DeepScience
*Multidisciplinary Research: Innovations in Science, Arts and Commerce*
*Published in October 2025 by Deep Science Publishing (USA | UK | India | Turkey)*
*ISBN: 978-93-7185-157-2 | E-ISBN: 978-93-7185-737-6 | DOI: https://doi.org/10.70593/978-93-7185-737-6*

# A comparative study of Instructional Design Models with special reference to Dick and Carey Model for E-content Development

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***Abstract***

*Creating effective E-content is essential for preparing pre-service teachers with modern pedagogical skills. Instructional design models provide structured frameworks for developing engaging and impactful digital learning contents. The purpose of this study is to compare four leading models—ADDIE, Morrison, Ross and Kemp, Dick and Carey, and Seels and Glasgow—to determine the most suitable framework for E-content development aimed at pre-service teacher education. The comparison examined aspects such as model structure, procedural flexibility, learner-centeredness, and support for innovative teaching. Results indicated that the Dick and Carey model is the most appropriate due to its systematic, linear, and interconnected components. Its focus on instructional goals, formative evaluation, and learner analysis makes it especially effective in crafting E-content that addresses the changing pedagogical needs of pre-service teachers. The study concludes that the Dick and Carey model is the optimal framework for creating innovative, structured, and learner-centered E-content. Its systematic design process guarantees both instructional quality and adaptability, meeting the requirements of 21st-century digital learning environments.*

**Keywords** : *Instructional Design Models, Dick and Carey model, E-content*

## Introduction

The rapid integration of digital technology in education has led to an increasing reliance on E-content to enhance teaching and learning. With advancements in digital pedagogy, instructional resources have evolved from static text-based materials to interactive, multimedia-rich digital content designed to facilitate deeper engagement and comprehension (Mayer, 2022). The proliferation of Learning Management Systems (LMS), adaptive learning technologies, and artificial intelligence-driven educational platforms has further transformed instructional delivery, making E-content an indispensable tool for educators and learners alike (Hodges et al., 2020).

According to Darling-Hammond et al., (2017) the preparation of pre-service teachers in Bachelor of Education (B.Ed.) programs demands specialized instructional strategies to equip them with the necessary pedagogical and technological competencies. Traditional teacher training often emphasizes theoretical knowledge without sufficient focus on integrating technology into pedagogy, leading to gaps in digital literacy and instructional effectiveness. Developing effective E-content for pre-service teachers is crucial for fostering digital

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pedagogy skills, improving lesson planning, and enhancing student engagement in classrooms (Koehler & Mishra, 2009). Redecker & Punie (2017) believe that well-designed E-content can provide flexible, self-paced, and interactive learning experiences, preparing future educators to integrate technology seamlessly into their teaching practices.

Laurillard (2012) noticed that a fundamental aspect of designing effective E-content is selecting an instructional design model that aligns with the principles of innovative pedagogy. As education shifts toward student-centered approaches, E-content must be structured to promote active learning, collaboration, and higher-order thinking skills. Instructional design models offer systematic frameworks for organizing content, ensuring alignment with learning objectives, and incorporating appropriate instructional strategies (Branch & Kopcha, 2014). However, the diversity of these models necessitates a careful evaluation to determine which one best supports the development of learner-centered, engaging, and pedagogically sound E-content for pre-service teacher training.

Reiser & Dempsey (2018) identified, selecting a suitable instructional design model is critical to ensuring the effectiveness of E-content in pre-service teacher education. Models such as ADDIE, Morrison, Ross and Kemp, Dick and Carey, and Seels and Glasgow each offer distinct processes and principles for designing instructional materials. A comparative evaluation of these models can provide insights into their advantages and challenges in the context of teacher training, helping educators and instructional designers make informed decisions about the most effective approach. By selecting the most appropriate instructional design model, resource person can enhance the quality of E-content, improve teacher preparation, and ultimately contribute to more effective and technology-integrated teaching practices in schools.

**Objectives of the Study**

The following objectives were taken for the present inquiry-

1. To adress the limitations of conventional Teacher Education
2. To examine instructional design models in relation to innovative pedagogy for enhancing learner-centered E-content development
3. To conduct a comparative study of four instructional design models—ADDIE, Morrison, Ross and Kemp, Dick and Carey, and Seels and Glasgow—for developing E-content tailored to pre-service teacher training.

**Methodology**

This study employed a comparative analysis of four prominent instructional design models—ADDIE, Morrison, Ross, and Kemp, Dick and Carey, and Seels and Glasgow—within the context of E-content development for pre-service teacher education. The goal was to identify the model that most effectively supports innovative pedagogy while addressing the unique needs of pre-service teachers. Comparative evaluation was chosen as it enables a structured analysis of the strengths, limitations, and applicability of each model.

The study relied on secondary data collected from existing academic literature, books, and peer-reviewed journal articles that discuss the principles, processes, and applications of the selected instructional design models.

**FINDINGS AND DISCUSSION**

1. **Adressing the limitations of Conventional Teacher Education through the use of E-content:**

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Beare et al., (2012) while discussing traditional teacher education models, often reliant on lectures, textbooks, and limited practical experience, may not fully prepare pre-service teachers for the complexities of modern classrooms. Dorner (2010) and Voogt (2013) noticed that these models frequently fall short in equipping future educators with essential technological skills, limiting their ability to integrate digital tools effectively into their teaching practices. Without adequate technology training, pre-service teachers struggle to engage diverse learners and address varying learning styles, which are essential in today's heterogeneous classrooms (Lin, 2008). Additionally, Milman (2005) traditional models often lack authentic assessment methods, such as real-world teaching simulations, which hinders the development of both practical skills and deep pedagogical knowledge. The absence of these opportunities creates a gap between theoretical learning and practical application, leaving many pre-service teachers lacking confidence as they enter the profession.

Lin (2008) as a scholar noted that the increasing diversity of student populations further necessitates culturally responsive teaching, an area where traditional teacher education has often been inadequate. Many programs fail to sufficiently address issues of equity, inclusion, and differentiated instruction, leaving new teachers unprepared to meet the varied needs of their students. Given that teacher quality is a key factor influencing student success (Beare, 2012), it is critical to improve teacher preparation by addressing these limitations. On the other hand, with technology becoming central to education, teachers must develop not only technical proficiency but also an understanding of how digital tools enhance learning. However, many traditional models lack the infrastructure and resources to provide this type of training, compounding the challenges faced by pre-service teachers.

E-content presents a promising solution to these challenges by offering flexible, interactive, and engaging learning experiences. Frehywot (2023) believe high-quality E-content can incorporate multimedia, simulations, and collaborative activities to support diverse learning styles. According to Baidoo-Anu (2023) It also enables personalized learning pathways, allowing pre-service teachers to focus on areas where they need the most support. Additionally, E-content provides opportunities for authentic assessment through virtual classroom simulations and project-based activities, allowing for the application of theoretical knowledge in realistic settings (Milman, 2005). Digital resources further expose pre-service teachers to innovative pedagogical strategies, enhancing their readiness for modern classrooms. According to Dengel et al., (2022) the flexibility of E-content also supports self-paced, asynchronous learning, making teacher preparation more accessible and effective.

## 2. Instructional Design Models

Instructional design (ID) refers to a structured methodology for developing educational and training programs in a systematic and reliable manner (Gustafson & Branch, 2002). This approach ensures that learning materials are created effectively to achieve specific learning goals. The concept of instructional design traces its roots to Silvern (1965), who applied systems thinking to solve instructional challenges. A system consists of interconnected elements that function collectively to achieve a common objective.

Let's discuss the four instructional Design Model one by one:

### *i. ADDIE Model (1975)*

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The center for Educational technology of Florida State University developed ADDIE Model in the Year 1975. The chief purpose to construct this model is to create a systematic guideline for developing instructional System for US Army. It follows of five phases:

1. **Analysis** – Identifies learning goals, audience characteristics, and instructional needs.
2. **Design** – Defines learning objectives, instructional strategies, and assessment methods.
3. **Development** – Creates instructional materials such as E-content, multimedia, and interactive resources.
4. **Implementation** – Delivers the instructional content to learners and facilitates engagement.
5. **Evaluation** – Assesses the effectiveness of instructional materials through formative and summative evaluations and makes necessary revisions.

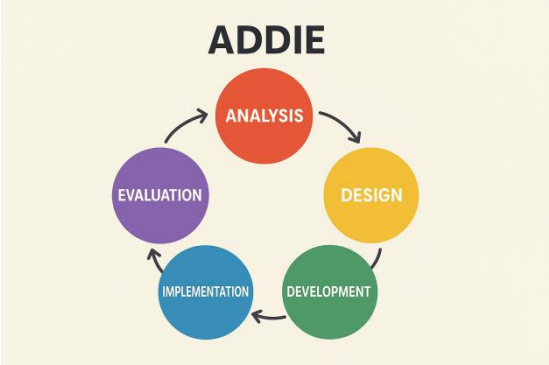


*Figure 1: The ADDIE Instructional Design Model*

The ADDIE model is particularly beneficial for designing learner-centered E-content for pre-service teachers, as it ensures a logical, systematic, and adaptable instructional approach.

### *ii. Dick and Carey Model (1978)*

The Dick and Carey Model (DC) was published in the year 1978 by Walter Dick and Lou Carey. The model was discussed in the book titled “The Systematic Design of instruction”. This model follows a structured instructional design approach based on behaviorist principles. It is similar to the ADDIE model but provides a more detailed and prescriptive sequence of steps. This model consists of ten interrelated components:

1. Identifying learning needs and goals.
2. Conducting instructional analysis.
3. Assessing learner characteristics and learning contexts.
4. Defining performance objectives.
5. Developing assessment methods.
6. Designing instructional strategies.
7. Creating and selecting instructional materials.
8. Conducting formative evaluation to refine instruction.
9. Revising instructional content based on feedback.
10. Conducting summative evaluation to assess overall effectiveness.

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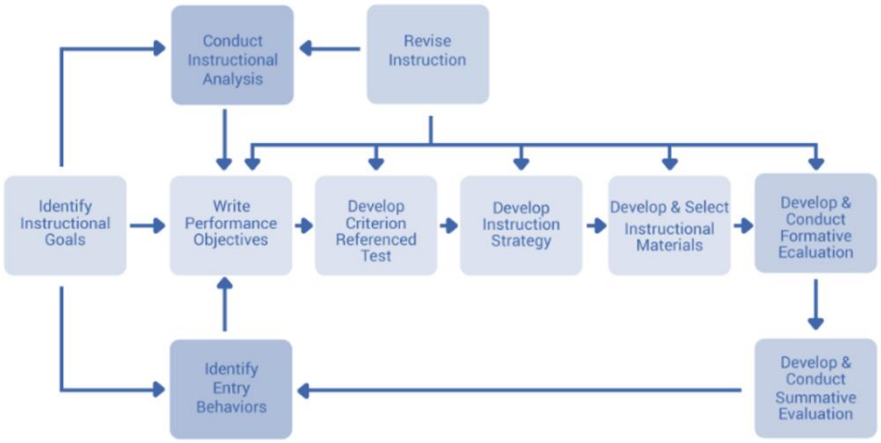


*Figure 2: The Dick & Carey instructional design model*

This model is less flexible than ADDIE model. This model is effective in course development as it is more focused on effective content making.

### *iii. Morrison, Ross, and Kemp (MRK) Model (1994)*

The Morrison, Ross, and Kemp Model (MRK) was introduced by Jerrold Kemp with Gary Morrison and Steven Ross in 1994. This model is a learner-centered instructional design framework that follows a circular, non-linear process. Different from ADDIE and Dick and Carey, this model allows for greater flexibility in instructional design. It consists of nine interdependent steps:

1. Identifying instructional problems and defining learning objectives.
2. Analyzing learner characteristics.
3. Identifying subject content and breaking it into manageable units.
4. Defining clear instructional goals for learners.
5. Organizing and sequencing content logically.
6. Designing instructional strategies for mastery learning.
7. Planning instructional delivery.
8. Developing assessment and evaluation tools.
9. Selecting learning resources to support instructional activities.

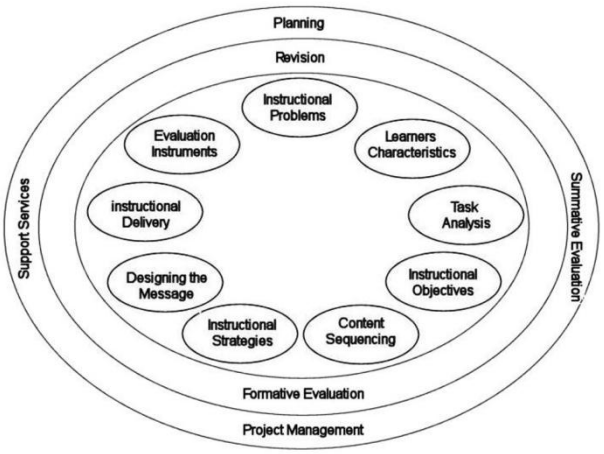


*Figure 3: Morrison, Ross & Kemp (MRK) model*

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This model is particularly effective for personalized learning and adaptive instruction, making it ideal for teacher training programs that require dynamic and evolving content.

### *iv. Seels and Glasgow Model (1990)*

The Seels and Glasgow Model was developed in the year 1990 by Barbara Seels and Zita Glasgow. This model is a project-based instructional design framework that focuses on systematic planning and implementation. It is commonly used in large-scale instructional projects, including e-learning and digital content development. The model follows three major phases:

1. Needs Analysis and Planning – Identifies instructional goals, learner requirements, and project constraints.
2. Design and Development – Structures content, selects instructional strategies, and creates multimedia-based learning materials.
3. Implementation and Evaluation – Deploys instructional content, trains facilitators, and conducts continuous assessment to improve learning outcomes.

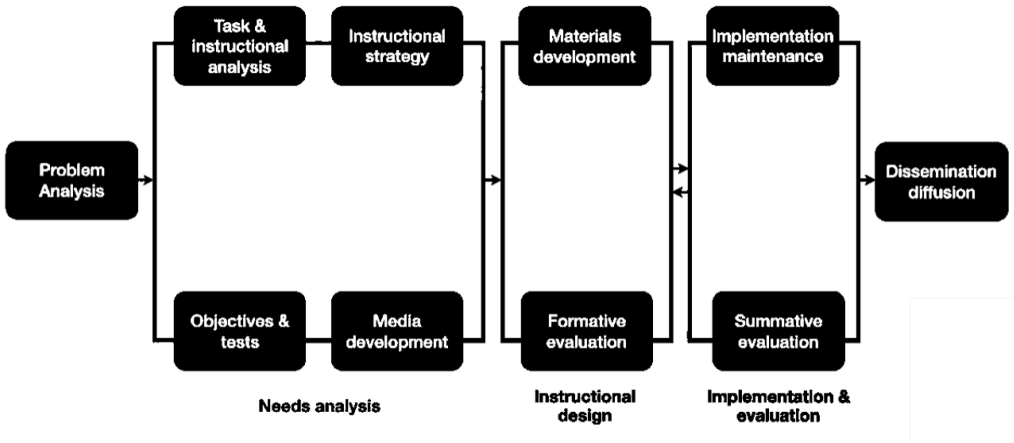


*Figure 4: Seels and Glasgow Model of Instructional Design*

This model is particularly useful for pre-service teacher training as it ensures a well-organized, technology-driven, and systematically designed learning experience.

## 3. Comparative Study of four ID Models towards developing effective E-content for Teacher Education.

Various ID models, including ADDIE, Morrison, Ross, and Kemp (MRK), Seels and Glasgow, and Dick and Carey (DC), offer structured frameworks for designing and implementing instructional content. This paper critically evaluates these four models, highlighting their strengths, limitations, and suitability for E-content development. While all four models follow a systematic approach, they differ significantly in orientation, flexibility, learner focus, and project management.

| Model | Orientation | Approach | Primary Output | Goal | Flexibility | Learner Focus | Evaluation |
|---|---|---|---|---|---|---|---|
| **ADDIE** | Systemic | Systematic | Course or curriculum | Develop structured instruction | Moderate | Strong | Extensive in evaluation phase |
| **MRK** | Classroom | Holistic | A few hours of instruction | Improve a piece of content | High | Strong | Moderate |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Seels & Glasgow** | Product | Systematic | Instructional package | Improve efficiency of production | Medium | Moderate | Extensive in materials development phase |
| **Dick & Carey** | System | Systemic & Systematic | Course or curriculum | Create an instructional system | Medium | Moderate | Extensive throughout |

### 3.1 Flexibility and Framework

Gustafson & Branch, (2001) points out a major distinction among these models is their degree of flexibility. The ADDIE and DC models follow a linear structure, guiding instructional designers step-by-step from analysis to evaluation. This structured approach ensures consistency but may be too rigid for adaptive learning environments.

Morrison et al., (2004) noticed that the MRK model follows a curvilinear process, allowing greater interaction between design components and non-linear development. The Seels and Glasgow model, while systematic, is organized into three project management phases, providing some degree of adaptability while maintaining structure (The Herridge Group, 2004).

### 3.2 Emphasis on Learner Needs and Personalization

According to Siragusa (2006) Learner need, engagement and adaptability are crucial for effective content development. The MRK and ADDIE models place a strong emphasis on learner-centered approaches, ensuring content customization and interactive learning. ADDIE, in particular, follows an iterative cycle, allowing for continuous improvements based on feedback.

In contrast, the Seels and Glasgow and DC models focus more on content production efficiency rather than individualized learning experiences. While learner characteristics are analyzed in both models, their rigid structures may limit real-time adaptability in instructional design (Setiawan, 2005).

### 3.3 Advantages and Challenges in E-content Development

Each model presents unique advantages and challenges for developing effective e-learning content:

i. **ADDIE Model**
- *Advantages:* Structured, iterative, widely applicable to various instructional settings.
- *Challenges:* Can be time-consuming, requires continuous evaluation for effectiveness.

ii. **MRK Model**
- *Advantages:* High flexibility, strong learner focus, allows customized and interactive E-content.
- *Challenges:* Less structured project management, requiring more design expertise.

iii. **Seels and Glasgow Model**
- *Advantages:* Strong project management focus, balances structure and adaptability.
- *Challenges:* Moderate learner focus, prioritizes production efficiency over customization.

iv. **Dick and Carey Model**
- *Advantages:* Comprehensive, ensures alignment with instructional goals.
- *Challenges:* Fixed in approach and framework oriented.

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### 3.4 Summary of the Comparative Findings

After considering the all the structure, Strengths and limitations we can summarise the findings as follows:

- One of the key strengths of the Dick and Carey Model is its emphasis on a systematic and learner-centered approach to instructional design.
- The Dick and Carey Model is the most suitable for E-content development among the given models because of its systematic, linear structure, and effectiveness-driven approach.
- Unlike the ADDIE Model, which is broad and generic, Dick and Carey provides a structured framework with interrelated components, ensuring step-by-step content development. Compared to the MRK Model, which focuses mainly on motivation, Dick and Carey emphasizes instructional alignment, assessment, and evaluation, making it ideal for structured E-content Development.
- The Seels and Glasgow Model is more suited for large-scale instructional systems, while Dick and Carey's modular nature makes it highly adaptable for E-content in mathematics pedagogy. Its nine interconnected stages, from identifying goals to formative evaluation, ensure high-quality, engaging, and effective learning materials.
- DC model integrates learner need, learning theories, instructional strategies, and feedback mechanisms, making it the best choice for developing well-structured E-content that enhances pre-service teachers' learning experiences.

## Conclusion

Choosing an instructional design model for E-content development should match the need of the learner, goals of teaching, and the flexibility required. More than 100 instructional design models, the ADDIE model is popular because it uses a step-by-step process and allows continuous improvement. The MRK model focuses on keeping learners motivated and adaptable, which makes it useful for interactive and learner-centered e-learning. The Seels and Glasgow model helps in creating content in a structured and project-based way, balancing efficiency with effectiveness.

The Dick and Carey model is different because it is very systematic, linear in structure and goal-oriented. It also includes assessment, alignment, and evaluation as key parts of the instruction making process. Some researcher think it is too rigid, but its connected steps provide a strong framework supported by research. This model is structured yet flexible, making it a great choice for E-content development. It ensures better teaching quality and keeps learners more engaged.

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*ISBN: 978-93-7185-157-2 | E-ISBN: 978-93-7185-737-6 | DOI: https://doi.org/10.70593/978-93-7185-737-6*

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