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## The Effectiveness of a Training Program Based on Multimedia on Enhancing the Teaching Process and Critical Thinking Skills of Teachers of the Deaf and Hearing-impaired in Secondary Schools

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## The Effectiveness of a Training Program Based on Multimedia on Enhancing the Teaching Process and Critical Thinking Skills of Teachers of the Deaf and Hearing-impaired in Secondary Schools

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### Abstract

The main aim of the current study is to measure the effectiveness of a training program on enhancing the teaching process and critical thinking skills among teachers of the deaf and hearing-impaired in secondary schools through multimedia and according to academic qualification and years of experience variables. To accomplish the study objective, the researchers used the quasi-experimental approach. They designed a four-hour short training program that was applied to 60 teachers of the deaf and hearing-impaired in secondary schools. The study findings revealed that 53.4% of teachers of the deaf and hearing-impaired possess multimedia skills experience in teaching critical thinking skills in the pre-test, whereas 61.3% of teachers of the deaf and hearing-impaired possess multimedia skills experience in teaching critical thinking skills in the post-test. In addition, the results showed no statistically significant differences in the years of experience variable in teaching critical thinking skills. Furthermore, the results indicated that the teachers who have Master's degrees or higher had higher average scores in critical thinking skills compared to those with bachelor's degrees.

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### Introduction

Today, the education system around the world is experiencing an improvement in assistive technology, adapting new teaching techniques, preparing teachers, and developing new curricula and research in both governmental and private sectors. According to worldwide statistics, hearing loss is the most spreading disability, with more than 43 million persons with more than 43 million people between the ages of 12 and 35 years suffering from disabling hearing loss due to various causes, and it is estimated that by 2050 more than 2.5 billion people will suffer from Hearing loss, of which 432 million adults and 34 million children require rehabilitation to treat hearing loss (WHO, 2021), so the education system in any country must balance developments in general education and education for people with disabilities as much as possible, and keep pace with changes in the field of education, particularly educational technologies, which is the fastest-growing.

Furthermore, there is great interest in teachers in the world of assistive technologies, to train them on how to adapt

and apply lessons to find alternative methods and knowledge discovery from students (Green, 2016). Probably multimedia and associated programs are the most prominent technologies currently used; they indirectly reduce the problem of language difficulty, which is the most prominent problem of the deaf and hearing-impaired, as it significantly increases motivation and facilitates access to rich linguistic experiences (Mathews 2016).

Teachers are the pillars of the education system, so providing teacher training and support to them are the pillars of the Philosophy of Education (Aldahom & Alazmi, 2016), education institutions are interested in developing highly qualified teachers to reach an educational outcome reflexed in the student in whom the goals of the whole educational process will be achieved. In addition, teacher training has a great deal of interest; being an influencer for the tangible success of the educational process, the positive role played by teachers towards students and other teachers reflects positive results in the effectiveness of their teaching and the outcomes of their students, which has been confirmed by numerous types of research (Schitz, 2012, 2014). The orientation of education, which is competency-based is one of the best improvements which has taken place in teacher preparation programs over the last two decades in the USA (Alqumsh & Alsaydah, 2016).

In this regard, the Ministry of Education in the Saudi Arabia Kingdom issued a guide including experiences from different countries in developing the education process, which indicates a set of teacher-taught skills that are important to reflect the needs of societies in the twenty-first century. Critical thinking skills have become essential in the educational system (Center of Excellence in Learning and Teaching, 2018). The reader might notice in the Special Education Library that critical thinking skills, which play a crucial role in the current era, as mentioned before, lack studies dealing with teacher's acquisition with disabilities to be applied in teaching their students, as studies that dealt with this field of research are scarce. For example, Suleiman et al. (2017) indicated a positive correlation between effective teaching and the extent to which special education teachers acquire critical thinking skills for both genders in favor of novice teachers more than experienced ones. Janssen et al. (2019) revealed an improvement in critical thinking skills among 54 teachers after taking a nine-hour training on teaching thinking skills to their students.

### **Statement of the Problem**

With the diversity of educational strategies aimed at enhancing thinking skills during the educational process, particularly in deaf students, assistive technology is an inevitable part of developing this aspect. The content of each Individualized Education Program is prepared for the student, whether to help him or use it to become an independent learner or as a means to complete the teaching process. This is determined by the IEP team at the school where the child attends (Rothstein & Scott, 2018).

Moreover, several studies confirmed, including Tajularipin et al. (2017) that training courses and workshops encourage this line of thought. The results were shown in a sample of 39 teachers of inclusive schools. The findings revealed a positive correlation between the effectiveness of teaching and orientation toward critical thinking.

In addition, Marshall et al. (2016) reported an improvement in the problem-solving skill of deaf and hearing-impaired students as a result of applying an approach based on critical thinking to 40 students in an experimental group. The students who participated in this study showed a significant improvement, which they maintained for a period of (6-12) months. In this context, Tajularipin et al. (2017) recommended that parties concerned with the professionalization preparation of teachers address the orientation in critical thinking. Accordingly, teaching the deaf and hearing-impaired and training the teachers to improve their skills regarding the scientific library need more research. It would be great to gain more knowledge and information regarding this field. The current research will add knowledge regarding the development of thinking skills through technology and the direction of the Ministry of Education in the Kingdom of Saudi Arabia to accomplish the critical thinking course in the second stage starting the next year 1443 (Ministry of Education, 2021).

### **Research Questions**

The study aims to answer the following research questions:

- To what extent does the effectiveness of the training program based on multimedia enhance the teaching of critical thinking skills among teachers of deaf and hearing-impaired students in secondary schools?
- What level of possession of multimedia skills experiences do teachers of the deaf and hearing-impaired have in teaching critical thinking skills?
- Are there statistical differences between the mean scores of the experimental group in the post-test of teaching critical thinking skills according to the academic qualification and years of experience variables?
- To what extent do the empirical processes (training program based on multimedia) affect the dependent variable (teaching critical thinking skills)?

### **Methods**

The study followed a quasi-experimental approach. A sample was chosen randomly as an experimental group using two tests: The first test was applied before the empirical process, and the second one was done after it. The researchers employed this method which goes with the problem of the study and its purposes and sample (Abbas et al., 2012).

### **The Study Group**

The study community involved in the current study is 351 teachers of deaf and hearing-impaired in secondary schools: 128 female teachers and 223 male teachers. The study sample included a group of teachers of hearing-impaired students in secondary schools in Saudi Arabia. The study sample also included a random group of teachers of deaf and hearing impaired in secondary schools. Due to the big study community size and the impact of COVID-19, the researchers tended to use social media platforms to reach the sample study, which included 60 teachers.

Table 1. The Characteristics of the Participants

Group	Frequency	%
<b>Gender</b>		
Male	12	20%
Female	48	80%
Total	60	100%
<b>Qualification degree</b>		
Bachelor	43	71.7%
Master or higher	17	28.3%
Total	60	100%
<b>Years of experience</b>		
Less than 10 years	14	23.3%
10-20 year	24	40%
20 year and more	22	36.7%
Total	60	100%

## Instruments

### *The Test of the Study*

To answer the research questions, the researcher employed a study tool that included the knowledge and skills of critical thinking, as follows: critical thinking criteria: clarity, validity, accuracy, linkage, depth, breadth, logic, and associated characteristics.

*Critical thinking skills:* conclusion, evidence and data gathering, clarification, making judgments, inferencing, analysis, and synthesis, evaluating the discussions, the link between cause and effect, objectivity, and neutrality.

*Critical thinking strategies:* McFarland, Monroe, Slater, Smith, the deduction for Baer, Wright.

The researchers applied the close-ended questions to identify the possible answers.

## The Training Program

After studying the related literature which presented training programs for teachers, such as Aljasim and Alhamdan (2018) and Washah and Alenazy (2019), the researchers designed a training program aimed at developing cognitive and practical proficiency, providing teachers with critical thinking skills and its strategies, as well as, focusing on teacher's acquisition of applying critical thinking skills in school curriculum on students of deaf and hearing impaired and implementation of critical thinking strategies via multimedia. The research was conducted via Zoom and continued for four hours in one session in the second semester of 2020/2021.

## Validity and Reliability

*Face validity:* as an initial step, the program and the test were presented to a group of reviewers specialized in

curricula, teaching methods, special education, measurement, and evaluation. The researcher followed the corrections recommended by seven reviewers. The corrections included the clarity of the information, skills, and phrases of the study tool, sufficient information to cover every aspect, and the deletion, addition, or modification of any part.

*Internal consistency:* Pearson Correlation Coefficients were used to measure internal consistency between the items of the pre-and post-tests as shown in Table 2. Table 2 shows a significant correlation between the pre-and post-test items, which gives high credibility to the design of the study tool at 0.01, thus indicates the consistency of the study tool. Also, Cronbach's alpha was measured for the test, it showed a high stability level, with a value of 0.79.

Table 2. Pearson Correlation Coefficients between the Items of the Two Tests

Pa.	PCC								
1	0.71**	8	0.73**	15	0.77**	22	0.86**	29	0.73**
2	0.71**	9	0.70**	16	0.75**	23	0.77**	30	0.66**
3	0.71**	10	0.59**	17	0.76**	24	0.74**	31	0.75**
4	0.55**	11	0.79**	18	0.84**	25	0.76**	32	0.77**
5	0.72*	12	0.84**	19	0.78**	26	0.78**	33	0.74**
6	0.53**	13	0.74**	20	0.69**	27	0.88*		
7	0.55**	14	0.57**	21		28	0.55**		

### Data Collection Procedures

After following the reviewers' suggestions and ensuring the validity and reliability of the study and the supervisor's approval of the supervisor, the researchers performed the following steps to complete the study procedures:

- A letter obtained from the Vice-Rector for Postgraduate Studies and Scientific Research directed to the Director of the General Administration of Education in Riyadh with a request to facilitate the application of study tools and obtain a recent statistic for the study sample.
- A facilitation letter for the researchers' task directed by the Director of the Planning and Development Department was obtained stating the approval to apply the study tools to the sample members.
- The researchers invited teachers to apply the study tools via the Zoom program, and the required number was obtained from the first meeting with the study sample. The program took three weeks to be announced and implemented.
- The data has been statistically collected and analyzed using the Statistical Package for the Social Sciences (SPSS).

The findings of the tools were extracted from the performance of 60 teachers on the pre and post-tests.

### Statistical Processing of Data

The data collected were processed using SPSS, and the following statistical processes were applied:

-Both frequencies and percentages were utilized to show the characteristics of the study.

Paired sample t-test was used to investigate the differences before and after applying for the training program.

-The T-test was employed to reveal the statistical differences between the mean scores of the experimental group in the post-measurement on the test of teaching critical thinking skills based on academic qualification.

-A one-way analysis of variance (One-way ANOVA) test was deployed to show the statistical differences between the mean scores of the experimental group in the post-test of teaching critical thinking skills based on the years of experience.

-Cronbach's alpha coefficient was applied to measure the test reliability.

Pearson's correlation coefficient was used to measure the internal consistency of the study tool.

## Results and Discussion

### Results of the First Question: What Level of Possession of Multimedia Skills Experiences Do Teachers of the Deaf and Hearing-Impaired Have in Teaching Critical Thinking Skills?

To identify the level of possessing of multimedia skills experiences teachers of the deaf and hearing-impaired have in teaching critical thinking skills, the researchers calculated the mean, standard deviation (SD), and percentage of the total score for the pre and post-tests. Table 3 presents the results.

Table 3. Mean, Standard Deviation, and Percentage of Pre- and Post-test Scores

Test	Sample	Mean	SD	%
Pre test	60	17.62	2.89	53.4%
Post test	60	20.23	3.72	61.3%

The results in the previous table explored that the mean degree of possession of multimedia skills by teachers of the deaf and hearing-impaired in the critical thinking skills in the pre-test is 17.62 out of 33 with a rate of 53.4%. The mean degree of possession of multimedia skills by teachers of hearing-impaired critical thinking skills in the post-test is 20.23 out of 33 with a rate of 61.3%. Due to the short period of the program, the method was applied via the Zoom program. The researchers believe that this percentage of development is very good.

It concluded that the decreased level of teachers' performance in critical thinking skills is due to their need to provide a training and teaching environment to apply these skills. The result supports Zascavage et al.'s (2007) study, which confirms that teachers require training and education to develop their ability in critical thinking. Therefore, evaluation of the performance in critical thinking skills of teachers of the deaf and hearing-impaired is not sufficient to solve the problem. In addition to the previous studies which assessed students' need for appropriate interventions, Gustafson and Boucher (2009) conducted a longitudinal study to evaluate the extent to which college students of deaf know critical thinking skills.

**Results of the Second Question: Are there Statistical Differences between the Mean Scores of the Experimental Group in the Post-test of teaching critical thinking skills according to the academic qualification and years of experience variables?**

The sample included participants with two academic qualifications: Bachelor's and master's degrees. Therefore, the researchers tried to use a t-test to figure out the differences between participants based on their academic qualifications. Table 4 explains the results.

Table 4. T-test Results for Differences between Participants according to *Academic Qualification Variable*

Academic qualification	Mean	SD	t-value	Statistical significance
Bachelor	17.69	4.72	2.44	0.018
Master	21.47	6.45		

Table 4 shows that according to the participant's educational background, there were statistically significant differences between the experimental group scores in the post-test of teaching critical thinking skills. This result means that teachers who hold a master's degree or higher had their average test scores higher than the average scores of teachers who hold a bachelor's degree. The result matches that of Al-Sanea and Al-khawaldah's (2018) study, which explored statistically significant differences among special education teachers on critical thinking skills due to educational background variable. The results found that the participants who obtain a master's degree or higher had the highest test scores. The result also agrees with the results of Swanwick et al.'s (2014) study, which indicated that teachers who obtained higher degrees have high degrees in critical thinking activities. In contrast, these results are inconsistent with that of Alharahsheh's (2016) study, which revealed no statistically significant differences due to the variable of academic qualification in critical thinking skills for science teachers. The researchers applied the ANOVA test to identify the statistical differences between the mean scores of the experimental group in the post-test on the test of teaching critical thinking skills according to the academic qualification and years of experience variables. Table 5 depicts the results.

Table 5. ANOVA Test Results for Differences between Participants according to *Years of Experience Variable*

Years of experience	Mean	SD	F value	Statistical significance
Less than 10 years	21.36	3.97	1.51	0.229
10-20	19.29	3.78		
More than 20 years	20.54	3.38		

Table 5 shows no statistical differences existed in the responses of the study sample attributed to the variable of the years of experience. This result means that the respondents' years of experience did not affect their test scores. The result agrees with that of Alqasim's (2014) study, which showed no statistically significant differences due to the variable of experience of teachers registered in Guidance and Direction Diploma program. In contrast, the result is inconsistent with that of Alharahsheh's (2016) study, which showed statistically significant differences in critical thinking skills among science teachers. Also, it does not accord with that of Alsanea and Alkhawaldah's (2018) study, which revealed statistically significant differences among special education teachers on critical

thinking skills due to years of experience variable for five years and more category. The researchers clarify that the difference is attributable to the possibility of some teachers enrolled in training programs that develop their critical thinking skills and methods of teaching these skills.

### **Results of the Third Research Question: To What Extent Do the Empirical Processes (Training Program Based on Multimedia) Affect the Dependent Variable (Teaching Critical Thinking Skills)?**

To identify the impact of empirical processes (the Training Program Based on Multimedia) on the dependent variable (teaching critical thinking skills), the Paired sample t-test was utilized to investigate the differences before and after applying for the training program. Table 6 presents the results.

Table 6. t-test Results for the Variances between the Pre-and the Post-test

Test	Sample	Mean	SD	t-value	significance
Pre-test	60	17.62	2.89	14.2	0.000
Post-test	60	20.23	3.72		

The results revealed statistically significant differences between the pre-test and post-test scores. That is, the post-test scores are higher than the pre-test scores: The mean of the post-test is 20.23, and that of the pre-test is 17.62. This result indicated the positive effects of the training program based on multimedia on teaching critical thinking skills to teachers was found 0.784.

Several studies confirmed the role of the training program in enhancing critical thinking skills. The current result approves those of Owaida's (2020) study, which showed improvement in the mathematics teachers' performance in critical thinking skills after underwent to experimental processing (the training program). In addition, the result agrees with Alsaidi and Alwakeel's (2017) study, which indicated the effectiveness of the training program prepared by two researchers to improve the critical thinking skills among mathematics and home economics teachers. Furthermore, the result accords with that of Mathew's (2016) study that revealed the effectiveness of multimedia in developing these skills by using a technique based on using a picture with a text and a picture with sign language. Likely, Ramadan (2016) and Alsisani (2013) confirmed the effect of multimedia in developing critical thinking skills. Alharbi's (2016) study, showed the students' acquisition of these skills through a module based on multimedia. Ching and Fook (2016) recommended according to their study results, improving the curriculum by designing learning media to achieve higher levels of critical thinking skills.

## **Conclusion**

The purpose of the current study is to discuss the effectiveness of the training program in enhancing teaching critical thinking skills among teachers of deaf and hearing impaired in secondary schools through multimedia. Therefore, the study figured out the following results. The degree of possessing multimedia skills by teachers of the deaf and hearing impaired in the critical thinking skills pre-test is 53.4%, whereas it scores 61.3% in the critical thinking skills post-test. Also, no statistically significant differences showed according to the years of experience

variable in the teaching critical thinking skills test.

In addition, teachers who hold a master's degree or higher had their average test scores higher than the average scores of teachers who hold a bachelor's degree. Moreover, the study revealed that the training program based on multimedia in teaching critical thinking skills has a positive impact on teachers of the deaf and hearing-impaired. Accordingly, the researchers recommended some suggestions for further studies to enrich special education. A study is suggested on orientation towards teaching critical thinking skills for teachers of the deaf and hearing-impaired. There is a need to measure the degree of possession of teaching critical thinking skills by teachers of the deaf and hearing-impaired through using different measures according to educational stages.

In addition, a comparative study should be conducted to take advantage of advanced countries' experiments in special education, which provide students with critical thinking skills at the education level. An analytical study of the deaf and hearing-impaired curriculum may be applied to merge critical thinking skills in all components of the school curriculum. An empirical study may be conducted to identify the proficiency level of deaf and hearing-impaired students in critical thinking skills after exposing their teachers to the training programs dealing with this aspect of skills. A qualitative study may identify practices employed by Saudi universities in teaching these skills to teachers of special education and mainstream education. Finally, a comparative study may evaluate and categorize teachers' on-the-job training programs in other countries that have a good impact on teaching critical thinking skills.

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