Abu Alhija & Fresko, 2009). A review by Spiel et al. (2006) found that neither student ratings of courses nor curricula provided adequate information. It is important to consider the learners' opinions as an indicator for curriculum evaluation (Meira & Kurcgant 2009), it is also important to consider the instructors' views to obtain complete effectiveness of curricula (Spiel et al., 2006).

A dietetics program is based on knowledge, skills, and competencies necessary to provide dietetic services. Dietetic programs should have established outcomes and strict procedures to assess achievement of goals and program effectiveness. Some examples of achievement measures could be program completion rates, graduate school acceptance rates, job placement, and the pass rate on the National Registration Examination for Dietitians (RD exam). In the past, one of the ways that North Dakota State University's (NDSU) dietetics faculty has evaluated the effectiveness of the dietetics program is the passing rate of its students on the RD Exam. However, not all students take the RD Exam immediately following graduation; moreover, some students do not allow their name to be attached to RD Exam results that are sent to NDSU. In addition, one test is not considered a determinant of thorough professional competence. Because of these reasons, the dietetics faculty would like to find another way to evaluate the effectiveness of the dietetic curriculum. The evaluation methods previously mentioned, final examinations and course evaluations, are already used in this curriculum and have been shown to be ineffective ways to evaluate the entire curriculum (Thompson et al., 2009; Spiel et al., 2006; Nasser-Abu & Fresko, 2009). Since pretest-posttest designs are widely used to measure change (Dimitrov & Rumrill, 2003) this method was used as another way to evaluate NDSU's dietetics program.

The Dietetics Program Assessment Tests (Appendix A) pretest is given during the sophomore year during the Introduction to Dietetics course. Dietetics Program Assessment Test covers information that the students will learn through the completion of the program. The Dietetics Program Assessment Test is given as the posttest as well and is administered during the students' senior year to help determine if they learned what

was expected. To the researcher's knowledge, no study has used a pretest-posttest design to evaluate a dietetics college curriculum. With this literature gap, the researcher hopes to find the pretest-posttest design to be an effective way to evaluate curricula. The purpose of this study is to evaluate NDSU's dietetics program through students' understanding and knowledge as demonstrated by the change in their pretest and posttest scores to ensure they are meeting competencies. It is hypothesized that the students will perform significantly better on the posttest compared to the pretest. Those students who do well on the pretest are expected to excel greater than those who do poorer on the pretest. In addition, it is also hypothesized that students who are not accepted into either dietetic program will do poorer on the pretest compared to those who are accepted into a program.

Research Questions

- Is the pretest alone an effective way to select students for the program, to ensure pass rates on the RD Exam? Should the pretest be used as one of the selection criterion for admittance into the program?
- Is there a difference in scores between students in the Coordinated Program in Dietetics (CPD) and Didactic Program in Dietetics (DPD)?
- Is there a difference in pretest scores between those who are not accepted into either program and those who are accepted?
- Do pretest scores predict program course grades?
- Is there a difference between pretest scores in different years?
- Is there an area of dietetics that students are doing poorly on the posttest?

Definitions

Assessment: The ongoing process of gathering, analyzing, and using information from multiple areas to draw inferences about the characteristics of a program for the purpose of making informed decisions to improve the learning process. A program assessment involves assessing the students as a group to determine what and how a program is contributing to the development and learning of the students (Stanford University, n.d.).

Blackboard: A digital course management system for delivering learning content, engaging learners, and measuring their performance (Blackboard Learn, n.d.).

Commission on Accreditation for Dietetics Education (CADE): Accrediting body for education programs that prepare students to begin careers as registered dietitians or registered dietetic technicians. This agency establishes and enforces eligibility requirements and accreditation standards that ensure the quality and continued improvement of dietetics and nutrition education programs (American Dietetic Association, n.d.).

Competency Statements: Competency statements specify what every entry-level dietitian should be able to do or has learned. All competencies must be taught in order for programs to maintain accreditation. These competencies are accredited or approved by CADE (Commission on Accreditation for Dietetics Education, 2008).

Coordinated Program in Dietetics (CPD): This program coordinates the required supervised practice experience and academic courses during the junior and senior years. Acceptance to this program is limited. After graduation the student will be eligible to take the RD Exam (Department of Health, Nutrition, and Exercise Sciences, 2010).

Curriculum: The set of related courses in a specific field of study (Merriam-Webster Dictionary, n.d.).

Didactic Program in Dietetics (DPD): In this program, the student takes the didactic course requirements and graduates with a Bachelor's of Science degree in dietetics. In order to be eligible to take the RD Exam, the student must complete a Dietetic Internship, which is available across the country and ranges in duration from eight to twelve months (Department of Health, Nutrition, and Exercise Sciences, 2010).

Evaluation: The process of gathering, analyzing, and using information from multiple sources to review the value of a program. Evaluation is different from assessment in that it serves to facilitate a program's improvement by examining a variety of outcomes, not by measuring students' skill level on a particular variable (Stanford University, n.d.).

National Registration Examination for Dietitians (RD Exam): National test taken by graduates of an accredited dietetics program following the supervised practice experience. This examination must be passed in order to become a registered dietitian.

Nominal Group Technique (NGT): The NGT is group discussion evaluation method that provides semi-quantitative, ranking-ordered feedback, about a group of learners' perceptions of the aspects of a program or course (Dobbie et al., 2004).

Scantron form: Forms used to collect data, like bubble mark information. Commonly used in higher education to collect basic student or faculty demographic data, campus surveys, class evaluations, or test answers for a multiple choice exam (Scantron, n.d.).

Self-evaluation: Self-evaluation is an evaluation technique in which the instructors rate the quality of their own course or program.

Limitations

This study is not without limitations. Since a pretest-posttest design is used, there are three possible threats to internal validity (history, maturation, and testing) in this research study. However, there was approximately two years between the administration of the pretest and the posttest. Thus, it is unlikely that the students remembered the test questions. Another limitation is the small sample size. Approximately 15-20 students are admitted into the dietetics program per year. This study looked at four years of data, with a total sample size of 127. One-hundred and twenty-two students completed the pretest during the four-year period. In only one of the years did the students complete the posttest (n=22); moreover, only 17 students completed both the pretest and the posttest. Students were asked to self-report their core dietetics course grades. These courses had been taken over the past three years and some students may not remember all of their course grades. This study only examines NDSU's dietetics program and cannot be generalized to dietetics' curricula of other colleges or universities.

CHAPTER 2.

LITERATURE REVIEW

The success of a curriculum is characterized by the way in which it meets stated needs and expectations of society (Thompson et al., 2009). When developing a collegiate curriculum, the faculty has to determine what society needs along with what standards are needed to ensure quality of practicing professionals and then design a curriculum specifically to meet those needs and standards. Society's needs are reassessed later and faculty will continue to move the profession ahead, which makes evaluating the effectiveness of a college curriculum very important (Thompson et al., 2009). For dietetics, society dictates the needs to CADE and CADE develops, creates, and updates the competencies every five to seven years, thus shaping the curriculum that must be taught. If these competencies are not met, the CPD or DPD will not continue to be accredited programs. If the programs are not accredited, then the students will not be able to take the RD Exam, which is what most students plan to do. Evaluation helps define the quality of educational experiences and reveals whether or not a program is meeting its educational goals and objectives (Dobbie et al., 2004).

In the past, one of the ways that NDSU's dietetics faculty has evaluated the effectiveness of the dietetics program is the passing rate of its students on the RD Exam. However, not all students take the RD Exam immediately following graduation; moreover, some students do not allow their name to be attached to RD Exam results that are sent to NDSU. The faculty would also like to have evaluation in a more timely fashion since currently they receive the pass rates semi-annually. Changes are made on a regular basis; however, results of the evaluation are not available until a few years after

the change has occurred which does not help determine if the changes improved passing rates of the RD Exam and/or student knowledge or skills. Because of these reasons the dietetics faculty would like to find a more immediate way in which to evaluate their curriculum. For the past few years the sophomore class has been given pretest covering information they should learn before completion of the program, followed by a posttest given after they have completed the program. This would help in assessing if the students learned what they were expected to learn (and remember). Effectiveness will be more apparent and timely if NDSU's dietetics program's pretest-posttest evaluation method would be an effective, reliable and valid way in which to evaluate the program.

Curriculum evaluation can be taken from many different points of view using a wide variety of methods. The purpose of this review is to describe the common evaluation techniques used in education and establish which way appears to be most effective. This review is organized by topics describing common evaluation techniques: examinations, self-evaluation, group discussion (the Nominal Group Technique), computer-mediated communication and group discussion, course evaluations, and pretest-posttest designs.

Examinations

Curriculum evaluation is necessary because final exam grades are not adequate indicators for skills learned to be transferred into practice (Spiel et al., 2006). It is extremely difficult to assess a student's ability to apply knowledge in a "real world" situation by means of a multiple-choice exam (Thompson et al., 2009). Curricula effectiveness and quality can be indicated by the acquired skills, which are demonstrated in natural settings, not on exams (Spiel et al., 2006). Therefore, the use of exams only

appears to be an ineffective means in which to evaluate courses to measure overall curriculum effectiveness.

Self-evaluation

Self-evaluation or self-assessment is a process that is initiated and carried out by the institution in order to describe and evaluate its own performance. Because of the high cost of external inspection systems, school-based self-evaluations have become more common, especially throughout Europe (McNamara & O'Hara, 2008). Instructors tend to have more positive attitudes about the possible results of self-evaluation than the actual process of self-evaluation (Vanhoof, Van Petegem, & De Maeyer, 2009). Self-evaluation can only work if all team members have a positive attitude toward it, which is often absent because of their reluctance to look critically at their own performance. Self-evaluation is perceived as being time consuming and difficult to carry out (Vanhoof et al., 2009). In addition, Vanhoof et al. (2009) found an unwillingness to carry out self-evaluations; hence self-evaluation may not be one of the best ways to evaluate curricula.

Group Discussion

There are several ways to conduct a group discussion. For this review the Nominal Group Technique (NGT) will be discussed. The NGT is an evaluation method that provides semi-quantitative, ranking-ordered feedback, about a group of learners' perceptions of the aspects of a program (Dobbie et al., 2004). The NGT is a process that involves a small group of students (4-8) writing statements about their learning needs or their experience of the program or course. The comments are then collected by a group leader, read aloud, and prioritized, all while the instructor is absent. The instructor then re-enters the classroom, and the students discuss their points while the instructor is silent

and remains neutral (Kiely, 2003). In this evaluation technique every participant has equal say in generating the ranking ordering of the desired items. Therefore, NGT evaluations recognize factors that are identified by learners as both positive and negative and the capture of the entire group's ranked-ordered opinion of the good and bad aspects of the program or course (Dobbie et al., 2004).

The main advantage of the NGT is that it focuses on student participation rather than faculty interests, reduces the impact of group dynamics and power relations, and encourages equal contribution from group members (Perry & Linsley, 2006). Another strength of the NGT is that it provides a constructive, problem-solving approach that permits equal participation by all group members, avoids the disproportionate influence by vocal students on the group process, and reduces the pressure to conform to the group opinion (Dobbie et al., 2004). Some benefits to the group discussion approach include providing opportunities for subject learning and being time efficient. In addition, the instructor is able to address the issues and converse with the students about the nature and source of the problems immediately (Kiely, 2003). The NGT format can generate a greater number of creative ideas and comments that may be looked over in a single focus group or a simple survey. The NGT requires minimal faculty development because the process is simple and straightforward. Faculty members should be able to conduct a successful NGT evaluation by attending one workshop or training seminar (Dobbie et al., 2004). The NGT has also been found to be reasonably time-efficient method of evaluating new courses (Lancaster, Hart, & Gardner, 2002).

The NGT is not without problems. Faculty must be willing to listen and act on the group feedback. Students may have strong opinions on what they like and dislike, but

their opinions may not correlate with their educational needs (Dobbie et al., 2004). There can be a dominance of knowledgeable and experienced students who feel the current program is working for them, which poses disadvantages to struggling students and does not allow the instructor get to the root of the problem. However, the NGT has been chosen over focus groups because focus groups tend to have more of a dominance of members who may prevent other students from getting their opinions heard (Grant, Berlin, & Freeman, 2003). Another negative of the NGT is that the ranked results from the individual votes represent an average view, rather than a group consensus (Lancaster et al., 2002). A problem also arises if the instructor does not investigate the causes of these problems (Kiely, 2003). Some have found the NGT to be too time consuming, but a modified NGT has been used to combat that problem (Dobbie et al., 2004).

Computer-Mediated Communication and Group Discussion

Computer-mediated communication (CMC) allows a group of individuals to discuss without having to meet face-to-face. One reason CMC could be beneficial for discussion is because it may be anonymous, which may allow individuals who do not generally express their thoughts express them freely, thus yielding greater involvement from all participants. However, a recent review concluded that although anonymous CMC groups perform as well as face-to-face groups, they are less satisfied with the decision-making process (Baltes, Dickson, Sherman, Bauer, & LaGanke, 2002). A study comparing CMC with face-to-face discussion, found that face-to-face group performed better than CMC groups, both quantitatively and qualitatively regarding problem analysis and criteria establishment. In addition, the CMC groups took approximately two times as long to complete a task (Li, 2007). Though CMC for group decision making may be an

efficient and rapid means of disseminating information, it is unlikely the most effective means of making group decisions (Baltes et al., 2002). In addition, as Wilson, Straus, and McEvily (2006) pointed out, the majority of studies examining decision making in a computer-mediated context do not consider temporality as a measurable variable. Thus, more recent literature indicates that decision making in a computer mediated environment may be as effective as face-to-face group decision making over time (Wilson, Straus, & McEvily, 2006), depending on the type of task to be carried out (Alge, Wiethoff, & Klein, 2003).

Course Evaluations

Course evaluations are one of the most common ways that college faculty evaluate their own instruction and the course. Although student ratings provide a common base for judging quality, there are a number of reasons why this may be an ineffective means of evaluation. Some instructors feel that students are unqualified to give valid assessments of their instruction and think that students do not take the evaluations seriously (Nasser-Abu Alhija & Fresko, 2009). Even students have questioned the usefulness and appropriateness of the teacher evaluation (Greimel-Fuhrmann & Geyer, 2003). Students are also more likely to respond more positively than negatively on these evaluations (Nasser-Abu Alhija & Fresko, 2009), so areas that the instructor can improve on may not be discussed. However, some dietetics instructors have stated that dietetics students are more critical on course evaluations and respond more negatively than positively. Unfortunately, no literature was found to confirm this observation from the faculty at NDSU.

A review by Spiel et al. (2006) stated that neither student ratings of courses or curriculum can provide adequate information. Although it has been perceived to consider the learners' opinions as a valuable indicator for curriculum evaluation (Meira & Kurcgant, 2009), it is also important to consider the instructors' views to obtain complete effectiveness of curricula (Spiel et al., 2006). Students do not necessarily know what they should know or understand before they enter the professional work force.

The halo effect is the "tendency to let our assessment of an individual on one trait influence our evaluation of that person on other specific traits". It has been found that the halo effect has an impact on the way in which the students complete evaluation forms. This halo effect does not occur with open-ended evaluations, but are more common in evaluations in which Likert scales are used, thus showing that students respond differently to different styles of evaluation forms (Darby, 2007). This halo effect has been found to exist when measuring teaching effectiveness through student ratings (Shevlin, Banyard, Davies, & Griffiths, 2000).

Students' evaluations may be reflected by their grades in the course. Spooen and Mortelmans (2006) found better students give higher ratings on teaching effectiveness; however, the researchers concluded that there was some value to student evaluations since students also rewarded good teachers with higher ratings on several scales of teacher performance. Nevertheless, others have found that student ratings may be biased, but mainly reflect the teachers' subject-oriented behavior in class (Greimel-Fuhrmann & Geyer, 2003). Students also appear to be inconsistent in their evaluations (Obenchian, Abernathy, & Wiest, 2001). Obenchian et al., (2001) found that instructors, who were perceived as enthusiastic, good-humored and warm, fared better on student evaluations.

Because of this it has been recommended to use multiple measures to evaluate teaching effectiveness.

Student ratings are an important source of evidence regarding teaching effectiveness for formative and summative assessments, but are not a sufficient source for summative decisions (Berk, 2005). Student feedback is essential for quality assurance of the institution and is the students' democratic right. However, student feedback is not to be fully trusted because the instructors feel that students do not take the feedback seriously enough (Nasser-Abu Alhija & Fresko, 2009; Smith & Welicker-Pollak, 2008).

Pretest-Posttest Designs

Pretest-posttest designs are widely used for the purpose of measuring change (Dimitrov & Rumrill, 2003). The basis of using a pretest-posttest design is if the posttest (given after some sort of intervention) score is considerably higher than the pretest score, a change has occurred in whatever the researcher was trying to measure (Drennan & Hyde, 2008). A one-group pretest-posttest design has been used to measure the effectiveness of educational activities (Fernandez & Delaney, 2004). The use of the pretest-posttest design to measure student performance was also found to be effective (Davis, Kvern, Donen, Andrews, & Nixon, 2000).

Although pretest-posttest designs are by no means flawless, having a pretest score does help decrease error in variance, thus creating more influential tests than designs with no pretest data (Dimitrov & Rumrill, 2003). There are many different types of pretest-posttest designs, such as, randomized control-group pretest-posttest design, randomized Solomon four-group design, and nonrandomized control group pretest-posttest design, all

of which have their own advantages, disadvantages and threats to internal and external validity (Dimitrov & Rumrill, 2003).

Several studies have used the pretest-posttest design to test students' knowledge (Nobel, Nelson, Sutingco, Marill, & Cranmer, 2007; Roscoe, Schonwetter, & Wallach, 2005). Even though the differences between pretest and posttest scores to assess the students' knowledge gained throughout a dental didactic program has been carried out (Pilcher, Charles, & Lancaster, 2008), no studies, to the researcher's knowledge, have been conducted that examined a longer curriculum (more than one year) or a dietetics curriculum.

Summary

Even though a variety of ways have been proposed to evaluate curricula, no common model or format is used, because of the differences in each college or university (Chen et al., 2009). This review addressed several different ways to evaluate curriculum. Individual examinations, self-evaluations, and course evaluations were found to be ineffective as means to evaluate curricula (Spiel et al., 2006; Vanhoof et al., 2009). Group discussion through the NGT may be an option, although if it is not carried out correctly in its entirety, it too seems not to be the best possible choice (Kiely, 2003). Moreover, many years would be needed to have enough students participate in the NGT to get an accurate assessment of the program. By then the curriculum and faculty may have changed. NDSU dietetics faculty have used a computer-mediated group decision making process to receive feedback about the programs from the seniors before graduation and they are expected to continue to do so; however, this evaluation technique would not likely give them a valid overall assessment of either program. A pretest-posttest design appears to be

an effective way to evaluate NDSU's dietetics program, especially since some pretests have been taken by several students over the past few years. However, no research report was found on the use of pretest-posttest data to evaluate a dietetics college curriculum or on a curriculum that lasted longer than one year. With this literature gap, it is worth future studies to determine if the pretest-posttest design would be an effective way to evaluate curricula.

CHAPTER 3.

MATERIALS AND METHODS

The purpose of this study was to measure the effectiveness of NDSU's dietetics program. The effectiveness was assessed by comparing students' Dietetics Program Assessment Test pretest scores, taken during sophomore year, with their Dietetics Program Assessment Test posttest scores, taken during senior year. This evaluation was used to determine if pretest scores predict program course grades or if high pretest results indicate a more successful student and the scores could be used as a selection criterion for acceptance into the dietetics program. Results from students in the Coordinated Program in Dietetics (CPD) were compared to those in the Didactic Program in Dietetics (DPD) and those not accepted into either program to see if there is a difference between the groups. The Dietetics Program Assessment Test was also divided into dietetics core content areas to see if there was an area that students were scoring poorly. Differences in pretest scores between years were also tested. The original purpose of the Dietetics Program Assessment Test pretest was to assess where the students were, as a group, at the start of their didactic program. This was the first step in the university mandated assessment of the program in 2006.

Population Sample and Sampling Procedures

Participants in this study were pre-dietetics students at NDSU. Sophomore students, who are interested in the dietetics program, took the pretest in the Introduction to Dietetics course, and seniors who finished the program took the posttest during their final semester. All students are required to take the Dietetics Program Assessment Test; therefore, participants were not recruited for this study. Senior participants were asked to

identify which dietetic program they are enrolled in, either the CPD or the DPD, to compare if the student results in one of these programs were different. For the pretests, a dietetics instructor identified which students were not accepted into the program, to compare these students' scores with those who were accepted into a program. Other demographic information about the participants was not necessary, since demographic information is not considered a factor for the outcome of this study. Pre-existing pretest scores were used bringing the total number of participants to 127.

Data Collection

The instrument used in this study, the test, was used as both the pretest and posttest. With two years between each test, the testing effect should not be a threat to internal validity. Dietetics Program Assessment Test had face validity since each instructor in the dietetics program at NDSU contributed questions to the test regarding their particular area of expertise (community nutrition, clinical/medical nutrition therapy, foodservice, basic nutrition/lifespan and management). The Dietetics Program Assessment Test consists of 50 multiple choice questions about information that the students should or will learn throughout the dietetics program. All students completed a Scantron form for the pretest. The researcher administered the posttest to the DPD students who completed a Scantron form for the test. The CPD students completed the posttest on Blackboard. The test took the students about one hour to complete. All pretest and posttest scores were analyzed. Since students take the pretest before they were admitted to the program there are more pretest scores compared to posttest scores. Additionally, in only one year out of the four did the students take the posttest. Pretest scores without matching posttest scores were still included in the overall pretest mean. It

was expected that the students should earn significantly better scores on the posttest compared to the pretest. Instructors anticipated seeing the mean posttest score to be above 80 percent. No specific average score for the pretest was predicted, since it is unknown whether students who perform poorer on the pretest excel in the dietetics program or those who do well on the pretest do better in the program. If participants perform better on the posttest compared to the pretest according to the established goals, this part of the curricula evaluation will be seen as a success.

Research Design

This study used a one group pretest-posttest design. The students take the pretest before entering the dietetics program. Following the application and interview process some of these students are accepted into either the CPD or DPD. After completing their required courses, the students take the posttest as seniors. This study is not randomized because all students are required to take the pretest and posttest regardless of whether the results were to be analyzed or not. Since pretests and posttests are used, the participants act as their own controls. The pretest has been administered to previous classes of dietetics students and their pre-existing pretest scores were used to increase the strength of this evaluation. It is expected that students will perform significantly better on the posttest compared to the pretest. If not, the dietetics curriculum may need to undergo a more extensive assessment to determine why students are not learning what they need to be in order to pass the RD Exam.

Procedures

Approval from the Institutional Review Board for the Protection of Human Participants in Research at NDSU (Appendix B) was given to this study. Students were

required to take the Dietetics Program Assessment Test pretest and posttest, during classtimes of the sophomore and senior year, regardless of whether the results were analyzed. The only change was that the test results were now evaluated on an individual basis and collectively. Pretests were administered in the fall semester to sophomore students and the posttests were given during the final year to all of the seniors in the dietetics program. Existing pretest scores from 2006 through 2008 were also examined.

Students gave informed consent (Appendix C) to have their test scores analyzed. Each student was either given a test and a Scantron form and placed his or her name on it or took the test via Blackboard. The seniors also marked which dietetic program they were enrolled in and reported their core dietetics course grades. The test took the students one hour to complete. After the tests were completed, the Scantron forms were sent to Information Technology Services for scoring. The data were then analyzed and students test scores were compared.

Analysis

Data from pretest and posttest score results were analyzed using SAS 9.2 software (Statistical Analysis System, Cary, NC). An ANOVA test was conducted to examine differences in pretest scores between different years. Tukey-Kramer was adjusted with this method for ANOVA, providing for more conservative confidence limits. A paired t-test was performed to compare individual pretest score with the corresponding posttest score. A t-test was used to compare posttest scores between the DPD and CPD. To compare pretest and posttest scores by individual question, an exact McNemar's test was conducted for each question. An exact Kendall's Tau test was conducted to examine the association between pretest score and course grades. Finally, another ANOVA test was

performed to compare pretest scores between those who were not accepted into either program, those accepted into the DPD and those accepted into the CPD. Statistical significance was established a priori at $\alpha = 0.05$.

CHAPTER 4.

RESULTS

Overall 122 students completed the pretest. As seen in Table 1, there were 23 students in 2006 with seven eventually being accepted into the Coordinated Program in Dietetics (CPD), eight in the Didactic Program in Dietetics (DPD), and eight not being accepted into either program. In 2007, 30 students completed the pretest, 15 CPD students, six DPD students, and nine students who were not accepted into either program. In 2008, a total of 37 students completed the pretest (13 CPD, ten DPD, and 14 who were not eventually enrolled into either program). Finally, in 2009 the pretest was completed by 32 students, 11 were eventually accepted into the CPD, five were eventually accepted into the DPD, and 16 students were not enrolled in either program.

Table 1. Number of Students Taking the Pretest

Year	CPD Students	DPD Students	No program	Total Students
2006	7	8	8	23
2007	15	6	9	30
2008	13	10	14	37
2009	11	5	16	32

Overall, there was a significant difference between pretest scores among different years ($p=0.0398$). After further analysis, this difference only existed between the years of 2006 and 2009 for pretest scores ($p=0.0273$) (Table 2).

Table 2. Comparing Pretest Means between Years

Year	2006	2007	2008	2009
2006		0.5165	0.6877	0.0273*
2007	0.5165		0.9840	0.4127
2008	0.6877	0.9840		0.4127
2009	0.0273*	0.4127	0.1957	

*significant at $\alpha < 0.05$

A Kendall's Tau test was used to examine associations between pretest scores and self-reported course grades. As seen in Table 3, the only course that had a significant association was Food Selection and Preparation Principles (HNES 261) ($p=0.0324$), (Table 3) which shows that as pretest rank was higher, course grades were also higher.

Table 3. Association between Pretest Score and Course Grades

Course	P-value
Metabolic Basis of Nutrition (HNES 351)	0.4620
Community Health and Nutrition Education (HNES 442)	0.5235
Food Selection and Preparation Principles (HNES 261)	0.0324*
Introduction to Medical Nutrition Therapy (HNES 354)	0.4047
Food Production Management (HNES 361)	0.4263
Athletic Training Medical Terminology I (HNES 260)	0.9706
Advanced Medical Nutrition Therapy (HNES458)	0.8281
Food Service Systems (HNES 460)	0.2160
Upper Level English Course	1.0000

*significant at $\alpha < 0.05$

As seen in Table 4, the pretest mean was 44.70 (which is out of 100 total points) and the standard deviation was 7.42 in 2006. The pretest mean in 2007 was 47.80 with a standard deviation of 7.40. In 2008, the pretest mean was 47.08 and the standard deviation was 9.09. Finally, the pretest mean in 2009 was 51.00 with a standard deviation of 8.11. The 2010 posttest mean was 74.09 and the standard deviation was 7.57. These are the same students who took the pretest in 2007.

Table 4. Pretest and Posttest Means

Year	N	Pretest Mean*	Pretest Standard Deviation	Posttest Mean*	Posttest Standard Deviation
2006	23	44.70	7.42		
2007	30	47.80	7.40		
2008	37	47.08	9.09		
2009	32	51.00	8.11		
2010	22			74.09	7.57

*Scores out of 100 points

As seen in Table 5, there were 45 students who were not accepted into either program. The 'No Program' group's mean pretest score was 46.09 with a standard deviation of 8.78. Forty-six students who were accepted into the CPD had a pretest score mean of 50.43 and a standard deviation of 7.69. The 29 students who were eventually accepted into the DPD had a pretest mean of 46.41 with a standard deviation of 7.90.

Table 5. Pretest Means between Programs

Program Type	N	Mean	Standard Deviation
No Program	45	46.09	8.78
CPD	46	50.43	7.69
DPD	29	46.41	7.90

Overall, there was a significant difference between pretest scores between programs ($p=0.0252$). After further analysis, this difference was only significant between pretest scores of those eventually accepted into the CPD and those who were not accepted into either program ('No Program') ($p=0.0331$) (Table 6). The CPD pretest mean was higher than the 'No Program' pretest mean.

Table 6. Comparing Pretest Means between Programs

Program	No Program	CPD Program	DPD Program
No Program		0.0331*	0.9847
CPD	0.0331*		0.0991
DPD	0.9847	0.0991	

*significant at $\alpha < 0.05$

A total of 22 students completed the posttest in 2010, 15 of which were in the CPD and seven completed the DPD. Because not all students took the pretest, only 17 students took both the pretest and the posttest.

Overall, there was a highly significant difference between pretest scores and posttest scores ($p < 0.0001$). The posttest mean was 24.12 points greater than to the pretest mean.

As seen in Table 7, the CPD students' mean posttest score was 75.00 with a standard deviation of 8.40 and standard error of 2.25. The DPD students' mean posttest score was 72.29 with a standard deviation of 6.47 and standard error of 2.44. There was not a significant difference between posttest scores of those in the CPD and DPD ($p = 0.4263$).

Table 7. Comparing Posttest Scores between CPD and DPD

Program	N	Mean	Std Dev	Std Err	P-value
CPD	14	75.00	8.40	2.25	
DPD	7	72.29	6.47	2.44	
					0.4263

Pretest scores and posttest scores were compared regarding each question to see if there was a significant change, whether an increase or decreases, from pretest to posttest. Food service questions four ($p = 0.0020$) and nine ($p < 0.0001$) had a significant increase in correct responses from pretest to posttest. As seen in Table 8, the only basic nutrition/lifespan questions that were significant were questions 12 ($p = 0.0215$) and 17 ($p = 0.0156$). Question 12 correct responses increased from pretest to posttest and question 17 correct responses decreased from pretest to posttest. The following medical nutrition therapy/clinical questions all had a significant increase from pretest to posttest: 21 ($p = 0.0078$), 35 ($p < 0.0001$), 37 ($p < 0.0001$), and 38 ($p = 0.0078$). Only two management related questions had a significant increase from pretest to posttest: numbers 26 ($p = 0.0078$) and 27 ($p < 0.0001$). Finally, the community nutrition related questions that

were significant were numbers 44 ($p=0.0156$), 47 ($p=0.0313$) and 50 ($p=0.0391$), all of which increased from pretest to posttest.

Table 8. Comparing Pretest and Posttest Answers by Individual Question Based on 2007-2010 data

Question Number	Type of Question	P-value	Number Correct Pretest	Number Correct Posttest
1	Food Service	0.2188	11	15
2	Food Service	1.0000	11	11
3	Food Service	1.0000	15	15
4	Food Service	0.0020*	1	11
5	Food Service	NA	15	17
6	Food Service	1.0000	3	4
7	Food Service	0.2266	5	10
8	Food Service	0.1250	10	15
9	Food Service	<0.0001*	0	12
10	Food Service	0.5000	17	15
11	Basic Nutrition/Lifespan	0.2188	9	13
12	Basic Nutrition/Lifespan	0.0215*	8	16
13	Basic Nutrition/Lifespan	NA	17	17
14	Basic Nutrition/Lifespan	0.1250	10	15
15	Basic Nutrition/Lifespan	NA	17	17
16	Basic Nutrition/Lifespan	0.1250	3	8
17	Basic Nutrition/Lifespan	0.0156*	10	3
18	Basic Nutrition/Lifespan	0.0313	10	16
19	Basic Nutrition/Lifespan	0.2188	11	15
20	Basic Nutrition/Lifespan	0.1250	7	12
21	Medical Nutrition Therapy/Clinical	0.0078*	8	16
22	Management	NA	14	17
23	Management	1.0000	9	10
24	Management	1.0000	17	16
25	Management	0.1250	6	11
26	Management	0.0078*	7	15
27	Management	<0.0001*	5	16
28	Medical Nutrition Therapy/Clinical	0.6250	14	16
29	Medical Nutrition Therapy/Clinical	0.1094	7	13
30	Medical Nutrition Therapy/Clinical	0.6875	14	12
31	Medical Nutrition Therapy/Clinical	0.4531	10	13
32	Medical Nutrition Therapy/Clinical	1.0000	5	6
33	Medical Nutrition Therapy/Clinical	NA	11	17
34	Medical Nutrition Therapy/Clinical	1.0000	14	14

Table 8. (continued)

35	Medical Nutrition Therapy/Clinical	<0.0001*	3	16
36	Medical Nutrition Therapy/Clinical	0.1797	3	8
37	Medical Nutrition Therapy/Clinical	<0.0001*	5	16
38	Medical Nutrition Therapy/Clinical	0.0078*	6	14
39	Medical Nutrition Therapy/Clinical	0.6875	7	9
40	Basic Nutrition/Lifespan	0.4531	11	14
41	Basic Nutrition/Lifespan	0.3750	3	6
42	Medical Nutrition Therapy/Clinical	1.0000	7	7
43	Medical Nutrition Therapy/Clinical	0.6250	11	16
44	Community Nutrition	0.0156*	0	9
45	Community Nutrition	0.1250	8	15
46	Community Nutrition	0.6875	8	8
47	Community Nutrition	0.0313*	5	14
48	Community Nutrition	1.0000	1	1
49	Community Nutrition	1.0000	7	8
50	Community Nutrition	0.0391*	5	15

*significant at $\alpha < 0.05$

NA= Test statistic could not be computed

As seen in Figure 1., the average percentage for correct answers for the community nutrition pretest questions was 34.6% and the posttest mean was 61.0%. The average percentage for the medical nutrition therapy/clinical pretest questions was 48.7% and 75.5% for the posttest questions. The food service questions had an average pretest average of 48.0% and posttest average of 77.3%. Basic nutrition/lifespan average percentages were 52.4% for the pretest and 73.69% for the posttest. Finally, the management questions had percent averages that were the highest for both the pretest (54.0%) and the posttest (81.1%).

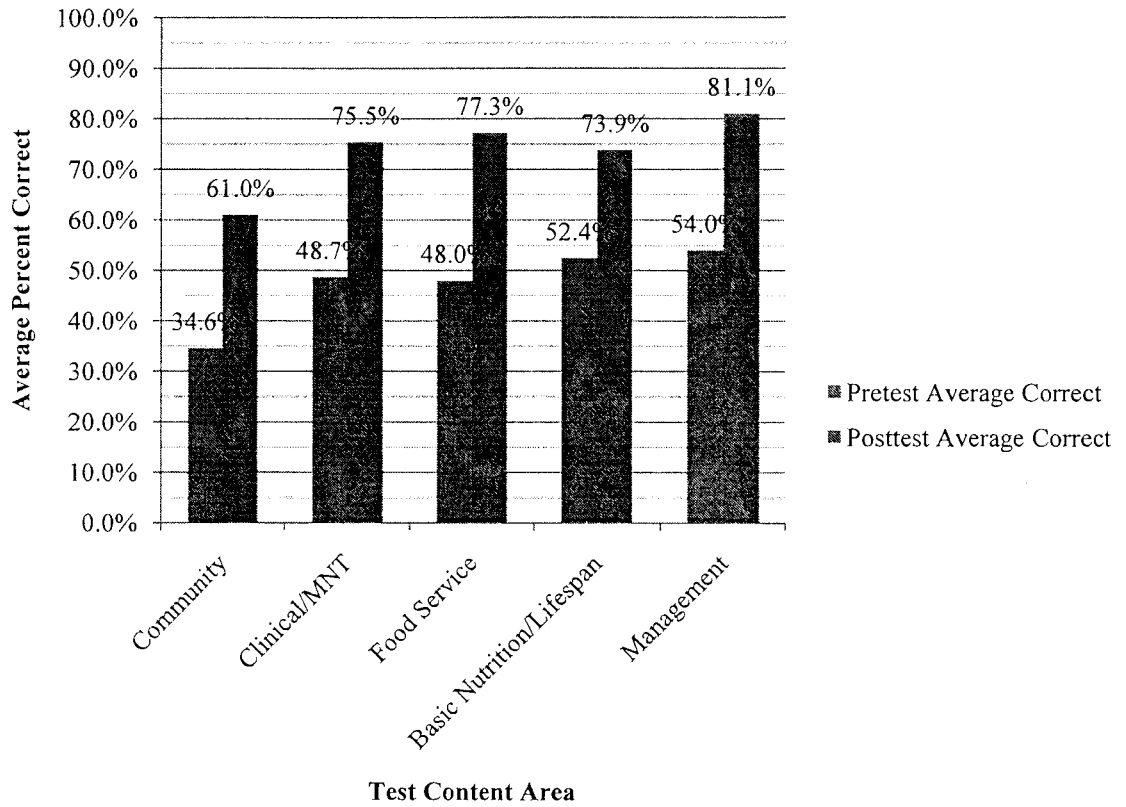


Figure 1. Average Percentage Correct on Pretest and Posttest by Subject Content Area

CHAPTER 5.

DISCUSSION

Pretest-posttest designs are widely used for the purpose of measuring change (Dimitrov & Rumrill, 2003). The use of the pretest-posttest design to measure student performance has been found to be effective (Davis et al., 2000). Several studies have used the pretest-posttest design to test students' knowledge (Nobel et al., 2007; Roscoe et al., 2005). No research reports were found on the use of pretest-posttest data to evaluate a dietetics college curriculum or on a curriculum that lasted longer than one year. It is likely that the pretest-posttest design has been used to evaluate curricula; however, the results were likely not published. Therefore, this research is unprecedented.

There was a significant difference between different years of pretest scores. After further analysis, this difference only existed between the years of 2006 and 2009 for pretest scores. This could be explained by possibly higher science or overall GPAs of the students in the 2009 pretest group. The pretest scores were the highest among the 2009 pretest group and the lowest in the 2006 pretest group with the scores increasing from 2006 to 2007, decreasing very slightly from 2007 to 2008 and then increasing again in 2009.

Dietetics Program Assessment Test pretest scores were compared with self-reported course grades to determine if there was an association between the two. The only course that had a significant association was Food Selection and Preparation Principles (HNES 261), which shows that as pretest scores were higher course grades were also higher. The majority of the students in this analysis did receive an A in this course, whereas in other courses there was more variety in course grades.

Overall, there was a significant difference between pretest scores between programs (CPD, DPD, and No Program). After further analysis, this difference was only significant between pretest scores of those eventually accepted into the CPD and those who were not accepted into either program. Those in the 'No Program' group may have been students who were not accepted into the program because they were not as well qualified as those who were accepted into either the DPD or CPD. On the other hand, those 'No Program' group students may have chosen not to apply to either program because he/she decided to change majors or was accepted into a different program like pharmacy, for example.

It is not unexpected that there was not a significant difference in pretest scores between those students eventually accepted into the DPD and those ultimately accepted into the CPD. Students are encouraged to apply to both programs if either program is suitable to the students needs. Competition into the CPD is strong since the number of students that the program is able to serve is limited to 15. If a student applies to both programs and is not accepted into the CPD, he/she may still be accepted into the DPD. This practice may make it appear that students in the DPD are not as competent as students admitted to the CPD program. However, some students who are highly qualified for either program may choose only to apply to the DPD for other reasons (e.g. being able to have a more flexible course schedule to receive a double major or a minor or wanting to move out of the area to get a different supervised practice experience). It is possible that either those not as competent DPD students who were not accepted into the CPD program and the highly qualified DPD students who did not apply to the CPD program may have evened each other out with their pretest scores. Or, those not as competent DPD

students are more similar in the beginning with all other students than what was thought and the pretest score did not predict students being accepted into a program or not.

The CPD students would be expected to excel on the posttest. By the time they have taken the posttest, they would have completed all of their coursework, their supervised practice hours, and are eligible to take the RD Exam following graduation. There was no significant difference between posttest scores of those in the CPD and DPD. The mean posttest scores between the CPD students and DPD students were quite similar (mean score of 75.00 for CPD students and 72.29 for DPD students). This is not surprising for the reasons stated above about the different types of DPD students (those not as qualified to be accepted into the CPD and are accepted into the DPD as a default and those who only want to be accepted into the DPD).

There was a highly significant difference between individual mean pretest scores and posttest scores, which means students' knowledge about the area of dietetics has greatly improved through courses throughout each program. The mean posttest score did not meet the faculty's goal, which was an 80 percent out of 100 percent.

Only 13 questions (26%) were significant when pretest scores and posttest scores were compared regarding each question. In all of the questions, except question 17, the number of correct responses increased from pretest to posttest. There are approximately similar amounts of significant questions in each subject area. Community nutrition has a higher ratio of significant differences between pretest and posttest (three significant questions to only seven total questions).

When looking at the percentage correct answers by test content area, community nutrition had the lowest percentage correct on the pretest (34.6%) and the posttest

(61.0%). This could be explained because the community nutrition questions were the last section of questions on the test. A few students did not answer these questions on the posttest possibly because they were out of time or did not realize that there was another page to the test, which could be why there is greater significance with these questions. Additionally, community nutrition is only one course and is one of the first courses that students are enrolled in when entering the program. Whereas, the other courses build on one another and fit into one of the content areas (for example, the Medical Nutrition Therapy/Clinical content area is made up of the courses of Metabolic Basis of Nutrition (HNES 351), Introduction to Medical Nutrition Therapy (HNES 354), and Advanced Medical Nutrition Therapy (HNES 458), and the Management content area is composed of Food Service Systems (HNES 460) and Food Production Management (HNES 361)). It is possible by the time of the posttest, students have forgotten some information they have learned in the community nutrition course because it was a year and a half earlier. The information that the students learned in this course was not as likely to be applied throughout the students' coursework until students applied the information in during their supervised practice experience.

All of the content areas had a similar improvement from pretest to posttest, roughly a 25 percentage point increase. Since no one area appears to be lacking more than any other, it would appear that the students are learning from all courses and are not necessarily struggling in one or two courses or excelling greatly in another.

CHAPTER 6.

CONCLUSION

There was a highly significant difference between individual mean pretest scores and posttest scores, which means students' knowledge about the content areas of dietetics has greatly improved through courses throughout each program. Since participants perform better on the posttest compared to the pretest according to the established goals, this part of the curricula evaluation was seen as a success.

There was no significant difference between posttest scores of those students in the CPD and DPD. Additionally, since no one area appears to be lacking more than any other it would appear that the students are learning from all courses and are not necessarily struggling in one or two courses or excelling greatly in another.

Course grades were only associated with Food Selection and Preparation Principles (HNES 261), which shows that as pretest scores were higher course grades were also higher. Due to the lack of association between all core dietetics course grades and pretest scores along with the small sample size, pretest scores should not currently be used alone or as one of the selection criterion for admittance into either dietetics programs.

No research reports were found on the use of pretest-posttest data to evaluate a dietetics college curriculum or on a curriculum that lasted longer than one year. With this literature gap, it is worth future studies to determine if the pretest-posttest design would be an effective way to evaluate curricula. Future studies should also focus on which areas dietetics students have a more difficult time in during their didactic coursework.

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APPENDIX A. SURVEY INSTRUMENT

Dietetics Program Assessment Test

1. In evaluation of food quality, subjective tests are:
 - a. evaluations of food quality that rely on numbers generated by laboratory instruments used to quantify physical and chemical differences in food
 - b. evaluations of food quality based on sensory characteristics and personal preferences as perceived by the five senses
 - c. conducted by a six-person panel and then graded for accuracy with respect to the food characteristic
 - d. as scientifically sound compared to objective tests regarding food characteristic data

2. The percentage yield in food preparation is the:
 - a. plate weight divided by plate plus food
 - b. ratio of inedible to edible or wasted food
 - c. ratio of edible to inedible or wasted food
 - d. raw weight minus plate waste divided by raw weight

3. The amount of time needed for preparation is the key to efficient meal planning, which begins with:
 - a. changing recipes to adjust cooking time
 - b. determining the baking time of the longest-baking items
 - c. determining the time the meal is to be served
 - d. timing all recipes and dividing the total time by the number of recipes

4. The prime physical factor in food spoilage is:
 - a. enzymes
 - b. microorganisms
 - c. parasites
 - d. water loss

5. The component in milk that is most easily altered is the:
 - a. carbohydrate content
 - b. fat content
 - c. mineral content
 - d. protein content

6. Dry heat cookery methods
 - a. are best for pork cookery
 - b. include deep fat frying and barbecuing
 - c. are appropriate for a less-tender cut of meat such as round
 - d. cause elastin components of meat to soften
 - e. a and b

7. A chicken salad recipe used 4 pounds of celery. What is the cost of the celery needed if the purchase price is \$.40 per pound and the yield factor is .83?
 - a. \$1.93
 - b. \$1.33
 - c. \$1.60
 - d. \$1.53

8. Which of the following is not an example of a critical control point in HACCP?
 - a. heating poultry
 - b. serving cream soup
 - c. storage of meat
 - d. consumption of food
 - e. washing & cutting vegetables

9. A disher (scoop) is a portion control tool with a numbered label. The number on the scoop indicates?
 - a. ounces per quart
 - b. servings per quart
 - c. servings per pound
 - d. ounces per serving

10. In egg purchasing, which information is standardized for food service:
 - a. Number of eggs per flat
 - b. Number of ounces in standardized size of egg (e.g. large, medium, etc.)
 - c. Grading
 - d. All of the above

11. All of the following factors are known to enhance the absorption of iron except:
 - a. MFP factor
 - b. stomach acid
 - c. ascorbic acid
 - d. calcium from milk

12. Which of the following is a characteristic of cholesterol?
- It is absorbed directly into the blood
 - It is a precursor for bile and vitamin D synthesis
 - It is not formed in the body when provided by the diet
 - It is found in abundance in tropical fats such as palm oil
13. Which of the following food proteins has the best assortment of essential amino acids for the human body?
- corn
 - rice
 - egg
 - gelatin
14. What is the primary site for absorption of nutrients?
- Crypt
 - Villus
 - Microvillus
 - Macrovillus
15. Which of the following substances is converted to vitamin A in the body?
- cholesterol
 - chlorophyll
 - xanthophyll
 - beta-carotene
16. Infants weighing _____ are least likely to die within the first year of life.
- 5 lbs 11 oz to 6 lb 5oz
 - 6 lbs 10 oz to 7 lbs 2 oz
 - 7 lbs 12 oz to 10 lbs
 - 8 lbs 8 oz to 10 lbs 2 oz
17. Which of the following is one of the most common causes of death today in the United States for the elderly?
- influenza
 - stroke
 - tuberculosis
 - pneumonia

18. Vitamin D status in the elderly is not dependent on:
- milk in diet
 - fruit juice in diet
 - season of the year
 - ethnic background
19. Which of the following side effects are common with Anorexia Nervosa?
- infertility
 - dehydration
 - throat problems
 - increased dental carries
20. Obesity increases the risk of all of the following except:
- Heart Disease
 - Gallstones
 - Cancer
 - Osteoporosis
 - Diabetes Mellitus
21. Malabsorption of Vitamin B12
- causes iron deficiency anemia
 - is commonly reversed by giving doses of B12 not to exceed the DRI's
 - is related to the amount of intrinsic factor produced in the gut
 - is rare among developed countries
22. A reduction in labor costs is likely to occur in which of the following situations?
- a restaurant increases the number of items served on its menu
 - a country club increases the benefits offered to employees
 - a hospital incorporates the use of more convenience food items
 - a school adds service of a breakfast program
23. Federal laws stipulate that restaurant employees who clear tables in the dining room must be at least ____ years of age.
- 13
 - 14
 - 15
 - 16

24. The Americans with Disabilities Act requires that:
- all persons with disabilities who apply for a job be hired
 - equal consideration be given to disabled applicants who meet job qualifications
 - persons with disabilities who meet some but not all qualifications be hired
 - special accommodations be made for all persons with disabilities who apply
25. The most important factor to consider when selecting hot food preparation equipment is:
- the facilities staff size
 - its versatility for cooking different foods
 - the amount of ventilation it requires
 - the specifics of the facilities menu
26. The most important aspect of the marketing mix is:
- place
 - product
 - promotion
 - price
27. The primary control in your foodservice operation is/are;
- labor costs
 - food costs
 - energy costs
 - the menu
 - equipment purchases
28. Which of these observations noted during a routine nutritional screening would warrant further assessment?
- weight gain of 2 lbs. in seven days
 - unintentional weight loss of 10% or more in the past 6 months
 - refusal to eat breakfast
 - increased consumption of food served
29. A glucose tolerance test may be performed
- intravenous injection of glucose
 - by oral consumption of a glucose drink
 - by consumption of a carbohydrate-rich meal
 - by all of the above
 - by both a and b

30. Which of the following classes (stages) of congestive heart failure is the worst?
- inability to carry on physical activity without chest pain
 - no undue symptoms with ordinary daily activities and no limitation with recreational activities
 - slight limitation with recreational activities
 - marked limitation with recreational activities
31. The nutritional history and the diet history differ in that
- the diet history includes detailed information about intake for a minimum of 7 days
 - the nutrition history includes a diet history, clinical findings, and laboratory data
 - the nutrition history is done by the physician while the diet history is done by the dietitian
 - the diet history is usually not accurate
32. During acute illness or trauma:
- negative acute-phase respondents rise
 - positive acute-phase respondents decrease
 - negative acute-phase respondents decrease
 - acute-phase proteins all rise in the same proportion
33. The rate of weight loss for men on energy-deficient diets is more rapid than for women because men
- generally have less fat to lose
 - are more successful at weight reduction programs
 - have higher RMR and LBM than women
 - are more likely to exercise while trying to lose weight
34. Possible mechanisms by which fruit and vegetable intake may alter cancer risk include which of the following?
- Fruits and vegetables contain naturally occurring antioxidants with protective effects.
 - Fruits and vegetables have substances such as flavonoids, phenols, and lignins with anti-arcinogenic properties.
 - Phytoestrogens, such as soy, are metabolized by gut bacteria into active antitumor agents.
 - All of the above are correct.

35. Which patient would most likely need parenteral nutrition? A patient with
- severe acute pancreatitis
 - HIV/AIDS
 - failure to thrive
 - oral or esophageal trauma
36. Alterations in metabolism secondary to critical illness or sepsis include all of the following except:
- use of fatty acids for energy.
 - increased metabolic rate.
 - increased blood glucose concentration due to increased glucose production or insulin resistance.
 - decreased ureagenesis and nitrogen loss.
37. When fat malabsorption is manifested with diarrhea, it may be helpful to use
- polyunsaturated fats in the diet
 - a fat-free diet
 - a low-fat diet and MCT oil
 - a larger dosage of vitamin supplements
38. In patients with diarrhea resulting from AIDS enteropathy, absorption may be satisfactory with the use of a
- standard enteral formula
 - chemically defined enteral formula
 - blenderized diet
 - diet with whole protein and complex carbohydrates
39. A urinary urea nitrogen excretion in excess of 15 g/day in the stressed patient is an indication of
- starvation
 - positive nitrogen balance
 - mild stress
 - severe stress

40. Two functions of protein in the body are:
- catabolism to glycogen and synthesis of triglycerides for storage
 - catabolism to glycerol and fatty acids for storage and synthesis of new proteins
 - maintenance of the body's supply of amino acids and conversion of protein to glucose for energy
 - anabolism of glucose to glycogen for storage and conversion of protein to fat for energy
41. During exercise, which of the following contributes only minimally to the amount of ATP used by working muscles?
- muscle glycogen
 - blood glucose
 - plasma fatty acids
 - oxidation of amino acids
42. Within the lamina propria, lying just below the epithelium, is the mucosa-associated lymphoid tissue which
- controls secretion from the mucosal glands
 - contains white blood cells and protects against ingested microorganisms
 - initiates peristalsis
 - secretes mucus, hormones and digestive juice into the lumen
43. Patients with what in-born error of metabolism should avoid nutrasweetened products?
- maple-syrup urine disease
 - phenylketonuria
 - homocystinuria
 - cystathioninuria
44. Which of the following is **not** an entitlement program?
- Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)
 - School Lunch Program
 - Food Stamp Program
 - School Breakfast Program
45. What type of objective is the following: To reduce the prevalence of skip breakfast syndrome by 10% within one year in 10,000 hometown residents.
- process
 - outcome
 - structure
 - input

46. Characteristics of goals include all of the following except:
- they are broad statements of desired changes
 - they provide a general direction for the program
 - they are specific, measurable actions to be completed.
 - they are the second step in the program planning process
47. The belief that one can make a behavior change is known as:
- behavioral capacity
 - expectations
 - self-efficacy
 - subjective norm
48. A strength of Social Cognitive Theory is that it focuses on:
- target behavior
 - attitudes
 - knowledge
 - skills
49. The process of testing and assessing certain elements of a program before it is implemented fully is called:
- outcome evaluation
 - input evaluation
 - formative evaluation
 - strategic evaluation
50. Enforcing school policy that restricts access to candy and soft drink machines is an example of a _____ intervention.
- Level I (building awareness)
 - Level II (changing lifestyles)
 - Level III (creating a supportive environment)
 - Level IV (maintaining behavior change)

APPENDIX B. IRB APPROVAL DOCUMENT

NDSU

NORTH DAKOTA STATE UNIVERSITY

701.231.8995

Fax 701.231.8699

Institutional Review Board

Office of the Vice President for Research, Creative Activities and Technology Transfer
NDSU Dept. 40001735 NDSU Research Park Drive
Rasmussen 7, P.O. Box 6050

Fargo, ND 58109-6050

Institutional Assurance #04AC002433
Expires April 24, 2011

December 10, 2009

Ardith Brunt
Department of Health, Nutrition and Exercise Science
EML 351IRB Expedited Review of: "Assessment of Didactic Dietetic Program at NDSU"; Protocol #HE10124
Co-investigator(s) and research team: Amanda Kosel, Yeong Rhee

Research site(s): NDSU

Funding: n/a

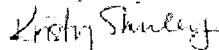
The protocol referenced above was reviewed under the expedited review process (category # 5, 7) on 12/4/2009, and the IRB voted for: approval approval, contingent on minor modifications.Approval expires: 12/3/2010 Continuing Review Report Due: 11/1/2010

Please note your responsibilities in this research:

- o All changes to the protocol require approval from the IRB prior to implementation, unless the change is necessary to eliminate apparent immediate hazard to participants. Submit proposed changes using the *Protocol Amendment Request Form*.
- o All research-related injuries, adverse events, or other unanticipated problems involving risks to participants or others must be reported in writing to the IRB Office within 72 hours of knowledge of the occurrence. All significant new findings that may affect risks to participation should be reported in writing to subjects and the IRB.
- o If the project will continue beyond the approval period, a continuing review report must be submitted by the due date indicated above in order to allow time for IRB review and approval prior to the expiration date. The IRB Office will typically send a reminder letter approximately one month before the report due date; however, timely submission of the report is your responsibility. Should IRB approval for the project lapse, recruitment of subjects and data collection must stop.
- o When the project is complete, a final project report is required so that IRB records can be inactivated. Federal regulations require that IRB records on a protocol be retained for three years following project completion. Both the continuing review report and the final report should be submitted according to instructions on the *Continuing Review/Completion Report Form*.
- o Research records may be subject to a random or directed audit at any time to verify compliance with IRB regulations.

Thank you for cooperating with NDSU IRB policies, and best wishes for a successful study.

Sincerely,

Kristy Shirley, CIP
Research Compliance Administrator

Last printed: 12/10/2009 1:28:09 PM

APPENDIX C. INFORMED CONSENT DOCUMENT

NDSU

NORTH DAKOTA STATE UNIVERSITY

Health, Nutrition, and Exercise Sciences

NDSU Dept. 2620

P.O. Box 6050

Fargo, ND 58108-6050

Title of Research Study: Assessment of Didactic Dietetic Program at NDSU

This study is being conducted by: Amanda Kosel amanda.l.kosel@ndsu.edu and advisor, Dr. Ardith Brunt ardith.brunt@ndsu.edu

Why am I being asked to take part in this research study? Because you are enrolled in NDSU's Dietetics program, you are invited to take part in this research project. You are required to take this test regardless; however, agreeing to participate will allow for a stronger analysis of the current program. Your consent to have your both your pretest results (taken when you were a sophomore) and the posttest (take now) evaluated is entirely your choice, and you may decide to not allow your results to be analyzed with no penalty to you. You are also being asked to give consent for your Registration Exam scores, which are sent to NDSU, to be evaluated and compared to your pre and posttest scores for a stronger program evaluation.

What is the reason for doing the study? It is our hope, that with this research, we will learn more about the strengths and weaknesses of the current dietetic didactic portion of the program.

Where is the study going to take place, and how long will it take? The tests will be administered in a NDSU classroom and should take about 20 minutes to complete.

What are the risks and discomforts? It is not possible to identify all potential risks in research procedures, but the researchers have taken reasonable safeguards to minimize any known risks. One known risk is the loss of confidentiality.

What are the benefits to me? You are not expected to get any benefit from being in this research study.

What are the benefits to other people? Benefits to future dietetics students are likely to include: changes in dietetic courses to increase knowledge retention, predicting a passing rate on the national registration exam for dietitians, and possibly changing admission requirements for the program.

Do I have to take part in the study? Your participation in this research is your choice. You may decide to not allow your test results to be analyzed, may change your mind and stop participating in the study at any time without penalty to you.

What are the alternatives to being in this research study? Instead of being in this research study, you can choose not to participate. However, you still are required to take the test.

Who will see the information that I give? We will keep private all research records that identify you. Your information will be combined with information from other people taking part in the study. When we write about the study, we will write about the combined information that we have gathered. You will

not be identified in these written materials. We may publish the results of the study; however, we will keep your name and other identifying information private.

We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information, or what that information is. For example, your name will be kept separate from your research records and these two things will be stored in different places under lock and key.

What if I have questions? Before you decide whether to accept this invitation to take part in the research study, please ask any questions that might come to mind now. Later, if you have any questions about the study, you can contact the researcher, Amanda Kosel at amanda.l.kosel@ndsu.edu or 701-709-0022.

What are my rights as a research participant? You have rights as a participant in research. If you have questions about your rights, or complaints about this research you may talk to the researcher or contact the NDSU Human Research Protection Program by:

- Telephone: 701.231.8908
- Email: ndsu.irb@ndsu.edu
- Mail: NDSU HRPP Office, NDSU Dept. 4000, PO Box 6050, Fargo, ND 58108-6050.

The role of the IRB is to see that your rights are protected in this research; more information about your rights can be found at: www.ndsu.edu/research/irb.

Documentation of Informed Consent:

You are freely making a decision whether to be in this research study. Signing this form means that

1. you have read and understood this consent form
2. you have had the consent form explained to you
3. you have had your questions answered, and
4. you have decided to be in the study.

You will be given a copy of this consent form to keep.

Your signature

Date

Your printed name

Signature of researcher explaining study

Date

Printed name of researcher explaining study