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Comparison of instructional design models: An instructional design model; example of the Near East University

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Abstract

The concept of instructional design, whose roots are based on the 1920s and the use of World War II and later, begins with the use of information by many psychologists, such as Gagne, Briggs and Flagan, for systematising their knowledge. To date, many instructional design models have been introduced and each has been classified in different ways and has many advantages in teaching environments. In this context, instructional design is discussed in terms of process, discipline, science, system and performance. In the scope of the research, a total of nine instructional design models were compared with each other in terms of eight criteria (general characteristics, purpose, basic outputs, model flow, strengths and weaknesses, importance and basic theories). The aim of the study is to help choose the most suitable and most useful instructional design model for the purpose of teaching environments.

Keywords: Instructional design models, general features, learning features, comparison.

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1. Introduction

When the instructional design is considered as a **process**, it is defined as a systematic development process that takes advantage of learning–teaching theories to improve the quality of teaching. In this process, it is also important to develop the appropriate systems that meet the needs and objectives of the learners as well as those (Berger & Kam, 1996).

When the instructional design is considered as a **discipline**, it is defined as a discipline that is based on the development and implementation of these strategies and the teaching strategies in research and theoretical context (Berger & Kam, 1996).

When instructional design is described as **science**, it is the science of design to develop, implement, evaluate and support learning (Berger & Kam, 1996).

When instructional design is defined as a **system**, it is a discipline that is based on analysis, design, development, implementation and evaluation processes (Dick & Carey, 2005).

When the instructional design is considered as **performance**, it is defined as a process in which instructional or non-instructional work and resources are managed to improve learning and performance (Reiser, 2001).

The concept of instructional design, whose roots are based on the 1920s and the use of World War II and later, begins with the use of information by many psychologists, such as Gagne, Briggs and Flagan, for systematising their knowledge. These psychologists have formed the foundations of the instructional design with the various methods and techniques they have developed during the training given to the soldiers in the army during the war. In the subsequent processes, there have been many developments under the title of instructional design and in this context, instructional design models have emerged (Reiser, 2001).

In general, there are four main elements in almost every design model (Kemp et al., 1996). These items include;

- Who is the learner? (learner features)
- What do we want to teach the learners? (targets)
- How is the subject or skills best taught? (learning–teaching methods and techniques)
- How do we know if learners are learning? (evaluation process)

The main purpose of the instructional design models is to guide the teaching of the development of functional learning processes to determine the training needs of a specific target audience and to meet these needs (Cakir, Cebi & Ozcan, 2013). In other words, it provides to effective systems with conditions that support learning.

Educational environments are full of learners with a wide range of skills, learning habits and mental abilities (Keles, Erumit, Ozkale & Aksoy, 2016). In this context, the *cognitive characteristics of learners*: general characteristics and readiness, *physical properties*: sensory perception, general health status and age, *affective characteristics*: interest, motivation, attitude, self-self, anxiety, beliefs and success characteristics, *social characteristics*: peer relations, cooperation trends, moral development, socioeconomic status, ethnicity and role models are important (Akkoyunlu, Altun & Soylu, 2011).

In terms of instructional design models, it is very difficult to make comparisons or make it superior to each other in terms of every stakeholder (academician, teacher, student, designer, program development specialist). For such an effective choice, it is essential to know well where the model came from, what purpose it was developed for, the extent to which it matched the educational objectives, and what skills or practices were required (Andrews & Goodson, 1980).

In this context, 9 instructional design models, 8 criteria (general characteristics, purpose, basic outputs, model flow, strengths and weaknesses, importance, basic theories) and compared with each other.

2. Method

This research was continued with literature review. The literature review is a process of examining the current sources of information and documents in order to reach the whole of the works written on the various subjects of a branch of science. In this context, before the research, books, theses, articles and other studies on the general characteristics of instructional design models were compared.

Table 1. Classification of instructional design models

Class-focussed models	Product-focussed models	System-focussed models
Assure Model	Seels and Glasgow Model	Dick-Carey Model
Gerlach and Ely Model	Hannafin and Peck Model	Smith and Ragan Model
Morrison–Ross–Kemp Model	Bergman and Moore Model	Diamond Model

Instructional design models 8 criteria; general characteristics, objectives, basic outputs, model flow, strengths and weaknesses, importance, based on the basic theories are compared in this study. The classification of Gustafson and Branch (2002) was used to create these 8 criteria.

3. Findings

3.1. Class-focussed models

3.1.1. Assure model y

- **General features:**
  The Assure Model is an instructional design model that aims to systematically plan teaching and to increase the efficiency of material selection and use (Akkoyunlu et al., 2011). Steps of the model; *learner analysis*, *determination of goals*, *selection of methods*, *media and materials*, *preparation and use in teaching environments*.
- **Purpose:**
  To create technology supported teaching environments.
- **Basic outputs:**
  Systematic planning of technology-supported classroom environment.
- **Course of model:**
  Linear
- **Strengths:**
  Systematic and detailed learner analysis and revision are the strengths of the model.
- **Weaknesses:**
  Time-consuming planning and implementation stages are among the weaknesses of the model.
- **Importance:**
  Technology support in teaching environments.
- **Basic theories:**
  Behavioral and Cognitive Theory

3.1.2. Gerlach and Ely model

- **General features:**

This is the first work to be planned in instructional design to determine the content of the subject. Subject contents are written within the scope of previously determined objectives and behaviours. At the same time, learner needs and readiness levels are among the other items that should be considered at this point.

- **Purpose:**

Developing the skills of the teachers to determine the deficiencies or errors they have identified and observed in the daily lesson plans and to solve them. If there is an error again, re-start the educational activities.

- **Basic outputs:**

To revise the missing or errors that occur during the daily course and to maximise the success level of the learners.

- **Course of model:**

Linear

- **Strengths:**

Offers systematic instructional design.

- **Weaknesses:**

Planning and implementation stages are time consuming.

- **Importance:**

Finding feedback activities when there are any shortcomings or errors in planning during instructional design.

- **Basic theories:**

Cognitive Theory

3.1.3. Morrison–Ross–Kemp model

- **General features:**

This model focusses on the continuous evaluation of each development phase during design. It is a non-linear circular model and the nine digits in the model are independent of each other and are not considered in order.

- **Purpose:**

In the model, it is aimed to mobilise the design activities by focussing on the analysis of topics, the characteristics of the learners, behaviours, teaching activities, resources, support services and evaluation.

- **Basic outputs:**

The feature that distinguishes this model from other models is that it deals with teaching from a student perspective.

- **Course of model:**

Spiral

- **Strengths:**

Individuals can progress in the direction of instructional methods on a chosen path. The learning environment focusses entirely on the learner.

- **Weaknesses:**

The planning and implementation stages can be time consuming in the process.

- **Importance:**
  It has a flexible structure within the instructional design models. Surec boyunca destek hizmetleri alınabilir.

- **Basic theories:**
  Behavioral and Cognitive Theory

3.2. Product-focussed models

3.2.1. Seels and Glasgow model

- **General features:**
  If the instructional designers want to increase the permanence of the product on the student, it would be appropriate to use the Seels and Glasgow model. In this context, the model can be preferred by novice users.

- **Purpose:**
  The aim of the model is to increase productivity in production is to go to review and revision. Thus, more effective and more permanent designs can be made.

- **Basic outputs:**
  The materials produced are equipped with visual contents in simple ways that both instructors and learners can use (Seels & Glasgow, 1998).

- **Course of model:**
  Semi-linear

- **Strengths:**
  The model requires intermediate level instructional design skills that can be used both by beginners and by professional designers. In addition, it provides designers with flexibility as it allows for material development.

- **Weaknesses:**
  It is a model that prolongs the design process due to continuous interim evaluation, revision and repetition during design.

- **Importance:**
  The Seels and Glasgow model aims to systematically work on teaching problems and learning conditions.

- **Basic theories:**
  Constructivist

3.2.2. Hannafin and Peck model

- **General features:**
  Problem analysis, design, teaching, implementation and evaluation are among the steps of the model.

- **Purpose:**
  The Hannafin and Peck Model is developed for the design of technology-supported teaching environments such as the Assure model.

- **Basic outputs:**
  It is an instructional design model that allows systematic planning of technology supported learning environments.

- **Course of model:**
  Flexible

- **Strengths:**
  In the model, feedback is received during the process to see how the instructional design is progressing and to evaluate its acceptance by the learner. In order to improve and improve the quality of the design with the feedbacks received, renewal and repairs can be carried out (Hannafin, 1987).
- **Weaknesses:**
  The planning and implementation stages are time consuming in the process.
- **Importance:**
  It is a design model that provides technology support in teaching environments.
- **• Basic theories:**
  Behavioral and Cognitive Theory

3.2.3. Bergman and Moore model

- **General features:**
  The problem is first analysed in the model so that the real purpose of the project is tried to be defined. In the next step, environmental analysis including target analysis, needs analysis and where to use the instructional design is done.
- **Purpose:**
  The model is used to realise and manage the production of interactive products and focusses on large multimedia projects.
- **Basic outputs:**
  In addition to multimedia and video, interactive new materials and technologies are produced in the model (Larson & Lockee, 2014; Lockee, 1996).
- **Course of model:**
  Linear
- **Strengths:**
  It is easy to allow trial and revision.
- **Weaknesses:**
  The old model, expensive, technical and complex process creates a limitation for designers (Bergman & Moore, 1990). Formative evaluation is made at every stage of the model. In this context, the use of the model should be advanced level of instructional design expertise.
- **Importance:**
  New material development and ease of stepping.
- **Basic theories:**
  Constructivist

3.3. System-focussed models

3.3.1. Dick and Carey model

- **General features:**
  The model, developed by Dick and Carey (1985), is an instructional design model that allows designers to achieve their learning goals and goals, and plans instructional strategies with a set of events and phenomena.
- **Purpose:**
  The purpose of the model is the design of one semester course or unit. It is possible to make designs for primary and high school levels on behalf of large groups.

- **Basic outputs:**
  Users of all levels of design skills can easily use the model.
- **Course of model:**
  Linear
- **Strengths:**
  Clarity in explaining the stages of the model is seen as an advantage. The model can be applied to students with different levels and status.
- **Weaknesses:**
  The fact that the examples given in the model are for the work life force the designers to make sample applications (Brandt, 2001; Dick, Carey & Carey, 2001).
- **Importance:**
  The model can be easily used by designers at the beginning stage. In this context, it is a model that can be used by designers who have just started to design a course, course or content.
- **Basic theories:**
  Behaviourist Theory

3.3.2. Smith and Ragan model

- **General features:**
  Smith and Ragan design model is a design theory based on a pragmatic approach based on a system approach, trying to explain instructional design and learning in this context. According to the model, the instructional design process starts with the determination of the performance objectives and follows the regulation of the teaching strategies (Smith & Ragan, 2001).
- **Purpose:**
  Providing careful and effective solutions to teaching strategies and developing special teaching strategies.
- **Basic outputs:**
  The Smith and Ragan model is a system-oriented model that is used to design a course or a curriculum in order to provide a learner-centred education in which the systematic, problem-solving process is applied (Smith & Ragan, 2001).
- **Course of model:**
  Linear
- **Strengths:**
  According to the model, the designer can make some changes in the steps of the model. For example, if the necessary information about the learner is available, the analysis step can be skipped and continue with the next step.
- **Weaknesses:**
  The steps in the stages of the Smith and the Ragan model are intertwined. Therefore, the change in one step causes changes in the other steps and creates a time problem for the designer (Smith & Ragan, 2001). In addition, the model requires an advanced design skill.
- **Importance:**
  With the Smith and the Ragan model, the training of different levels of institutions is provided but also the design of new materials.
- **Basic theories:**
  Cognitive Theory

3.3.3. Diamond model

- **General features:**
  It is seen that the model is used to promote the use of current technology (Diamond, 1998).
- **Purpose:**
  It is used to design a module, unit, subject or a course within the curriculum.
- **Basic outputs:**
  In the model, an emphasis is placed on teamwork to produce a comprehensive result within the process.
- **Course of model:**
  Semi-linear
- **Strengths:**
  One of the biggest advantages of the model is teamwork, innovation and technology.
- **Weaknesses:**
  The use of the model only in higher education programmes limits its use and development.
- **Importance:**
  Unlike other instructional design models, emphasises team/team work in solving problems.
- **Basic theories:**
  Behavioral, Cognitive and Constructivist Theory

4. Results and comment

In this research, class-oriented, product-oriented and system-oriented models were compared according to eight criteria. In this context, the results are expected to be a reference for designers. It is important to know before going to these comparisons; it is very difficult to estimate the success of the instructional design model that is decided to plan for a particular learning situation and there is no method for this (Gustafson & Branch, 2002).

Examining the class-oriented models: Assure model is an effective instructional design model that can be used to create technology-supported learning environments. However, users should remember that all stages of this model must be planned again and again. Gerlach and Ely Model: it is one of the most suitable instructional design models to be chosen if group work is done in the classroom. However, the planning and implementation phases are time consuming and should not be ignored in the process. Teaching is the most appropriate teaching design model Morrison–Ross–Kemp model that can be preferred if it is to be taken from a student perspective. In addition, the model has a flexible structure and can be easily adapted to other instructional designs. The planning phase, such as Gerlach and Ely model, is a time-consuming disadvantage for designers.

After the use of product-oriented models, new learning teaching materials emerge. If it is desired to use the interim evaluation step in the design process, the preferred instructional design model can be Seels and Glasgow Model. Continuous interim evaluation, revision and repetitions in the process are disadvantages for designers. Hannafin Peck is the most appropriate instructional design model that can be chosen if it wants to see how the process is progressing and to evaluate learner acceptance. However, the quality of the design is improved and more effective products are produced. However, the time problem is a disadvantage. Bergman and Moore model are preferred if instructional design is to be subjected to trial and revision procedures. Furthermore, the level of expertise of the instructional designer is expected to be at an advanced level.

System-oriented models examined: it should be known that the instructional design models included in this scope need extensive teamwork. The Dick and Carey model is an appropriate instructional design model that can be preferred in terms of addressing learners of different levels and status. The

fact that the examples given in the model are for the work life force the designers to make sample applications. Designers who wish to provide elaborate and effective solutions to teaching strategies and to develop special teaching strategies in this context may choose the Smith and Ragan model among instructional design models. Considering the disadvantages of the model, the change in one step causes changes in the other steps, which creates a time problem for the designer. In addition, the model requires an advanced design skill. Finally, when looking at the Diamond model, teamwork, innovation and technology support is one of the biggest advantages. However, it is the biggest limitation to use only in higher education programmes.

5. Suggestions

When the literature is examined, it is noteworthy that there are many instructional design models. Only nine of the instructional design models were covered in this study. In the study, it can be suggested that new research and comparison studies can be done in the context of other instructional design models. These research and comparisons can be conducted both at theoretical and practical levels at different levels of educational institutions. In this context, which instructional design can be more effective in terms of which instructor and learner opinions can be determined.

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Appendix

The instructional design of the related thesis (*The Effects of The Use of Online and Blended Learning Environments in Mathematics Teaching Based on Authentic Learning Approach to Students' Mathematical Success and Online Authentic Learning Self-efficacy*) was made by Assure model.

In this study, the reason for the inclusion of the Assure model is one of the most suitable models that provide technology support in a systematic plan for course designers who want to use materials and technologies effectively and efficiently. The steps in which the steps of the Assure model are adapted to the scope of study are as follows:

1. Analysis of learners

The target group was determined in this step. First grade students in different departments of Near East University Vocational School of Health Services constitute the target group of the study. In addition, the entrance qualifications of the students were determined at this stage. In this context, needs analysis was performed. Before starting the 16-week training, open-ended questions were asked to determine the expectations of the students. The students answered these questions via a social network (Facebook) from the group page opened for the course. Related questions:

What kind of changes (advantage, disadvantage) can you create if the basic mathematics education is carried out using the virtual method in the classroom rather than in the classroom?

What are your expectations (course materials, method, evaluation, etc.)?

When the answers were examined, it was determined that the expectations of the students were more oriented towards the exams. In addition, since the teaching will not be carried out face-to-face in a classroom environment, the students expressed that they would be uneasy about this issue. As a suggestion, the situation of creating the opportunity of meeting with the instructors in the classroom before the exam week is discussed.

2. Determination of purposes

At the end of this, instructional design designed for the needs of students as follows:

Gain awareness about authentic learning,

Have self-efficacy for authentic learning online,

Students will be able to adapt their knowledge and skills to daily life, real life, environment and situations and gain lifelong learning in this context,

They are expected to have cooperative learning, creative thinking and independent learning skills.

3. Determination of purposes

In this study, pre-test and post-test control group experimental design was used. In this context, three groups were determined: two experiments and one control group.

4. Use of media and materials

The selection of media and materials varies between the experimental groups and the control group.

Basic Mathematics course, based on the authentic learning approach, was conducted in a blended learning environment in Experiment 1 group. In accordance with the structure of the blended learning method, the courses were conducted traditionally and online. The course materials used are: Textbook (Basic Mathematics—II, A. Kacar (2006). PegemA Publishing, Ankara.), whiteboard, Moodle LMS, Moodle modules (including forum, survey and homework modules), Moodle productivity tools (calendar-process monitoring, in-class search and offline study), BigBlueButton tool, authentic learning-context online course videos and Facebook group page. In addition to authentic learning approach, event-based learning, scenario-based learning, connected learning and problem-based learning are used.

Basic Mathematics course based on authentic learning approach was conducted in the online learning environment in Experiment 2 group. The course materials used in this context are: Moodle LMS, Moodle modules (including forums, surveys and homework modules), Moodle productivity tools (calendar-process tracking, in-class search and offline work) The BigBlueButton tool is the authentic learning-context online course videos and Facebook group page. In addition to the authentic learning approach, event-based learning, scenario-based learning, correlative learning, and problem-based learning were used. All of these methods and techniques used are based on students solving real problems from life and associating them with course subjects (Bektas & Horzum, 2014).

Basic Mathematics course based on authentic learning approach was conducted in the traditional learning environment in the control group. The course materials used are: textbook and whiteboard. Authentic learning approach has been used to support learning. In the environment, in accordance with the traditional learning method, teaching staff took the role of authority within the classroom and students were kept as listeners. The main resources are teaching staff; the textbook was used as an auxiliary resource to the instructors (Senemoglu, 2011).

5. Participation of learners

This step is considered as an intermediate evaluation stage in the process, in this direction feedback from students. The lecturers gathered all group students together in the 7th week and held a meeting in order to question the satisfaction of the students about the learning–teaching process. The records of this meeting were recorded with the permission of the students. The feedback was taken into consideration by the instructors and the researcher, and the deficiencies in the process and learning environment were determined and a number of solutions and innovations were made to eliminate these deficiencies.

6. Evaluation

The online authentic learning environment developed at this stage has been evaluated by the students for the last time in terms of purpose and suitability. In this study, a scale was developed by the researcher: *Student Opinion Scale on the Assessment of Moodle LMS with an Educational Online Learning Environment* .

The online authentic learning environment six created in this context is presented to the learners in terms of size. These dimensions are as follows: usefulness, effectiveness, communication and feedback, content, competence and motivation. Apart from the said questionnaire, the achievement test developed by the lecturers pre-test and the self-efficacy scale for online authentic learning were applied as a final test to the target group at the end of the 16-week period. For the purposes of these data collection tools, necessary evaluations were made at the end of the learning–teaching process.

As a result, considering the results of this thesis designed with Assure Model, in this thesis designed with the Assure Model, the desired success has been achieved according to the purpose and sub-objectives and it was found that the academic achievement and online learning self-efficacy of all group students increased compared with the pre-test level.

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