

Analysis of Three Instructional Design Models

Abstract

Instructional design models provide for a systematic approach of implementing the instructional design process for a specific educational initiative (Morrison, Ross, & Kemp, 2004). This paper will briefly describe the purpose and what instructional models are followed by process of three selected models: (a) the Dick and Carey systems approach; (b) Morrison, Ross and Kemp model (also known as the Kemp model); and (c) the Three-Phase design (3PD) model. The process description for each model will serve as the foundation and supporting points required for comparing and contrasting process of the models.

Dick and Carey, Kemp, and Three-Phase Design models for Instructional Design

Instructional design (ID) models can provide a systematic approach of implementing the instructional design process for specific educational initiatives (Morrison, Ross, & Kemp, 2004). Gustafson & Branch (1997) states that there is a wide variety of instructional design models describing the ID process created for different situations and settings (as cited in Gustafson & Branch, 2002b; Ryder, 2006).

The purpose of the instructional design models offer both educational and training organizations design steps, management guidelines and teamwork collaboration options with designers, technicians and clients (Gustafson & Branch, 2002a). Specifically by definition, a model can be defined as “a way of doing something; an explicit representation of a reality. It is an example or pattern that prescribes relationships in a normative sense” (Branch & Gustafson, 1998, p. 4).

A model can also function as a visual and communication tool to help conceptualize complex schematics or instructional design process along with how the various stages or elements relate to each other (Gustafson & Branch, 2002a). The application and value of a model is dependant on the instructional situation, problem or task (Siemens, 2002; Ryder, 2006).

Dick and Carey Systems Approach Model

The Dick and Carey systems approach model is one of the most influential ID system oriented models. Like most models, the Dick and Carey system bears the conventional core elements of analysis, design, development, implementation, and evaluation, also known as the ADDIE model (see Figure 1). The Dick and Carey model is more complex where the approach based from the five core elements is broken down to additional or variety of steps with different terminology (Brant, 2001; Gustafson & Branch, 2002a). Most importantly, Brant (2001) states

that, designers must end up with a product containing accomplished objectives and measurable outcomes. This process used in many businesses, government including military environments as well as performance technology and computer aided instructions reflects the fundamental design process (Gustafson & Branch).

Dick & Carey Systems Approach Model

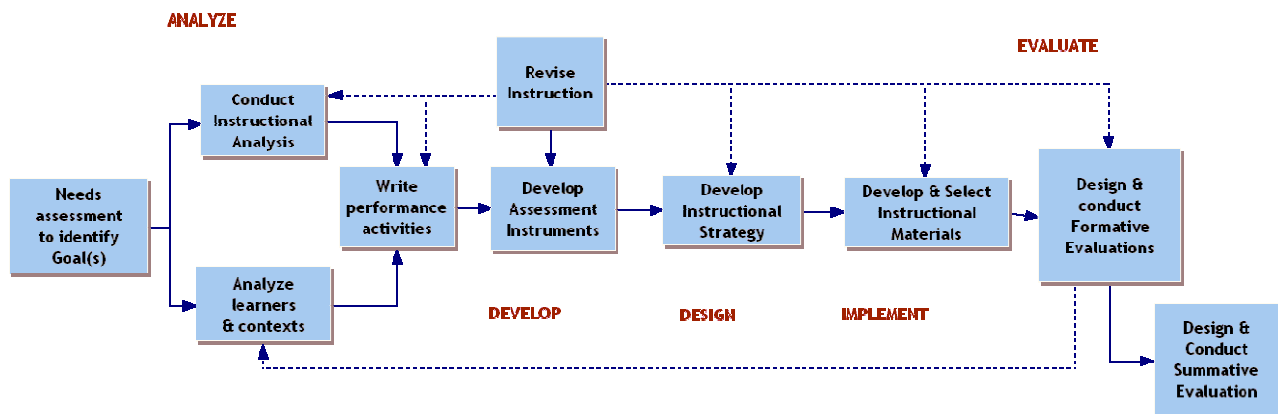


Figure 1. Dick and Carey Systems Approach Model showing the linear approach for design instruction with review process. ADDIE components (indicated in red) are added for discussion analysis (source from Dick, Carey & Carey 2001, p.2).

The components for the model stated by Dick, Carey and Carey (2001) consist of nine procedural steps or linear sequences (see Figure 1). Each of these components is dependant upon one another indicated by the direction of solid arrow lines. Dotted lines representing formative evaluations points to instructional revisions that originates from reexamination of the instructional analysis' validity and entry behaviors of learners. The sequential steps for the design are as follows: (a) assess needs to help identify learning goals, (b) conduct instructional analysis and analyze learners and contexts, (c) write performance objectives, (d) develop assessment instruments (e) develop instructional strategies (f) develop and select instructional material (g) design and conduct formative evaluations, (h) revise instruction based from

formative evaluations, (i) design and conduct summative evaluation (not a mandatory step) (Dick, Carey & Carey, 2001; Gustafson & Branch, 2002a).

Assess needs to help identify learning goals. The application of this first component makes it unique from other models in that it supports the use of needs assessment procedures and clear measurable goals. “Goals are clear statements of behaviors that learners are to demonstrate as a result of instruction” (Dick, Carey & Carey, 2001 p.30). Instructional goals must be created before the implementing the ID process (Dick et al; Gustafson & Branch, 2002).

Conduct instructional analysis. Before proceeding with instruction implementation, designers must conduct the process of instructional analysis to find out prior learner’s skills, knowledge and attitudes. They must also carefully examine and create step-by step task description to help learners achieve instructional goals (Dick et al, 2001).

Analyze learners and contexts. This step aligned with the process of instructional analysis (see figure 5), involves the collection of information on learners’ entry behavior, characteristics, prior knowledge, skills and attitude, academic motivation and learning preferences. An instructional design can then proceed to the selection of an environment that can support learning. The performance context for learning application and skills is important for the building of instructional strategies (Dick, Carey & Carey, 2001).

Write performance objectives. Next, objectives in the form of specific statements are important for informing what learners will do during instruction and upon completing of an instructional module. Objectives also function as measuring tools that connect to the assessment step (Gustafson & Branch, 2002). Dick, Carey & Carey (2001) consider this as the foundational step to the next stage for testing.

Develop assessment instruments. The purpose of assessments is to measure the performance objectives. Knowing each objective's behavior, conditions and criteria, offers the designer guidance on how to select and determine an assessment instrument that can measure performance objectives. Both objectives and assessments again are dependant on each other (Dick, Carey & Carey, 2001).

Develop instructional strategies. Four major components consisting of pre-instructional activities, content presentation, learner participation (including feedback) and follow-through activities make up the instructional strategy component. Instructional strategies must focus on memory and transfer skills. The instructional designer while considering learning theories, should also decide the medium for instructional delivery including lesson interactivity (Dick, Carey & Carey, 2001).

Develop and select instructional material. Depending on lessons taught and available supporting resources, instructional materials function as important resource for knowledge and skills. Learners are required to engage actively with the instructional material. By the end of this phase, the designer should have draft copies of materials, assessments and instructor manual. The designer can continue revising and improving lesson materials during the evaluation process (Dick, Carey & Carey, 2001).

Design and conduct formative evaluations. Gustafson and Branch (2002) state that the process of designing and conducting of formative evaluations can help assess the value of instructional goals. Three types of evaluations are recommended for the process, one-to-one evaluation, small group evaluation and field evaluation (Dick, Carey & Carey, 2001).

Revise instruction based from formative evaluations. Data collected from formative evaluations is then used for instruction revision. This is the final step of the design process but also functions as the first step for the interaction process (Dick, Carey & Carey, 2001).

Design and conduct summative evaluation. Dick, Carey and Carey (2001) state the summative evaluation though is considered a culminating evaluation for examining instructional effectiveness; is not part of the nine basic stems of the systems approach model. It is also not an integral part because the designer of instructor is not involved in this process.

The above descriptions clearly indicate the linear form for the Dick, Carey and Carey model. Each process cannot function as a stand-alone. Dick, Carey and Carey (2001), claims to say that the systematic approach of the model is an effective and successful approach because of its focus on learners' objectives and final achievement prior to the planning and implementation stage. Next, there is a careful linkage between instructional strategy (targeted skills and knowledge) and desired learning outcomes (appropriate conditions must be supplied by instruction). The final and most important reason is the replicable and pragmatic design process where the product is usable for many learners and different occasions; time and effort revising the design product during the evaluation and revision process is recommended.

The team involved in the above design process often times consist of the instructional designer and team of specialist comprised of the manager, content specialist, media producer and evaluator. The team draws on each other's skills to produce the product. Instructor with specialized skills can also be a stand-alone team (Dick, Carey & Carey, 2001).

Morrison, Ross & Kemp Model (Kemp model)

Kemp states that the instructional design approach that focuses on curriculum planning stems from the learner's perspective rather than content, making it different from traditional

design practice. The factors, which influences learning outcomes contributed to the constructs of Kemp's model, included the following: (a) level of readiness in dealing with lesson objectives, (b) instructional strategies related to objectives and student characteristics, (c) media and resource selection, (d) support for successful learning, (e) determination of objective achievements, and finally (f) needed revisions for program improvements (as cited in Gustafson & Branch, 2002b; Morrison, Ross & Kemp, 2004).

Morrison, Ross & Kemp's complete model of instructional design plan consists of nine elements arranged in a circular manner (clockwise) in a form of an oval shape (see Figure 2). The elements are, (a) instructional problem identification and goal specifications of an instructional course, (b) examination of learner's characteristics based on instructional decisions, (c) subject content identification with task analysis related to goals and purposes, (d) instructional objective specifications, (e) instructional units in arranged in logical and sequential order for learning, (f) instructional strategies designed to meet the mastery of lesson objectives, (g) plan and develop instruction, (h) evaluation instruments for measuring course objectives and (i) resource selection for instruction and learning activities (Morrison, Ross & Kemp, 2004).

The introductory phase for Kemp's model places the most emphasis in the design process (Morrison Ross & Kemp, 2004). Morrison et al. state that the instructional designer must conduct a needs assessment and goal analysis, also known as performance assessment to see if instruction or training is required. This is the problem identification stage is required prior to the process of designing a course.

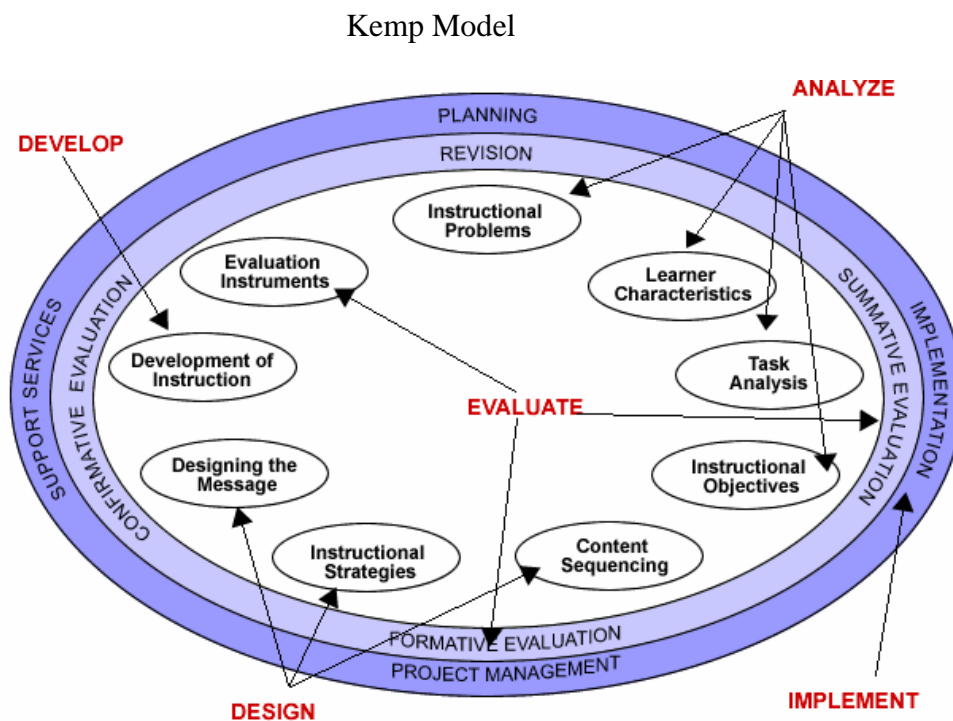


Figure 2. Kemp's Model with ADDIE components added for discussion analysis (Source from Morrison, Ross & Kemp, 2004 p. 29).

Each non-linear element for design process (no connecting arrows or lines as shown in Figure 2) arranged in an oval pattern indicate is not predetermined; hence, it does not have a targeted starting point. The term element is used instead of the terms "step, stage, level or sequential item" since the model is not a true linear approach (Morrison, Ross & Kemp, 2004 p. 10). The instructor can start from any point in the oval and proceed in any manner. This flexible arrangement allows the individual to select either one of the processes for the course needs. In addition, the two outer ovals additions to the diagram represent managerial and feedback procedures conducted during the design, development and implementation stages. This non-linear structure again allows to designer to customize based on the organization or institutional needs. The purpose is having the flexibility structure is to ensure that the goals of learning objectives are not compromised (Morrison, Ross & Kemp, 2004).

In reference to the evaluation process, the management and instructional designer has the option to utilize formative (reflective data of instructional objectives), summative evaluations (test program effectiveness, including cost and benefits) and confirmative evaluations (follow-up after students leave the program). Like Dick and Carey's model, the formative evaluations which is a measuring tool for quality control during the development process is made up of three stages, one-to-one, small group and field trials for evaluating larger student or participant population. Summative evaluations conducted at the end of the instructional program are followed up by confirmative evaluations for reviewing student competencies and performance outcomes (Morrison et al, 2004). In summary, the Kemp design model focuses on resource creation, implementation and delivery followed by evaluation and improvement (Sims & Jones, 2002).

Three-Phase Design (3PD) Model

The 3PD model is, "an enhancement to the traditional instructional design process focuses on the creation of functional course delivery components, with evaluation and improvement activities integrated with scaffolding (support) for the teacher and learners to provide a dynamic teaching and learning environment in which resources or strategies can be developed or modified during the actual delivery stage" (Sims & Jones, 2003, p. 8). The dynamic process requires ongoing communication with the support team for best implementation. As illustrated in Figure 3, the 3PD model team under each iteration phase comprises of the academic person (A), designer (D), and educational designer (ED) has a focus on developing successful online projects. The ultimate goal is for this model is to enable the academic while attending to content maintenance, to become less dependent on the developer and educational designer over a period of time, hence becoming an independent designer and developer (Sims & Jones 2002).

Three-phase Design (3PD) Model

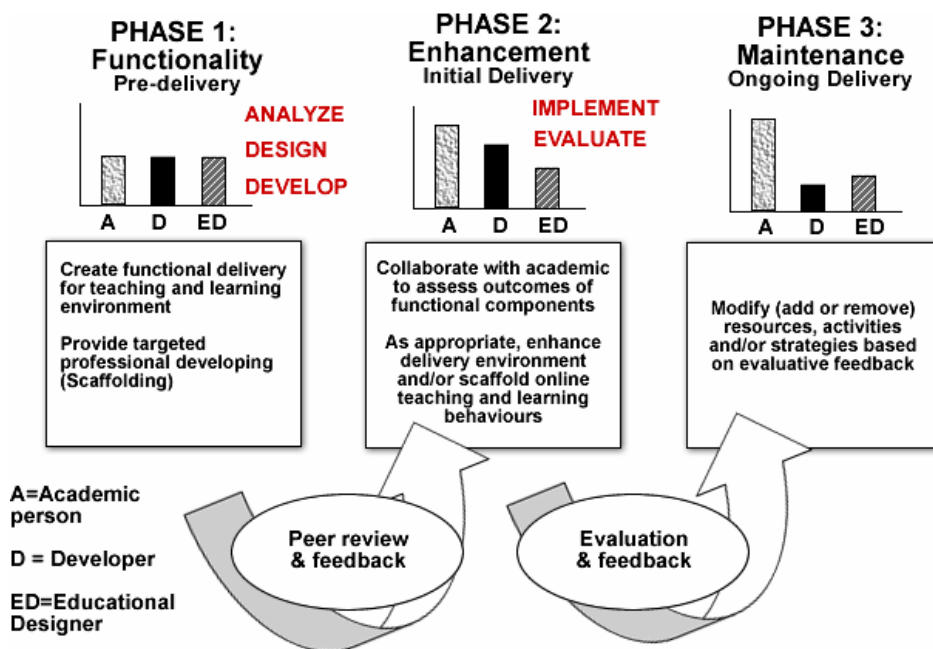


Figure 3. Three-phase Design Model with ADDIE components added for discussion analysis (source from Sims & Jones, 2002. p. 4).

The 3PD model bases on the assumption that the design development is for a non-traditional setting but an online collaborative environment (Sims & Jones, 2003). The model proposes four critical factors. The first stated by Sims and Jones (2002), “the instructional design development process must align with institutional expectation, contemporary pedagogies as well as available resources and skills” (p. 3). Technology has indeed open doors to a variety of delivery options, hence does affect the approaches of online course delivery and teaching methods.

The next factor relates to the academic professional development. New instructors with a lack of online teaching experience will need on going support through scaffolding processes. Scaffolding is a process where the instructor and learners can learn new concepts about the online environment through the support team. Herrington and Oliver (2001) stated that because

of the rapid implementation of learning management systems, increase growth of online learning as well as learner-centered environments, this has caused an increased need for scaffolding processes (as cited in Sims & Jones, 2002).

The third factor refers to the approach of team-based work where communication and understanding among team members takes place during the development process reinforcing group collaboration (Sims & Jones, 2002). With the ongoing growth of information, knowledge sharing through communication and collaboration plays an important role. Finally, the last factor involves incorporation of scaffolding support units for both academic instructors and staff where skills learned can help ensure success in confronting new challenging and learning paradigms (Sims & Jones, 2002).

The 3PD model comprises of 3 phases (see Figure 3). Phase 1 known as pre-delivery mode involves the preparation of online teaching components. This includes planning teaching and learning strategies (learner-centered, experiential or situated), learning outcomes, lesson materials and resources. Each member of the team has specific roles (Sims & Jones, 2002).

Phase two, the enhancement mode is the delivery phase. During the delivery process, ongoing feedbacks and evaluation permits the opportunity for immediate enhancements to the learning environment, hence creating a scaffolding environment where participants can learn about the new processes. With the support through collaboration and communication from other team members including users (learners), the instructor gets to improve the learning environment in a proactive way (Sims, Dobbs & Hand, 2002). This is a great advantage of the proactive evaluation process because it can help take care of immediate concerns or problems while learning from the situation.

The educational designer is the major player in the development team while faculty and learners make up the other groups respectively. The educational designer (ED) is also responsible for giving educational and curriculum design guidance and advice and may have other managerial responsibilities. Prior entering into the third phase, the team prescribes changes and enhancements for subsequent delivery. Phase 3 then begins its maintenance mode with ongoing support and training that takes place over a long time where quality assurance is the key focus (Sims & Jones, 2003).

Comparisons and Contrasting Differences of the Three Models

The following section offers an account of observed similarities and differences in characteristics and qualities analyzed from the three model's process description and presentation. In particular, the following were noted: (a) the use of visuals that fits the model definition and processes; (b) the general constructs (conventional form) for each model with its goals and purposes; (c) the evaluation processes, and (d) the role of team collaboration.

Use of Visuals to Represent Model Structure and Functions

Each model process or system description is well represented and supported with diagrams by each author (see Figures 1, 2 & 3). What makes the models different from each other is the layout for the individual element or component as it applies and relates to each other, represented through the symbolic illustrations. For example, in the Kemp model, the use of non-connecting lines indicate that the components do not relate to each other, while the Dick and Carey diagram shows the one-way linear application of the design stages. The 3PD model through the illustration of the vertical placements of all three phases represented the dynamic relationship of the model process (team collaboration and level of team influence) was also able to indicate the stages of its linear activity across (Phase 1-Phase2-Phase 3)

Conventional Form or Structure

Brant (2001), Gustafson and Branch (2002) as mentioned earlier indicated that Dick and Carey model is based off the conventional core elements of the ADDIE model. The ADDIE model consisting of the components of learner analysis, design of instruction (including objectives and strategies), material development and media selection, course implementation, and evaluation is also found in Kemp and the 3PD model. ADDIE components are indicated in red text (see Figures 1, 2 & 3).

Next, each model utilizes at least one form of traditional linear (step-by step process) approach. The Dick & Carey and Kemp models are more comprehensive and detailed compared to the 3PD model. Critics have said that the step-by step prescription is extensive and takes too long to apply; at times, the process is too costly (Nickols, 2000) and may not be appropriate for specific instructional task (Botturi, Cantoni, Lepori & Tardini, in press; as cited in Gordon & Zemke, 2000). Dick and Carey's steps build on each other and one cannot proceed to another without the prior step. In addition, the design process cannot begin until instructional goals are established. Kemp's model, however, containing all Dick and Carey's steps is less prescriptive and practical as the designer can select any applicable element. It offers a more heuristic approach where the flexibility allows adaptation for technology situation such as online environments (Botturi et al). The 3PD model though linear in format (Phase 1 to Phase 3) as shown in Figure 3, has iterations within each scheduled phase as well (Sims & Jones, 2003). The valuable feature includes further enhancement of the traditional "development" functionality through its "evaluate/elaborate/enhance/maintain" process. The strategies "try-it" approach is also cost effective compared to the other models requiring a longer time for iteration process (Sims & Jones, p. 16).

Evaluation Process

All three models offer the component of evaluation, but may vary in functionality and purposes. The two noted observations are, first, evaluations that relate to technology concerns; and second, evaluations that have different emphasis at different stages of the process.

Technology related issues. Based on Jones & Pallouci (1999) the most general form of an instructional system consist of there major components, “instructional objectives (input), delivery system (process), and learning outcomes (output)” (p. 3). Referring to examples of traditional ISD systems like Dick and Carey as well as Kemp’s model, they stated the following, “Although there are many ISD models that include system evaluation as a major component, none of them adequately addresses the complexities and dimensions of the technology and how these may relate to learning outcomes” (p. 3). On the other hand, one of the 3PD model strategies relating to the evaluation, a proactive process infers that it is able address such issues. For example, during the phase of course implementation, concerns can be immediately taken care by technology-oriented as well as academic teams (Sims & Jones, 2003). As Sims, Dobbs and Hands, (2002) further affirms that through the proactive evaluation process while addressing critical issues associated with learning resources and course delivery, can increase the chances of building effective educational outcomes.

Processes and emphasis differences. Morrison, Ross & Kemp offers an extensive prescription on the evaluation process. Within the evaluation process itself exist models of evaluation. For example, as indicated earlier, there are three stages within the formative evaluation process. This process takes place during the development phase (Morrison, Ross & Kemp, 2004). Summative and confirmative evaluations are conducted at the end of the course instruction by team members. The Dick and Carey model emphasizes and utilizes the same

formative principles as Kemp's model. The only difference is that the summative evaluation is a culminating process reviews instructional effectiveness conducted by someone not involved with the design process. In addition, Dick and Carey's evaluation process does not have a confirmation (follow-up) evaluation.

The evaluation process works differently in the 3PD model; the process is known as the proactive evaluation. As stated by Sims and Jones (2003) formative feedbacks take place between instructor and students during the implementation of the course. The difference in comparison to the other two models is that, the proactive evaluation in Phase 2 (the implementation phase) offers valuable opportunities to enhance the quality of the learning environment. The proactive evaluation process also allows immediate trouble shooting to take place for possible problems that may arise during the progression of online activities.

The Role of Team Collaboration

Each model supports the concept of individual, team collaboration and project management concerns, but varies differently at different stages of the design process. Dick and Carey's teamwork concept relies on group (manager and specialists) collaboration of skills for the production of the final product. Sometimes the instructor as a stand-alone can also be the "team" on condition that the instructor has all the skills needed for the project (Dick, Carey & Carey, 2002). The Kemp model assumes that the designer has strong meta-cognitive and leadership skills to be able to manage and revise changes during the development process (Botturi, Cantoni, Lepori & Tardini, in press; Morrison, Ross & Kemp, 2004). Morrison, Ross & Kemp states that the four essential roles are the instructional designer, instructor, SME and evaluator each having specific skills and responsibilities. The 3PD model discusses the support of skills as well as developing instructors and students' skills and knowledge though shared

communication and working relationships (see Figure 4). Team members consist of administrators, technicians, designers, instructors and as well as learners (Sims & Jones, 2003). The inclusion of learners as well as focus on team (academic and technical staff) care and concerns contrast the 3PD model from the other models.

3PD Team model

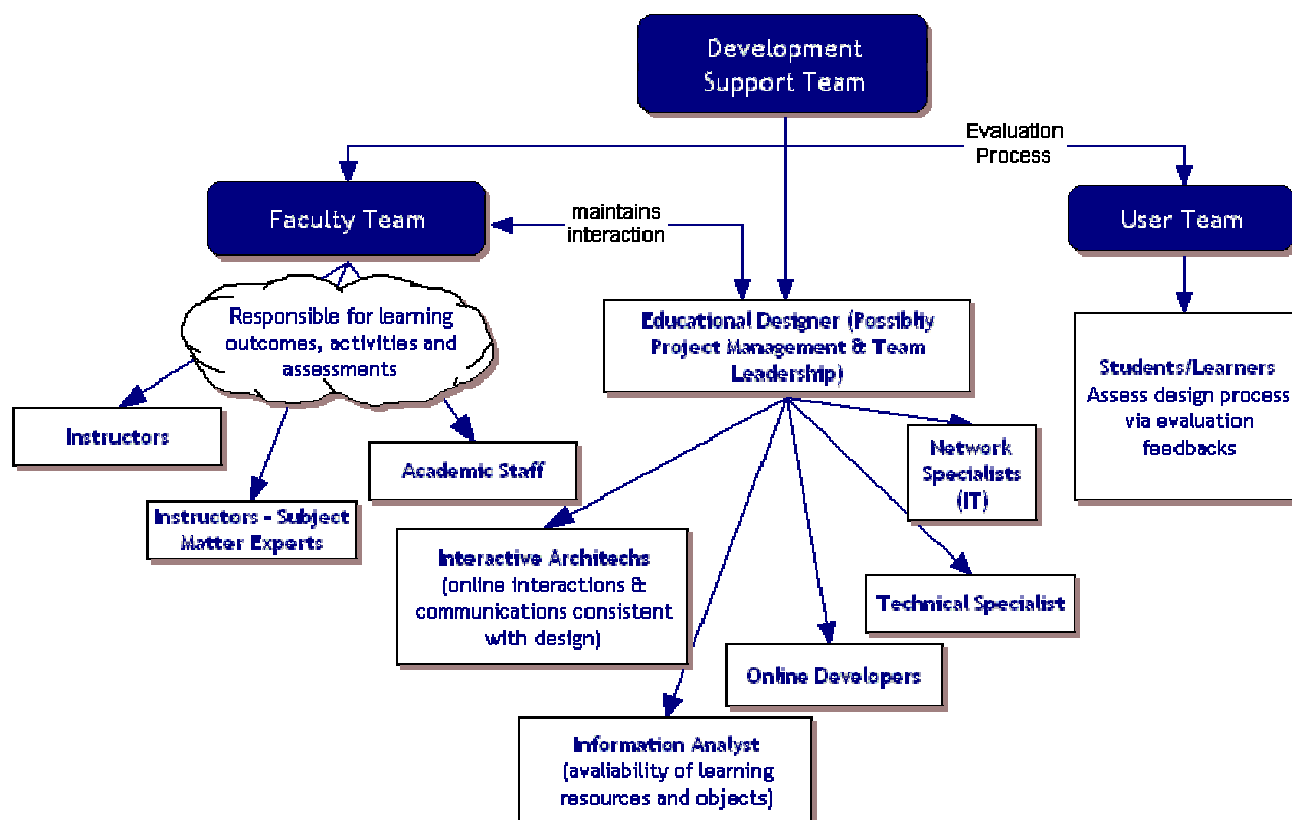


Figure 5. 3PD Team Responsibilities (source from Sims & Jones, 2003).

Conclusion

Three instructional design models, namely, Dick and Carey, Kemp and the 3PD model for educational initiatives were discussed and presented in this paper. Each model offered valuable benefits and guidance applicable to the instructional design process depending upon the institution's needs, purpose and setting. The characteristics and design for each model were compared and contrasted. Several similarities and differences were found during the analysis.

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