Instructional Design Models—Framework for Innovative Teaching and Learning Methodologies

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Effective instructional design is essential for efficient teaching and learning outcomes in all disciplines, particularly in the nursing content-laden curriculum. Instructional design model steps and processes enable faculty to determine the scope of the course contents, sequence of instructions, innovative presentation, and evaluation strategies. The generic instructional model of analysis, design, development, implementation, and evaluation (ADDIE) underlies every instructional design process. This paper compares and contrasts the characteristic features, processes, and steps involved in the design of the Dick and Carey instructional design model with the Morrison, Ross and Kemp model using the underlying framework of ADDIE. Each model, with varying degrees of ease of use, employs a nine-step system and procedural processes to provide strategies for creating course instructions. Learner perspective is the focus of each model and the models both have an appeal to course design and specific learning activities within a course. While the Dick and Carey model requires the use of all the components in order to create an instruction, the Morrison, Ross and Kemp model, with its independent or simultaneous use of the elements in any order, and the knowledge that there are cases where not all the nine elements are applied, make the model more flexible and easier to use. Integration of the elements of the Morrison, Ross and Kemp model into the blood transfusion learning activity for the learners in a medical-surgical nursing course validates the model and demonstrates its effective application to real-world instructional design process.

Keywords
Instructional Design Models (IDMs), nursing, course development, faculty, learner

1. Introduction

The scholarship of teaching, which includes curriculum design and instruction, is the mainstream role of faculty in educational institutions. In nursing education, the curriculum based on the parent institution and program's mission, as well as the philosophy of the faculty, provides the roadmap for instructional designs. According to Iwasiw, Goldenberg and Andrusyszyn (2010), curriculum development and the resultant instructional designs in nursing education is a creative, ongoing active process for producing unified and meaningful learning experiences that meet the expected goals and objectives of the program. Sound educational and instructional design principles, theory, and research underlie the creation of meaningful learning experiences that meet the educational goals and objectives of adult learners in nursing education (Finke, 2009). The instructional design principles and models, which specify methods or strategies in the design of a course of study, are based on instructional design and learning theories.

The instructional design theories based on the general learning theories provide faculty with a framework on how best to create instruction and instructional materials for efficient learning outcomes. According to Mastrian, et al. (2011), behaviorism, cognitivism, and constructivism, among other theories, are the lenses through which learning occurs. Each of these theories in concert with the many instructional design theories provides faculty with varying degrees of usefulness within the processes and steps of the instructional design models based on the faculty's philosophy about teaching.

Modular presentations of the instructional design procedures based on the design theories facilitate the comprehension of the design process. The instructional design theories utilizing the premises of the different learning theories enable faculty to design or create course instruction using one of the several instructional design models. For instance, the elaboration instructional design theory based on cognitive learning theory provides a holistic approach that enables faculty to select and sequence course topics and task information for instruction in such a way that the learner can accommodate with existing knowledge (Mastrian, et al., 2011). The elaboration and other instructional design theories are goal-oriented and provide specific strategies for creating course instructions with one of the many instructional design models.

There are many instructional design models that define the phases for producing instructional product for effective learning experiences. These models, which include Gagne; Dick and Carey; and Morrison, Ross and Kemp models, among others, have processes that employ a combination of content area material, technology, and critical and creative thinking skills in the design of instructions (Baum and Newbill, 2010). Similarly, Tracey (2009) noted that critical and creative thinking enables faculty to decide the sequence of instructions, the scope of the content, and the presentation strategies. Deciding on the scope of the content is especially valuable in content-laden curricula. Such curricula with resultant instructional designs are critical to learning. The several instructional design models, which guide the creation of instructions, differ in their steps and purpose, but share similar underlying framework of ADDIE—the generic instructional model of analysis, design, development, implementation, and evaluation that underlies every instructional design process (Mastrian, et al., 2011). The characteristic features and the processes and steps involved in the design of the Dick and Carey model, as well as the Morrison, Ross and Kemp model provide the basis for comparing and contrasting the models. The application of the Morrison, Ross and Kemp model in the context of blood transfusion therapy for the adult nursing learner illustrates the processes and steps of the instructional design process.

2. Processes and Steps of the Dick and Carey Model

The Dick and Carey instructional design model uses a detailed nine-step system and procedural process to provide strategies for creating course instructions. According to Dick and Carey (1985), the systematic steps of the design model include the processes outlined in Figure 1.

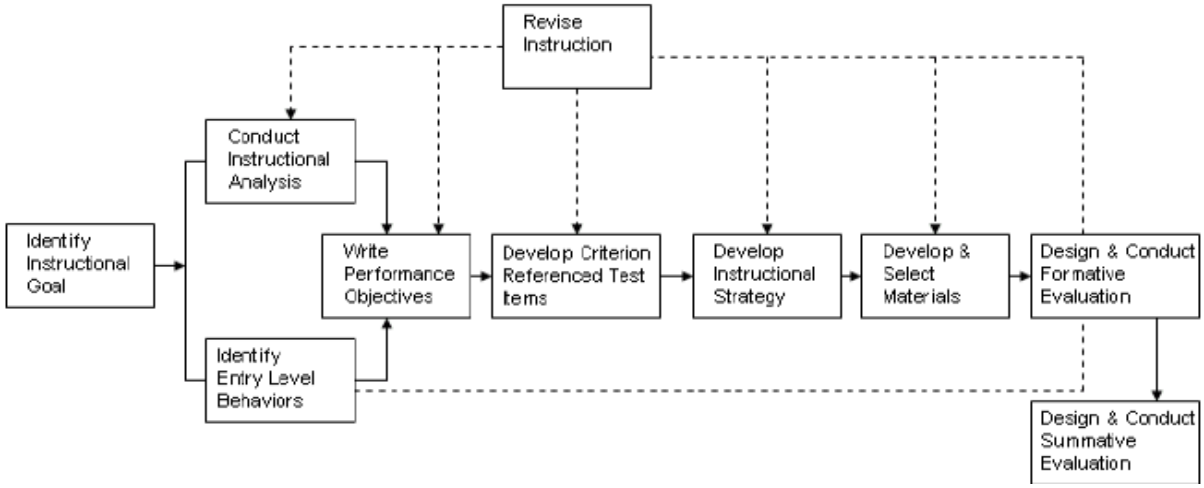

Figure 1: The Dick and Carey Systems Approach Model for Designing Instruction

a) *Identify instructional goal.* Instructional goal refers to what students are able to do at the end of the instruction. Needs assessment from the curriculum, practical experience with learning difficulties of students in the classroom, or innovations in professional practice enables an instructional designer to determine an instructional goal.

b) *Conduct instructional analysis.* Having identified the instructional goal, the designer determines what type of learning is required of the students. Analysis of the instructional goal helps to identify required subordinate skills and the procedural steps needed to learn a particular process.

c) *Identify entry-level behaviors.* Entry-level behaviors and characteristics of the learner in terms of knowledge, skills, attitudes, and environment where learning will occur are important considerations in the design of instructional activities.

d) *Write performance objectives.* Objectives based on instructional analysis and learner characteristics should emphasize performance of specific behavior skills, the conditions of performance, and the criteria for successful performance.

e) *Develop criterion-referenced test items.* Emphasis is on the development of assessment items that are parallel to and measure the student's ability to achieve the intended objectives.

f) *Develop instructional strategy.* Based on the five preceding steps, the designer identifies interactive instructional strategies for pre-instructional activities; presentation of information, practice, and feedback; testing; follow-through activities; and the preferred media for achieving the objectives.

g) *Develop and select instructional materials.* The designer uses the preferred instructional strategy to produce the instructional materials.

h) *Design and conduct formative evaluation.* Series of evaluations conducted through one-to-one evaluation, small-group evaluation, and field evaluation help to collect data needed to identify how to improve instruction.

i) *Revise instruction.* Data from formative evaluation reexamine the validity of the instructional and learner analysis, statement of performance objectives, and test items, as

well as the instructional strategy. The collected data after the revision, applied to the deficient areas, help to improve the instruction.

The design and conduct of summative evaluation is an independent step in the model as indicated by the block rather than the dotted line. Summative evaluation is the culminating evaluation of the effectiveness of instruction. The evaluation occurs at the end of the instruction after formative evaluation and the revision of instruction to meet expected standards. The above steps and processes of the Dick and Carey instructional design model have some similar and different characteristic features from the Morrison, Ross and Kemp model.

3. Processes of Morrison, Ross, and Kemp Instructional Design Model

The Morrison, Ross and Kemp instructional design model has four fundamental components of learner, objectives, method, and evaluation, to which the integration of additional components form a complete nine elements of the instructional design process. Morrison, Ross and Kemp (2004) asserted that the nine elements of an instructional design process include the components in Figure 2.

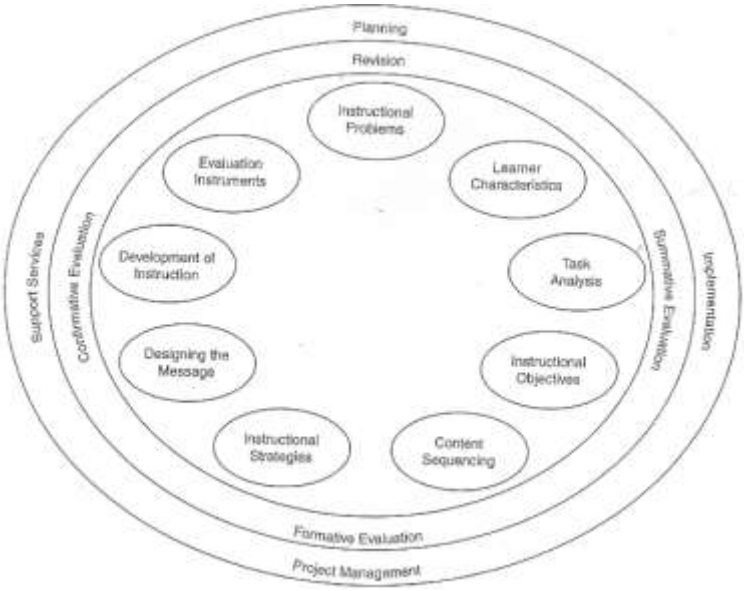

Figure 2: Components of the instructional design plan (Morrison, Ross and Kemp, 2004)

a) *Identify instructional problems.* Needs assessment, goal analysis, or performance assessment can help to identify instructional problems and specify goals for designing the instructional program.

b) *Examine learner characteristics capable of influencing the instructional decisions.* Three characteristics of learner traits include general characteristics of age, gender, and ethnicity; specific entry characteristics of prerequisite skills for the instruction; and the learning styles. Non-conventional learners include culturally diverse learners, adult learners, and learners with disabilities.

c) *Identify and analyze subject content and task components related to stated goals and purposes.* The definition of content areas addresses the instructional problem as well as identifies the objectives, design the instructional strategies, develop test items, and create the instruction.
d) *Specify learner's instructional objectives.* The instructional objectives, which meet specified criteria and embrace the three domains of objective; cognitive, affective, and psychomotor domains, indicate what a learner is expected to do after completing a unit of instruction.
e) *Sequence the content within each instructional unit for logical learning.* The designer decides on the best sequencing strategy for presenting the instruction. The strategy can be task or concept expertise according to the elaboration instructional design theory.
f) *Design instructional strategies to enable each learner to master the objectives.* Instructional strategies are determined by the content and performance specified in the objectives. Two types of strategies include the initial presentation, which entails hands-on experience, or the use of visuals as well as generative strategies, which include recall, integration, organization, and elaboration to make the content meaningful through active processing.
g) *Design the instructional message and develop the instruction.* The message design process provides the designer with a means for effectively communicating the instructional strategies.
h) *Develop evaluation instruments for the assessment of objectives.* This element refers to the formative, summative, and confirmative development of testing instruments and materials used to measure the degree to which learners have acquired the knowledge, can perform the skills, and exhibit changes in attitudes as required by the objectives.
i) *Select resources to support designed instruction and learning activities.* Resources include logistics matters such as budget, facilities and materials, equipment, and personnel services needed to support the successful delivery of instruction.

The preceding elements of the Morrison, Ross and Kemp instructional design model have characteristics that are similar to and different from the Dick and Carey model. These similarities and differences described in the following paragraphs depict the unique characteristic features of both models.

4. Differences in the Characteristic Features, Processes, and Steps of the Dick and Carey with the Morrison, Ross and Kemp Instructional Design Models

The presentation of the nine attributes of each of the models accounted for their major differences. The Dick and Carey model has linear presentation in accordance with the linear generic ADDIE model (Williams van Rooij, 2011). The components of the model presented in boxes and arrows show the sequential order of the series of steps employed by designers in order to design, produce, evaluate, and revise instructions. According to Dick and Carey (1985), the series of steps with arrows depict the receipt of input from the preceding steps and the provision of output for the next step. Contrary to the linearity of the Dick and Carey model with

arrows linking each step, the Morrison, Ross and Kemp model is non-linear without arrows in between the elements. Baturay (2008) noted that the model presents in an open iterative circle with a flow that begins from the inner center oval element process patterns and moves to the second outer circle with evaluation forms, and finally the outermost circle of planning, implementation, project management, and support services. The use of elements eliminates the characteristic steps or sequence in a linear presentation; the oval patterns present a continuous cycle approach of constant planning, design, development, and assessment with no defined starting point. According to Morrison, Ross and Kemp (2004), the nine elements inside the innermost circle form a logical, clockwise pattern with the instructional problem at the 12 o'clock position; the oval shaped pattern is an indication of no specific starting point. The absence of lines and arrows between and among the elements is a further indication of the non-sequential, non-linear presentation.

In addition to the different presentation formats, the models differ in the type and positions of evaluation. In the Morrison, Ross and Kemp model, the inclusion of resources to support instruction and learning activities rather than evaluation emphasize the cyclic nature of the model. Revision on the second outer circle with formative, summative, and confirmative evaluation depicts continual use in all the elements of the design process. In the Dick and Carey model, formative evaluation ends the design process with data from the evaluation used to revise all the other processes, as indicated by the dotted lines. Summative evaluation is not part of the process as indicated by the solid arrow line, and there is no confirmative evaluation.

Following the types and positions of evaluation in both models is the different position of the assessment instruments. In the Dick and Carey model, construction of assessment items sequentially follows the creation of the learning objectives, revised with data from the formative evaluation, and helps to ensure alignment of objectives and assessment. In the Morrison, Ross and Kemp model, assessment items created after the final revision of the objectives is subject to revision with data from the formative evaluation.

Overall, both models have varying degrees of ease of use. The Dick and Carey model requires the use of all the components in order to create an instruction. This requirement involves a great deal of time and effort. The Morrison, Ross and Kemp model, with no specific starting point, the independent or simultaneous use of the elements in any order, and the knowledge that there are cases where not all the nine elements are applied, make the model more flexible and easy to use. In spite of these differences, there are some similarities in both models.

5. Similarities in the Characteristic Features, Processes, and Steps of the Dick and Carey with the Morrison, Ross and Kemp Instructional Design Models

The Dick and Carey model, as well as the Morrison, Ross and Kemp model are examples of specific models of the instructional design process. Both models incorporated the ADDIE features of analysis, design, development, implementation, and evaluation as an underlying framework (Baturay, 2008; Mastrian, et al., 2011). Analysis in both models through needs assessment identifies instructional problems, goals, learner's characteristics, content, and context

of instructions. Needs assessment for a course of instruction validates the need for the course, ensuring unity and coherence within and among other courses in the curriculum to meet the needs of students, faculty, and professional nursing practice. According to Young (2000), the analysis step is the most important phase because without complete understanding of the problem, goals, learners' characteristics, content, and context of instruction, there will be no blueprint to guide the rest of the steps of instruction. In determining the context of instruction in a nursing program, Iwasiw, Goldenberg and Andrusyszyn (2010) noted that contextual factors include the forces, situations, and circumstances internal and external to a nursing program that are capable of influencing the parent institution and the program. The goal, learner, and task analysis enable the course designer to identify needed problems or processes needing enhancement in the course to provide input for the design phase.

In the design phase of ADDIE, both models entail the identification of learning objectives, creation of assessment instruments, and strategies for creating and delivering instructions. The objectives, which must meet performance, condition, and criteria characteristics, are composed of the cognitive, affective, and psychomotor domains of objectives to reflect the different aspects of student learning. According to Bastable (2008), the objectives should be learner-centered; action oriented, and describes the expected learning experiences at the end of the learning situation. The objectives specifically denote who will do what, under what conditions, and how well. Assessment includes the various methods used to determine the attainment of course objectives (Gronlund and Waugh, 2009). The specific type of assessment, traditional or performance test based on the instructional objectives determines the evaluation instrument. Alkharusi (2008) reported that traditional assessments include multiple choice and other achievement test formats that require little time to administer and score while alternative assessments include performance-based assessments that are more engaging and challenging. The criterion-referenced assessment, for instance, uses a set of predetermined criteria to determine mastery of competencies in a performance assessment. In order for the process to be valid, the components of planning assessments which include learning objectives, course materials, and classroom activities must be aligned with each other so that assessment will measure what it purports to measure. Instructional methods or strategies can be traditional or activity based. According to DeYoung (2009), the activity-based strategies are student-centered and entail active learning on the part of the students. Chosen teaching strategies should match the unique students' characteristics in the course.

Having determined the objectives, assessment instrument, and the instructional strategies in the development phase of ADDIE, both models emphasize development and selection of specific instructions. The implementation phase follows in both models in the delivery of instructions and culminates with the final phase of evaluation. Evaluation of instructions is similar in both models but differs in types and positions in both models. Formative evaluation in both models is diagnostic, as it identifies students' progress and difficulties with learning. Analysis of data from formative evaluation permits adjustment of instruction to meet students' needs and improve learning. Generally, while formative evaluation provides feedback on the progress of the students in meeting course objectives, summative

evaluation occurs at the end of course instruction and provides information on the extent to which course objectives are achieved (Oermann and Gaberson, 2006). Unlike the formative evaluation, assignment of grades is a characteristic feature of summative evaluation.

In addition to the generic steps of ADDIE, there are other similarities between the Dick and Carey and the Morrison, Ross and Kemp instructional design models. Further similarities include the focus on what the learner is able to do at the end of instruction, the nine process attributes of the models, flexibility (as both models can be adapted as desired), and the systematic interrelatedness of the components of both designs in the production of effective instruction. The proponents of both models assert that there is no single best way to design an instruction. The learner perspective is the focus of each model and both models have an appeal to course design and specific learning activities within a course. Designing a blood transfusion learning activity within the Medical-surgical nursing clinical course for the adult learner evaluates the applicability of the Morrison, Ross and Kemp model.

6. Blood Diffusion Learning Activity Instructional Design Process with the Morrison, Ross and Kemp Instructional Design Model

The Morrison, Ross and Kemp instructional design model revolves around four fundamental components. These components include (a) the learner, the focus of instructional design, (b) objectives, which specify what learners should learn or demonstrate, (c) methods, which ensure how the content of the activity can best be learned, and (d) evaluation, or how to determine the extent to which the objectives are achieved. According to Morrison, Ross and Kemp (2004), these components are interrelated, and when integrated with an instructional problem or learning activity, content, sequence, and delivery of content and resources to support the learning activity form a complete instructional design plan. Although the model does not specify any particular starting point, a logical order of instructional activity, learner characteristics, objectives, content and sequence, method or instructional strategies, delivery of instruction, evaluation, and resources to support instruction and learning activities will validate the practical application of the model in a blood transfusion learning activity.

a) *Identify instructional problem or activity.* In nursing practice, many hematologic diseases, therapeutic, and surgical procedures depend on blood product support. Efficient and safe administration of blood to clients with basic health disruption is a fundamental skill of the medical-surgical nursing course. The goal of the instructional activity is to equip students with the necessary knowledge, skills, and abilities for effective patient care in blood transfusion therapy.
b) *Examine learner characteristics capable of influencing the instructional design.* The learners are associate degree seeking, senior level, young, and middle-aged adult students from diverse cultures, and composed of mainly second degree and English as a second language learners. Self-direction, internal motivation, critical thinking, and problem-based learning with collaboration and group approach make up the learning style of the students (Bastable, 2008). Problem-based instructional activities with known outcomes make learning for the students relevant, useful, and motivating.

c) *Specify learner's instructional objectives.* The learner at the end of the blood transfusion instructions will be able to:
   - Determine the indication for blood therapy and appropriate type of blood for any given patient situation
   - Verbalize feelings of confidence in blood transfusion skills
   - Demonstrate the skill of safe administration of the three basic blood components

d) *Subject content and task analysis related to stated goals and objectives.* Learning activities in blood transfusion therapy based on the objectives include (a) peripheral and central venous access; (b) intravenous fluid solutions; (c) blood products and indication for use; (d) blood administration procedure; and (e) blood transfusion reactions, causes, clinical manifestations, management, and prevention (Lewis, et al., 2007). Learning objectives limit the scope of contents of any learning activity.

e) *Sequence the content within each instructional unit for logical learning.* Students first learn the listed contents of the blood transfusion learning activity in a three-hour didactic interactive feedback lecture, titled intravenous (IV) therapy. Following the didactic instructions and prior to patient care clinical practice, the contents sequenced in the nursing skill laboratory from general to specific knowledge based on the chronological progression of the blood transfusion therapy takes the students systematically through the process.

f) *Design instructional strategies to enable each learner to master the objectives.* As a goal-oriented and problem solving style of learners, simulation, an activity-based teaching strategy helps each learner master the blood transfusion therapy process. Prior to the simulation experience, learners in an initial presentation strategy watch interactive audio-visual scenarios of the blood transfusion skill to obtain a mental image of the procedures involved in the skill. The generative strategy of simulation, where learners integrate the processes, follows the interactive skill video presentation. As a teaching strategy, simulation fosters students' development of clinical judgment and critical thinking skills (Cato, Lasater and Peeples, 2009). Simulation scenarios mimic real-life situations and enable the adult learner to think critically in order to perform accurately.

g) *Design the instructional message and delivery of instructional materials.* Clinical case scenario in simulation where the instructor demonstrates the skill following theoretical explanations and observes learners practice the skill is the best way to introduce the content to the learners. Attainment of this delivery strategy occurs with each individual learner in a clinical group through the high fidelity human simulation. Through cues and prompts from the Simman (patient), patient's significant other, and the clinical instructor's interaction with the learner in the role of a physician using the interactive SBAR (situation, background, assessment, and recommendation) hands-off communication technique, the learner can recall, integrate, organize, and solve the clinical problem. According to Kameg, et al. (2010), communication is a critical component of nursing education in the provision of safe patient care. Through effective

communication skills, the learner provides the physician with adequate patient information for the correct intervention orders.

h) *Develop evaluation instrument for the assessment of the objectives.* The attainment of the objectives of the blood transfusion therapy is determined through formative, summative, and confirmative evaluation processes. While formative evaluation occurs during the process of instruction, summative occurs at the end of instruction, and confirmative takes place over an extended period after the course of instruction. According to Vandeveer (2009), formative and summative evaluation strategies and instruments need to be consistent with the approaches used during the instructional strategies and learning activities. The evaluation instrument for the blood transfusion therapy is a performance assessment checklist with a scoring rubric and criteria that are consistent with the objectives, strategies, and activities. Simulation of performances is an efficient teaching and assessment strategy as it enables practice in the same assessment process. Gronlund and Waugh (2009) noted that performance assessments have high realism as they mimic real world experiences. Such assessment practice is essential in nursing learning activities where proper acquisition and demonstration of cognitive, interpersonal, and technical skills denote performance competencies for efficient professional nursing practice. During the teaching and learning sessions, the instructor, after the demonstration of blood transfusion procedures, formatively observes the learners, questions, and corrects their practice of the skills in the laboratory and patient care settings. According to O'Connor (2006), the instructor gathers formative assessment data through observation of performances and anecdotal notes for use in revising the instruction as needed. Summative evaluations with grades assignment occur in the final simulation performance skills session in the laboratory. During the summative simulation performance sessions, learners integrate the necessary senses while applying the cognitive, affective, and psychomotor domains in order to recognize a problem in the care of the patient as well as plan and implement the correct intervention. Detailed assessment instructions and orientation to the simulation environment and conditions for learners and the evaluators ensure accurate performance and evaluation. The learner's performance assessed by two instructors scoring the listed criteria in the evaluation checklist with such responses as met, partially met, or unmet, permits objective determination of successful performance. A total score of 75% and above from each instructor denotes successful performance.

i) *Select resources to support designed instructions and learning activities.* Resources needed for the simulation of the blood transfusion skills include an equipped simulation laboratory facilities, materials, equipment, and personnel services.

The integration of the above nine elements of the Morrison, Ross and Kemp model into the blood transfusion learning activity for the adult learners in a medical-surgical nursing course validates the model and demonstrates its effective application to real-world instructional design process.

7. Conclusion

Instructional design using the design models within the scholarship of teaching is the prerogative of the faculty. The instructional design models based on the instructional theories derived from the learning theories enable faculty to create the best instruction and instructional materials for efficient teaching and learning processes. The instructional design models, which represent the lifecycle or phases in the creation of a course of study or learning activity range from the linear generic ADDIE model to more specific learner-centered models.

The Dick and Carey model, as well as the Morrison, Ross and Kemp model are examples of learner-centered models. Both models have unique features in their similar but different characteristics that enable efficient creation of instructions. While the similarities center mainly on the underlying ADDIE framework, flexibility, number of processes, and being learner centered, the differences center on the mode of presentation of the nine process attributes, type, and position of evaluation, as well as assessment instrument and the varying degrees of ease of use.

The Morrison, Ross and Kemp model is more flexible and easier to adapt due to its distinguishing oval pattern circular presentation. The four fundamental components of the model, which includes learners, objectives, methods, and evaluation, along with the instructional problem, subject content and sequence, and instructional message and delivery, as well as selection of resources to support instruction and learning activities make up the instructional design plan.

The blood transfusion skill therapy, an adult learning activity in the medical-surgical nursing course validates the efficacy of the model. The model as applied to the blood transfusion adult learning activity demonstrates the constant planning, design, development, and assessment processes to ensure effective instruction and acquisition of necessary competencies. The confirmative evaluation process in the model validates competencies over an extended period after the course in other advanced nursing courses and in professional practice.

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