

## Standards for Developing Instructional Websites Using Artificial Intelligence Applications: A Study on Instructional Technology Students

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## **Abstract:**

In recent years, Artificial Intelligence applications have developed and are used in all fields. The production of Instructional Websites using these applications has had a great deal of luck from many companies, especially the major international companies Google, Microsoft, and Open.ai. And other applications that are provided for free or paid, as these applications contributed to the production of many Instructional Websites, which necessitated research into standards to evaluate the number of these sites that are produced by Instructional technology students, teachers or teaching experts, and this is what this research aims to reach instructional standards that are represented in the clarity of the general goal and instructional goals of the website on the home page and other indicators, and technical standards that are represented in the appearance of page sections and the sidebar, and site development standards that are represented in the use of codes and page design languages HTML, CSS, MySQL, PHP. How much do you use Github? In development, then the standards related to the use of Artificial Intelligence applications in website development.

## **Introduction:**

With its increasing spread and the number of its users, the Internet has become important and necessary in all areas of life, as its sites vary in all aspects of social, economic, political, cultural and entertainment activities. As a result, it has become necessary to guide and teach learners to develop and produce instructional websites by providing adaptive content for each learner in a manner that suits his capabilities and abilities.

In the digital era, developing and designing instructional websites has become a critical skill, particularly

with the rise of AI applications enhancing these processes. This is due to the massive spread of the Internet, especially in instructional institutions, and the ease of access to it anywhere there is a computer connected to the network, until it has become a method of daily dealing and knowledge exchange between individuals and institutions. This is confirmed by many studies such as the study (*Ahmed, 2021*); and the study (*Tamer et al., 2021*).<sup>1</sup>

Instructional website development skills are essential competencies for Instructional technology students, as they are responsible for teaching the design and development of instructional websites and the use, teaching and development of remote learning environments that consist mainly of web pages. Therefore, the instructional technology student must be familiar with the skills of developing instructional websites, especially modern ones that rely on Artificial Intelligence applications (*Muhammad et al., 2020*).

Many studies have addressed the skills of designing, developing and producing instructional websites, such as: the study (*Muhammad et al., 2020*), which addressed the development of instructional website skills using widespread learning environments; the study (*Muhammad, 2021*), which addressed the impact of differences in the characteristics of learning environments on developing website development skills; as well as the study (*Heba et al., 2020*), which addressed the effectiveness of an existing smart adaptive system in developing website design skills. The skills of these studies varied, some of which addressed the skills of the Expression Web program (including skills in using web development languages (HTML, CSS, PHP).

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(<sup>1</sup>) The documentation system used is APA v7 .

Website development methods and skills have developed in recent years using ready-made templates with the provision of servers to upload the site for free or paid. Recently, many sites have appeared that rely on Artificial Intelligence systems to develop websites in less than a few minutes by providing a set of keywords and then producing an integrated website with the possibility of producing a new site each time. Examples of these sites include the site (GPT) and the website (app.writer.com).which is free to use, and the web application (BRAD) from Google which evolved into (Gemini) and (Bing) from Microsoft which later evolved into the Copilot tool. and other sites that develop and produce websites, videos, images or presentations using Artificial Intelligence.

Both Google and (and Microsoft Corporation (For example, in providing many applications based on Artificial Intelligence that can be used in teaching. Providing educational content through ) Microsoft Teams (or ) Google Classroom (As each of them provides services and applications that support Artificial Intelligence systems and can be employed in the learning process, especially if smart applications and their related accessories are employed from one company.

This requires the necessity of defining educational, technical and artistic standards for producing instructional websites using Artificial Intelligence applications in a manner that suits the learners' goals, knowledge, needs, requirements, and abilities to build websites that fulfill the purposes required for them .

## Research Problem

The research problem lies in the absence of well-defined criteria for evaluating instructional websites developed with AI applications, leading to inconsistent quality and effectiveness. This was demonstrated through several sources that can be explained as follows:

Recommendations of many studies that addressed the necessity of developing skills in developing instructional websites using electronic environments with their different characteristics and patterns of design and production, and the importance of learning these skills using evaluation criteria such as the study (*Tamer et al., 2021*); the study (*Muhammad et al., 2020*); the study (*Muhammad, 2021*); the study (*Heba, et al., 2020*); the study (*Hasnaa, 2020*); the study (*Sara, Khaled, 2022*); the study (*Abdullah et al., 2022*); the study (*Nashwa et al., 2022*); the study (*Hani, 2020*); and the study (*Nashwa, et al., 2021*).

Confirming the recommendations of many conferences that address the design of learning environments and the use of Artificial Intelligence applications in education, such as: the first international conference of the College of Education (*Kamil, Y. E, 2017*) and the conference Artificial Intelligence as a Support for Enhancing Adaptive Learning: Contributions and Challenges) (*Amal, 2022*).

Thus, the problem of the current research was determined in the necessity of setting standards for producing instructional websites using Artificial Intelligence applications in a manner that suits the goals and needs of learners. Therefore, the research problem can be addressed by answering the following main question :**What are the standards for producing instructional websites using Artificial Intelligence applications** ؟The following sub-questions branch out from this question:

- What are the instructional standards for producing websites using Artificial Intelligence?
- What are the technical standards for producing websites using Artificial Intelligence?
- What are the criteria for developing a website produced using Artificial Intelligence?
- What are the criteria for using Artificial Intelligence applications in website development?

### **Research objectives:**

The aim of the current research is to reach:

- Instructional standards for producing instructional websites using Artificial Intelligence applications.
- Technical standards for producing instructional websites using Artificial Intelligence applications.
- What are the criteria for developing a website that was produced using Artificial Intelligence?
- Standards for using Artificial Intelligence applications in website development.

### **Research Methodology:**

The current research follows the descriptive analytical research approach for instructional technology research.

#### **Search Steps: Follow the search steps below:**

**First :**Preparing the theoretical framework for the research by reviewing previous studies and instructional technology literature related to the research topic.

**Second :**Presenting previous literature, studies and research related to the standards for producing instructional websites using Artificial Intelligence applications.

#### **Third: Conducting the field study by applying the following:**

1- Preparing a list of standards for producing instructional websites using Artificial Intelligence applications by:

-Collecting the extracted criteria and classifying them logically:  
Setting indicators for each criterion.

-Preparing the initial version of the list of criteria and presenting it to the arbitrators as a pilot sample:

-Show the initial list to a sample of professors, instructional technology and curriculum specialists.

### **Importance of research:**

2- Opening the door for researchers to apply mobile learning or integrate it into e-learning.

3- Directing the attention of researchers interested in the field of instructional technology to conduct studies and research on designing mobile learning environments using instructional, technical and technological standards for mobile learning environments.

### **Research limits:**

The current research is limited to extracting the criteria related to producing instructional websites using Artificial Intelligence applications and the evaluation tool from studies, research and related literature that could be obtained, then presenting them to a sample of professors and specialists in the field.

Importance of research:

The importance of the research stems from several aspects:

- Contribute to providing standards for producing instructional websites using Artificial Intelligence applications
- Laying the theoretical, instructional, technical and scientific foundations for building instructional websites using Artificial Intelligence applications , which is one of the necessary competencies for instructional technology students in particular.
- Providing a mechanism for evaluating instructional websites produced using AI applications.
- Providing research tools that benefit teachers and researchers related to producing instructional websites using Artificial Intelligence applications.

### **Search terms:**

**The researcher defines the skills of producing instructional websites using Artificial Intelligence applications** procedurally as the learner's ability to implement the procedures and steps that he takes using Artificial Intelligence in developing an instructional website according to the standards of designing instructional websites, and it is measured through a cognitive test and a standards questionnaire.

**Operational definition of criteria** : The basis by which a website produced using Artificial Intelligence applications is judged to identify and enhance its strengths and shortcomings, address them and modify them on the site.

Creating instructional websites using Artificial Intelligence applications:

Education in the current digital age is a decisive factor in determining the fate of individuals, institutions and countries, which

necessitated the move towards the second generation of digital transformation that relies on Artificial Intelligence, which results in the development of many skills, the most important of which are the skills of developing instructional websites using Artificial Intelligence. The skills of developing instructional websites using Artificial Intelligence applications are one of the most important technological skills needed for the student teacher in the current digital age, as they represent one of the innovations of technology and its constantly updated methods in education.

Basic concepts

The definitions agree on ( *El-Gendy, Mohamed, 2021* ) ،( *Tamer et al., 2021* ), ( *Mohamed et al., 2020* ) ،( *Sara, Mokli, 2022, 35* ) on the websites:

- A set of pages containing elements such as text, images, videos, and graphics linked together in a cohesive and interactive structure, with the aim of displaying and describing information about a particular entity or institution.
- Special instructional units, aiming to improve and facilitate the learning process for a specific group, through the Internet.
- An interactive learning environment consisting of several pages .connected to each other by hyperlinks Home Page Which represents the starting point for entering the site
- Electronic content is built and organized systematically within these pages and using multimedia.

### **The importance of instructional websites:**

Literature and research ( *El-Gendy & Mohamed, 2021* ), ( *Tamer et al., 2021, 252* ) ( *Mohamed et al., 2020* ) confirmed the importance of instructional websites in that they:

- Websites provide an environment in which the user can control the display and viewing style using different interaction patterns.
- An instructional tool capable of developing education and continuously increasing its efficiency.
- Overcoming the constraints of time and place so that the learner can access and interact at any time and in any place.
- An integrated electronic instructional system that includes many content learning resources, which contributes to increasing the achievement, skill performance, and knowledge stock of learners.



(Tamer et al., 2021, 253: 254) explained that the content of instructional websites is displayed in three forms:

1- Sequential organization: It is called simple or linear organization. This organization is the most widespread because it is similar to the structure of books and magazines that learners are accustomed to using.

2-Hierarchy Organization: One of the best organizations that suit instructional topics is the hierarchical organization, which contains many branches and information, so that you start from the main page and several pages branch off from it.

3-Web Organization: It is considered one of the most complex organizations used, as it supports free navigation without being restricted to the site pages by providing many links within each page.

Elements of instructional websites:

The most important elements of the instructional website design process are:

- 1- Target audience: The instructional website must take into account the needs of its users, their expectations of the content they study, search for and want to acquire.
- 2- Objectives: Writing clear, specific educational objectives is important in the planning and design process as it outlines a clear path for what is to be designed.
- 3-Home Page (Start Page and Contents): A website should include a start page or home page that serves as the starting point to the rest of the site.
- 4- Site browsing environment: The browsing style between the site content, starting from the home page to the other site pages, must be determined in the style adopted for that site.
- 5-Page design: The website pages should follow the design principle of simplicity and clarity, consistency in colors, use of light backgrounds, and maintaining the length of the pages for ease of loading.
- 6-Text and Graphics The clarity of information depends on the degree of visual distinction between the font size, blocks of text and headings and the surrounding white space.
- 7-Choosing the website programming tools (languages - editors - software) used in building websites, and the most appropriate one must be chosen to achieve the goals.

(Tamer et al., 2021, 254: 255) explained that the stages of website development processes are integrated in a harmonious manner to produce a high-quality interactive website, which are:

- a) The planning stage of site development procedures.
- b) Analysis and design phase.
- c) The development phase, evaluation and quality control of the site.
- d) Testing phase of publishing and distributing the site, phase, technical support phase.

There are a set of principles and foundations for designing websites as a process that is not random, and should be based on several principles that are taken into consideration when carrying out each step of its construction and production, starting from the planning and construction stage and ending with the implementation and application stage:

First .Planning :(This is the first step in designing effective web pages by studying the category that the site wants to target, while reviewing pages that contain content similar to what is wanted to be designed to know how others have designed them.

Second: Visual design ) virtual design) . (It includes all the visual factors and elements that achieve visual balance for users:

1- legibility (Avoid backgrounds with many decorations and texts written in unclear fonts, and use common fonts that are available on all devices.

2- Page layout Most web pages have a clear and fixed layout, with the center of the page containing the most important elements, the right side of the page containing new or added elements, and the left side containing the usual and common content.

3- Spatiality Smart design does not take advantage of every space on the page, but rather leaves an empty part of it that does not have to be white, but does not contain main content.

4. Use of multimedia (It involves using animation, sound and video and employing them to create more interactive, attractive and interesting websites.

5. Usability :This is one of the most important design principles, as it is the ease of finding, processing and reusing information.

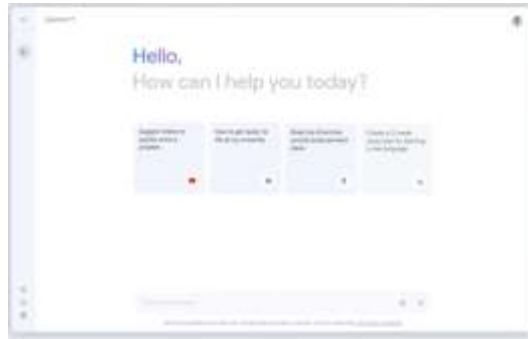
(Heba et al., 2020, 221) designed an intelligent adaptive system based on the principles of Artificial Intelligence technology; it provides content that adapts to the course objectives, learning style, cognitive status, and student characteristics, trying to achieve learning objectives.

Examples of Artificial Intelligence applications that can be used in producing instructional websites

(1) chat.openai



(2) Gemini



(3) Copilot



Procedures for building a questionnaire for the standards of producing instructional websites using Artificial Intelligence applications

The questionnaire on the standards for producing instructional websites using Artificial Intelligence applications was prepared, with the aim of assessing the level of learners in the skills of developing instructional websites using Artificial Intelligence applications chat (openai.com)The questionnaire was built and adjusted by following the following steps:

- 1) **Determining the objective of the questionnaire Criteria :**The questionnaire aimed to measure the performance level of the

two research groups in developing instructional websites using Artificial Intelligence applications chat (openai.com) After the research group finished studying the adaptive content, each learner produced a project an instructional website using Artificial Intelligence applications chat (openai.com).

- 2) **Determining the questionnaire items :**The criteria questionnaire was prepared in light of the list of skills that were reached, the objectives, and the educational content. The questionnaire consisted of (4) main criteria and (12) indicators.
- 3) **Quantitative assessment of the criteria questionnaire elements :**The five-point quantitative assessment was determined in degrees for each aspect of the usage skills in order to evaluate the learner's performance level in each indicator of the questionnaire, so that it is (5) degrees if the learner's performance level for the indicator is proficient, (4) degrees if the learner's performance level for the indicator is very good, (3) degrees if the learner's performance level for the indicator is average, and (2) if the learner's performance level for the indicator is not available (1) if the productive element is not present .The total score is (60) degrees.
- 4) **Validity assessment of the questionnaire :**The criteria questionnaire was presented to (11) arbitrators in the field of instructional technology, to express their opinions on: the item's affiliation to the skill, the importance of the item, and the scientific accuracy of the item. The phrases that obtained a percentage of (43%) or more of the total experts' opinions were selected, and the percentage of experts' opinions on the questionnaire phrases ranged between (81%: 94%), which indicates the validity of the questionnaire and its suitability for application to the students of the survey group.

## Search Results

**Table (1) Distribution of items of the questionnaire for evaluating the development of an instructional website using Artificial Intelligence applications**

The standard	Indicators	number
<b>Instructional standards</b>	-Clarity of the general purpose and educational objectives of the website on the home page. -The site name appears in the ( Header) section.)	3

The standard	Indicators	number
	-The logo used on the site is consistent with the site's objectives.	
<b>Technical standards</b>	-The homepage displays structured sections (Header, Footer, Sidebar, and Main Content), ensuring clarity and accessibility for users. -All site pages appear in ) Side bar -Browsing to the site pages keeps the ( Header - Footer - Side bar) displayed.)	3
<b>Website development standards</b>	-The site pages include the basic structure of the language ) HTML.( -The site pages are formatted using CSS codes.) -The site pages include a display of data from a database ( mysql). -Site pages show the link between site data and the user interface using ) PHP). The site has been successfully uploaded to GitHub).	5
<b>Standards for using Artificial Intelligence applications in website development</b>	The integration of AI applications, such as ChatGPT, facilitated problem-solving during the website development process, improving efficiency and innovation he faces while developing the site.	1
<b>The questionnaire as a whole</b>	<b>12 indicators</b>	<b>12</b>

The table shows The research produced a comprehensive list of criteria categorized into educational (clarity of objectives), technical (design principles), and developmental (use of AI tools like HTML, CSS). The research concluded with preparing a list of criteria for producing instructional websites using Artificial Intelligence applications.

#### **Discussion and interpretation of results:**

Statistical processing was carried out on the list of criteria for producing instructional websites using Artificial Intelligence applications, where the importance percentage for all sub-criteria

reached (97%), which indicates the importance of all main and sub-criteria in producing instructional websites using Artificial Intelligence applications, and thus the final image of the list of criteria was reached.

### **Research Recommendations:**

In light of the research results, a number of procedural recommendations were reached, which are:

- The research emphasizes training educators and students in AI-based website development, recommending future studies on integrating adaptive AI tools into educational environments.
- Evaluating instructional websites based on instructional website production criteria using Artificial Intelligence applications.

### **Searches Suggestions:**

In light of the research results and recommendations, it is suggested to conduct the following research:

- Developing instructional websites using Artificial Intelligence applications for general education students at the secondary level.
- Professional development for teachers in website development in light of instructional website production standards using Artificial Intelligence applications

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