



# The Effect of Interactive Infographic on Developing Some Technological Skills for Students at Technical Secondary schools

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## Abstract

The recent research aims at investigating the effect of using interactive infographic on developing some technological skills for students at technical secondary schools. Descriptive and quasi experimental methods were followed plus doing a random pre and Post application for a sample of 30 female students. After applying the research tools represented in accumulative test, the observation card, pre and post application, results assured the effectiveness of using the interactive infographic on developing some technological skills for students at technical secondary schools besides existing of statistically significant differences between pre and post applications concerning cognitive and performance aspect of cooling technology for the post application.

**Keywords:** - Interactive Infographic, Technological Skills, Secondary schools.

## Article History

**Receive Date:** 2021/10/15

**Accept Date:** 2021/11/13

**Publish Date:** 2021/11/25

Volume 1/ Issue2, December, 2021

**DOI:** - 10.21608/ijahr.2020.256309

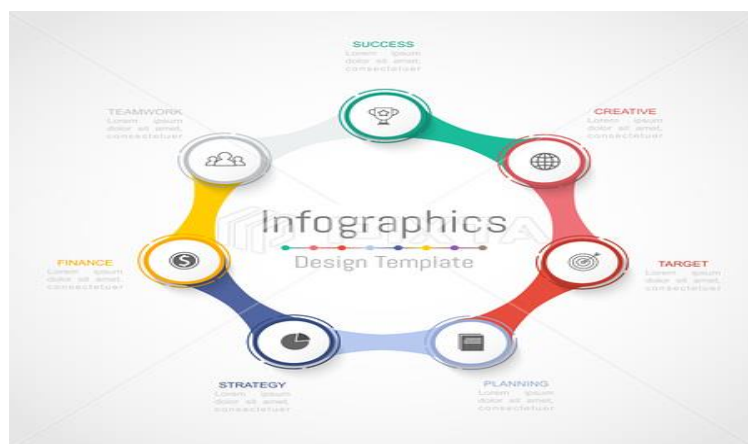
## CITATION:

Abdulmoneim, M. (2021). The Effect of Interactive Infographic on Developing Some Technological Skills for Students at Technical Secondary schools. *International Journal of Advanced Humanities Research*, 1(2), 34-42. doi: 10.21608/ijahr.2020.256309

## Introduction

### Interactive Infographic:

Infographic has become widely used along with the current revolution of information technology especially with the extensive use of smart phones and laptops which facilitate interaction between users and infographic elements. In the Arabic literatures, infographic was defined by other terms such as illustrations, interactive photographic information, information designs and visual representation of data. Interaction is defined as exchanging information between users and what they design in which particular tests or processes are done besides receiving direct responses (1). (2) defines it as an animation with which readers interact. Regardless of animation idea, infographic depends on web applications in which videos and illustrations which are full of colors, images and texts are used rather than depending on displaying the content of the infographic just textually. That interactive infographic is one of the most suitable kinds for most students as it motivates students for learning, empowers learning activities and sticking concepts and facts into students’ visual memory (3). Study number (4) aimed at investigating effectiveness of using an interactive infographic – based learning environment on developing listening skills for students at faculty of education, Um ul Qura University, department of English. Furthermore, (4) argued that using infographic for displaying data visually leads to involving minds in criticizing issues and reasoning them from different angles. (5) assured that it is possible to use infographic to study digital issues through social media.



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**Figure (1)** elements of designing infographic Technological skills

cooling technology course is taught at technical industrial secondary schools which train students at their workshops to acquire several skills such as detecting the leak of cooling compound in the circuit, replacing any damaged part in the cooling circuit with a new one, replacing old compressor oil with a new one, loading and unloading home refrigerator and other skills learnt by students.

Cooling technology is practically defined as reducing the temperature of a space below the temperature of the ambient medium by using cooling appliances such as fridges, filters, and air conditioners. A course of cooling technology includes three branches: the first one includes the theoretical part; the second branch includes laboratory activities and the third branch which includes the practical aspect. As for theoretical part, it focuses on the theoretical explanations of mechanical or electrical circuits of cooling and conditioning whereas the second branch cares about experiments proving validity of gas general laws. The third branch focuses on encouraging students to carry out theoretical skills they learn from teachers in classes. Several studies dealt with different strategies of teaching skills in general such as study (6) which argued that there is an effective impact of using blended learning on developing computer skills for the study sample plus study (7) which tried to know the effect of using computer simulation on developing electric engineering skills of technical school students.

### **Methodology**

The recent research depended on two methods: the descriptive and quasi experimental method. The former was used to describe the theoretical and philosophical frame of the study problem, doing surveys for previous related studies, and collecting data and information about teachers' characteristics plus analyzing the content, pedagogical design and making study criteria. As for quasi experimental method, pre and post application of a single group was used to know the effect of Interactive Infographic on developing skills of cooling technology for students and knowing the effect of the independent variable (interactive infographic) on the dependent one (cooling technology skills). The philosophy of technical education is to prepare specialized technicians to face work market by acquiring necessary technical skills including cooling technology ones. Through holding interviews taking students' opinions, it was noticed that female students are not aware of cooling technology skills, so the present study tries to tackle that issue by designing an interactive infographic as a way for answering questions of the study:

- What is the extent of developing the cognitive aspect of technological skills by using the interactive infographic for industrial school students?
- What is the extent of developing the performance aspect of the technological skills by using interactive infographic for industrial school students?

To answer these questions, the following Hypotheses were formed:

**The first hypnosis:** there are statistically significant differences at significance level of  $\leq 0.05$  between mean scores of experimental group participants in the pre and post applications of the accumulative test related to cognitive aspects concerning cooling technology for the benefit of the Post application.

**The second hypnosis:** there are statistically significant difference at the level of  $\leq 0.05$  between mean scores of the experimental group participants in the pre and post application of observation card related to performance aspects concerning cooling technology for the benefit of the Post application.

The research was applied on 30 female students at Zefta industrial secondary school as a randomly selected sample from cooling and air conditioning department aged 16 and 17 years old. Designed by the interactive infographic, the educational content was divided into small lessons including a group of main skills and secondary ones according to principles and standard criteria of designing interactive infographic as shape (2) illustrated.

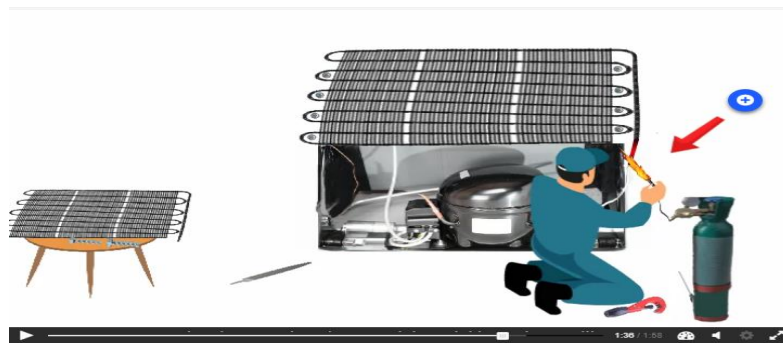


Fig (2) design of the content in the light of used interactive infographic

To test effectiveness of interactive infographics on developing skills of cooling technology, an accumulative test was designed to measure cognitive aspects of these skills by making a test of 50 phrases distributed into two groups including 25 of multi choice questions. Each phrase includes introduction to a question annexed by 4 choices (a, b, c, or d) which have to be simple clear and of equal length. Reliability of the test was measured by Pearson correlation coefficient (0,784) which are strong ones plus measuring the apparent validity of the test by having it amended and reviewed by a group of consultants and experts in the field of instructional technology.

As for observation card which was used for measuring subtle aspects of cooling technology skills, the card consisted of 4 main skills and 64 secondary ones in which students' performance was evaluated total scores. Four levels of performance were defined: good, medium, weak and non performing. To measure reliability of the card, other teachers at Zefta industrial secondary school, department of cooling and air conditioning technology were asked to redo applying the card for other two times. Results were processed through measuring agreement and disagreement

between the researcher and other teachers by using COOPER equation as shown in the next table:

$$\text{Accord(percent)} = \frac{\text{Accord (n)}}{\text{Accord (n) + variation(n)}} \times 100 *$$

Fig. (3) COOPER equation

Table (1) ratio of agreement between observers of the card.

M	Statement	Mean of agreement ratio
1	Unpack and assemble the components of the home refrigerator and water cooler.	94%
2	Oxy estylline welding.	92%
3	Performing manual skills in (tuck-suidij-flir-khafs) for pipes	96%
4	Welding the point (the pent)	94%
	<b>Total</b>	94%

The previous table show that means of agreement between observers was 94% which proves reliability of it. Hence, the observation card is finally ready to be applied. Data were collected and processed by SPSS program.

Results of the first hypnosis: to test the validity of this hypnosis, paired samples t-test was used to define differences significance between mean scores of experimental group participants in the pre and post application of the accumulative test related to the cognitive aspects of cooling technology skills. The following table shows the results:

Table (2) differences significance between mean scores of experimental group participants in the pre and post application of the accumulative test

Variable	measure	Means	Means of differences	Standard deviation For differences	The value of "T"	Degree of freedom	Statistical significance
Accumulat ive test	post	41.63	32.4	7.83	22.6	29	Function at level ≤0.05
	pre	9.23					

The previous study shows existing of statistically significant differences at the level of  $\leq 0.05$  between mean scores of experimental group participants in the pre and post application of the accumulative test for the benefit of the Post application. That showed increase in total mark of the cognitive aspect test related to cooling technology skills for female students. The first hypothesis was accepted according to previous results which agree with study (8) (9) (10) (11) that confirmed effectiveness of Interactive Infographic on cognitive achievement.

**Results of the second hypothesis:** to test the validity of this hypothesis, t-test of paired samples was used to define differences significance between mean scores of experimental group participants in the pre and post application of the observation card concerning performance aspects of cooling technology skills. The following table shows the results:

**Table (3)** indicating the difference between the average grades of the experimental group in the tribal and remote measurement of the note card

Variable	measure	Means	means of differences	Standard deviation For differences	The value of "T"	Degree of freedom	Statistical significance
Observation card	post	159.4	145.4	13.59	58.5	29	Function at level $\leq 0.05$
	pre	14					

The previous table refers to existing of statistically significant difference at the level of  $\leq 0.05$  between mean scores of experimental group participants in the pre and post application of observation card for the benefit of the Post application which proves the increase in the total mark of the card for female students. By these results, the second hypothesis was accepted in accordance with the previous studies (12) (13) (14) (15) that confirmed effectiveness of Interactive Infographic on developing skills.

**Discussion**

After referring to results of the accumulative test and observation card, interactive infographic is found effective in developing cognitive and practical aspects of cooling technology skills of research participants for the following reasons:

- Well-designed infographic elements including images and animations which enabled students to practice cooling technology skills easily.
- Videos of the interactive infographic made it easy for students to learn skills fast.

- The positive role of the infographic as it shows relations between lessons and generating different ideas which increases efficiency of learning.
- Feedback and activities helped students to practice skills of cooling technology easily.

#### **Recommendations**

- Providing interactive infographic with images and static pictures plus series of shapes.
- It is necessary to display brief related information through infographic.
- It is necessary to help students and teachers practice skills of visual reading for information.
- It is necessary to introduce different types of infographics: static, mobile, and interactive to satisfy students’ needs and consider individual differences.
- Caring with developing skills of cooling technology for secondary industrial school students as they are required at labor market.

#### **Suggestions**

- Studying the effectiveness of using interactive infographic on developing skills of upgrading educational websites plus promoting critical thinking for secondary school students.
- Studying effectiveness of using interactive infographic on developing creative thinking skills for secondary school students.
- Studying effectiveness of designing mobile infographic on developing skills of producing data base for secondary school students.
- Studying the effect of dimensions of learning analyses at electronic environment on developing skills of producing mobile infographic for instructional technology students.
- Studying effectiveness of using mobile and interactive infographic in adaptable learning environment for upgrading skills of visual thinking and solving programming problems.



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