

The Effect of using the QR Technique in Teaching the Skill of Dribbling in Basketball to Healthy and Deaf Students during COVID-19

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Abstracts: This study aimed to identify the effect of using the QR technique in teaching the skill of dribbling in basketball to deaf healthy students during the Corona pandemic, as well as to identify the differences between the use of the QR technique and the traditional method, depending on the condition variable. The researchers used the experimental method in this study, and a deliberate sample of (24) healthy and deaf students was chosen, who were distributed equally into two experimental and control groups, and two measures were made, before and after, of the skill level of the sample, during which they applied the program, which lasted for a month, three days a week. per group. After collecting the data and using the necessary statistical treatments, it was found that there is an effective effect of using the QR technique, and there are statistically significant differences between the two measurements in favor of the post-measurement for both groups. As for the differences between the two groups, the development was in the level of skill performance in favor of the experimental group. The results also indicated that there were no statistically significant differences due to the variable of the type of students. In light of the results, the researchers recommended the need to provide the research results to each of the Ministry of Education, the Olympic Committee and the Basketball Association, and the adoption of technology as an educational guide for teachers and coaches in anticipation of any future emergency, and the need to hold specialized courses for university professors, teachers and trainers to train on creating content using the QR technology, and to conduct Similar studies to compare deaf and healthy people and extend them to include both sexes and in other games.

Keywords: QR, Basketball, Dripping, Instructional technology, Hearing impairment.

1. INTRODUCTION

The COVID-19 pandemic and its associated consequences have had a significant impact on the educational process at all stages and levels, with continuous or intermittent interruptions in various countries around the world, leading to a clear disruption in the educational system, particularly in school teaching. It was necessary to utilize the rapid developments witnessed by the world and the technological boom in recent years in the fields of computer technologies, multimedia, the Internet, social media, and integration between them, resulting in what is now known as information and communication technologies. This pandemic forced the world as a whole to use these technologies as an essential alternative, and their use led to the discovery of new possibilities that were not previously known by teachers, students, and parents alike. Their impact has been clearly evident in all areas of daily life, including education and training, due to their many advantages in saving effort, time, and money, in addition to the possibility they offer for dialogue with the learner, who has become the focus of the educational process, and therefore must be given a greater role in its implementation.

The QR code, multimedia, and hypermedia are considered to be some of the technological innovations that have educational value and contribute to improving the efficiency of the educational process. They are considered a more viable and effective educational system, especially during the COVID-19 pandemic. Their focus is on the learner through their active interaction and participation with a computer-based educational program, and finding ways of interaction between the learner and the computer. (Monguillot et al, 2014) (Gabov et al, 2022).

It is a product that provides a service to users by connecting text, audio, and static or moving images together simultaneously in the form of a link, code, or interactive CD, regardless of its diverse purpose, which can be for entertainment, communication, leisure, education, or commercial purposes (Homs & Assem, 2016) (Ghazi, 2019).

This means that QR codes or multimedia are used to create new forms of educational programs where multiple educational communication media interact non-linearly, with the aim of providing learners with an educational environment rich in multimedia communication media. These media help to gather various types of information from different sources and in different forms into one system, as well as other available media in the student's device environment. These media interact with each other and are controlled by the available technology at the student's fingertips (phone, tablet, computer, etc.) to enable the learner to achieve educational and behavioral goals (Lopatina, 2019) (Firmansyah, 2019).

Ghazi (2020), (2019), explains that QR stands for Quick Response Code, which is a technology for converting data into a specific encoding in a random manner in the form of small square boxes with a length and width inside a virtual box consisting of three boxes at the top corners and the lower left corner, and inside it is a square box that contains the encoding markers. This technology was invented in Japan in 1994 by Dens Wave company.

Since deaf individuals are an integral part of society, they have rights and duties, and it is the responsibility of the state to provide them with the best opportunities to exercise these rights in a manner that is appropriate for their disabilities, through providing them with the opportunity to engage in sports activities. This is what Al-Maitami (2013) Abu Salem (2007), and Al-Tahami (2006) referred to, as international organizations have developed sports and professional programs for disabled individuals that are compatible with all types of disabilities, and that are included in their countries' constitutions. The interest in this issue has become an essential factor, through which desired changes can be made in the social, economic, and sports structure of society, by investing in these human energies to provide them with livelihood opportunities as useful members, producers, and athletes. Ghazi, (2019), indicates that engaging in sports activities plays a pivotal role in teaching and developing the capacities of disabled individuals, honing their talents and personalities, and raising their morale. Hence, there is a need to expand the scope of interest in deaf individuals and increase studies related to their demands, in order to provide them with special programs, as they are part of the youthful human wealth that can be invested and directed to become a strong tributary for communities (Ghazi & Mahrousa 2019).

1.1. Study Problem

Humanity is currently living in an era of increasing and rapid knowledge production, with new inventions, discoveries, and research in all fields of knowledge appearing every day. Since the primary goal of education is to transfer knowledge from one generation to the next, education has become characterized by continuity. To maintain this continuity, it was necessary to use technological means. Therefore, the experience of distance learning during the COVID-19 pandemic was a new and widespread experience, as the pandemic that began in December 2019 forced 290 million students around the world to stay at home due to closure decisions in various countries as a preventive measure to prevent the virus from spreading (UNICEF, 2020). The pandemic also led to the interruption of more than 1.6 billion children and young people's education in 161 countries, which is approximately 80% of the enrolled students in schools (World Bank, 2020) (UNICEF, 2020).

The problem of the study lies in the observation of researchers and their experience in the fields of education, technology, and specifically basketball. In Jordanian government and private schools, there is a significant number of hearing impairments of varying degrees who are subjected to physical education curriculum that is taught to their non-disabled peers in an incorrect and ineffective manner that does not suit their abilities. They are often excluded from participating in activities included in the curriculum, including basketball. This is because they lack the sense of hearing that teachers often rely on to explain and convey information or skills. They compensate for this by employing their other senses, especially vision, to acquire and learn skills, especially during remote learning due to the COVID-19 pandemic.

Researchers see that the problem of deaf people learning basic basketball skills and not practicing them lies in two issues. The first issue is related to the physical education teacher who directs his instructions and guidance to deaf students by speaking to them verbally (without mastering sign language) in face-to-face education and not remotely. Therefore, he cannot convey the information to them, which sometimes causes frustration and a lack of

interest in teaching them the skills at other times. The other issue concerns the deaf students who receive these instructions and guidance, as they are not able to understand what is required of them even if they are able to execute it, causing them frustration and disinterest in practicing. If they do practice, they do it randomly just to pass the time. To overcome the problem of individual differences between teachers and learners, it is necessary to resort to using information technology, especially by sending QR links to the various stimuli that these means provide, and displaying them in different ways and methods that allow the learner to choose the appropriate one that suits his abilities, desires, and tendencies.

From here, researchers came up with the idea of finding a way to overcome the problem faced by both deaf and hearing students in receiving and delivering information by providing a guide for the teacher that collects and sends it through a (QR) code link that helps in delivering the information or idea to deaf students in an exciting and technically studied way while the student is present anywhere during the COVID-19 pandemic. Researchers resorted to taking advantage of the widespread use of QR technologies in various aspects of life, including sports and education, to develop a programmed educational program based on the use of this feature as a visual learning tool in teaching deaf student's basketball skills as a preliminary experiment in the Mini Basket game for children.

From here, it can be pointed out the importance of this study as one of the few studies that addressed the education and training of deaf individuals in basketball, specifically remotely, as well as the use of a QR technology-based educational program in learning and developing the basic skill of bouncing the basketball during the COVID-19 pandemic for this specific category of disabled individuals. To the researchers' knowledge, this program can also be used by their healthy peers, whether students or players, during this pandemic.

Study Objectives: This study aimed to:

1. Identify the impact and effectiveness of using QR technology in teaching and developing basketball dribbling skills for deaf and healthy students.
2. Identify the differences in the level of skill performance among the study sample members based on the variable of students' status (deaf and healthy).

1.2. Study Hypotheses

To achieve the objectives of the study and based on the theoretical framework, the researcher developed the following hypotheses:

- 1- There are statistically significant differences at the ($\alpha \leq 0.05$) level of significance between pre- and post-measurements in teaching and developing ball bouncing skills among deaf and healthy students in favor of the post-measurement attributed to the QR educational technology.
- 2- There are no statistically significant differences at the ($\alpha \leq 0.05$) level of significance in teaching and developing ball bouncing skills among deaf and healthy students attributed to the QR educational technology, attributed to the students' status variable.

2. METHODOLOGY (SAMPLE)

The study sample consisted of a group of deaf students from the lower elementary stage (sixth grade) from several schools and clubs: Al-Rajaa School for the Deaf and Dumb, Al-Aila Village Private School, the Jordanian Club for the Deaf, and the Prince Ali Club for the Deaf/Amman, all officially registered with the Ministry of Education. It should be noted that (6) students were excluded from the study sample for use in the exploratory experiment, resulting in a total of (24) students (12 deaf students and 12 hearing students) who were equally distributed into two groups: the first experimental group consisted of (6) deaf students and (6) hearing students, while the second control group consisted of the same distribution. Tables 1 and 2

provide a description of the study sample individuals distributed between the two groups, and the comparability of the height and weight variables in the experimental and control groups.

Table 1. Sample Distribution According to the Type of Group.

Variance	Type	Control Group	Experimental Group	Total
Health Status	Normal	6	6	12
	Deaf	6	6	12
		12	12	24

Table 2. Means, Standard Deviations, and T Test Between Groups (Height and Weight).

Variable	Measurement Unit	Group	Mean	SD	T-Test	Sig.
Height	CM	Experimental	152.66	4.59	0.03	0.898
		Control	152.57	4.30		
Weight	KG	Experimental	48.50	6.25	0.32	0.742
		Control	47.20	6.79		

Note: *T Value at the Level $\alpha \leq 0.05$ is 2.07.

Table (2) shows the values of the arithmetic means, standard deviations, and the value of t calculated between the two groups for weight and height. The calculated significance levels of (0.898) for the variable height and (0.742) for the variable weight indicate the absence of statistically significant differences between the experimental and control groups in height and weight. This is because the significance level was greater than 0.05, and therefore, it can be inferred that the two groups are equivalent in these variables.

2.1. Tool: (Designing a Computerized Educational Program using QR Technology)

The researchers reviewed a set of previous studies, literature, and scientific references related to computerized educational programs, basketball game, hearing impairment, teaching methods, as well as specialized websites for basketball training, and some foreign educational videos for basketball skills such as (Lopatina, 2019), Ghazi (2018), Al-Maitami (2013), Gabov et al, (2022), Al-Taieb et al,(2017), Al-Waisi (2008), Al-Mahamid (2007), Bani Dumi (2007), Al-Khattabah (2006), Goeller (2004), Jabr (2006), Abdullah and Badawi (2006), Al-Hayek and Adeeb (2006), Jobling (2006), Goeller & Karen (2004), Al-Shalan (2006), Al-Shaloul (2005), Kucher, Bill (2005), Brown (2005), Fawzi (2004), Shahin (2004), Afandi (2015), Jodoïn & Robertson (2014), Bulter (2005), Carr (2002), Homs & Assem (2016), Krause (2017), Ghazi (2019), as well as specialized basketball websites such as (Coach’s Clipboard.net), (BreakthroughBasketball.com), (fiba.com\minibasketball) in order to identify the study objectives and the best way to link the specific training in the bouncing skill and prepare it through links and codes to be sent to deaf students and follow up on their implementation through live broadcasting through Microsoft teams and zoom programs.

The educational program was initially written, which consists of 12 instructional units, each unit contains three parts (the introductory part which includes general and specific warm-ups and muscle stretching exercises or a small game, the main part which includes the educational activity and the practical activity for the skill, and the concluding part which includes cool-down exercises or a small game). The duration of each unit is 45 minutes, which is equivalent to a study session prescribed by the Ministry of Education for the (primary lower) school stage for the study sample. Then, these links were presented to a group of expert referees and specialists in the field of curricula, teaching and sports training, basketball training in particular, and those specialized in special cases and modified sports. See Figure (1).

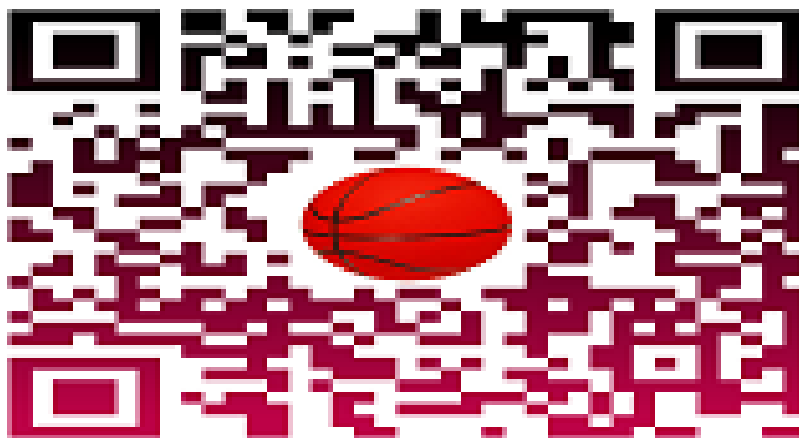


Figure 1. The QR Code for the Basketball Dribbling Skill Training Program.

2.2. Content Validity

Content validity of the QR educational program was established by presenting it to a group of expert referees in curricula, teaching methods, and basketball training. The referees and experts agreed on the validity of the program, which obtained a high content validity percentage of (86.39%) through the assessment tool developed for this purpose.

2.3. Reliability

The reliability coefficient of the physical and skill tests was established by applying the test and re-test method with a one-week interval on a sample of the study community and six students from outside the sample. Table (3) shows the correlation coefficient between the first and second applications of the skill tests under study.

Table 3. Means, Standard Deviations, and Correlation Coefficient Values Between the First and Second Administration of the Skills Test.

Skill Tests	Measurement Unit	1st Application		2nd Application		Correlation Coefficient	Sig.
		Mean	SD	Least Value	Highest Value		
Static Dribbling Skills	Value	0.72	0.48	0.69	0.46	0.931	*0.001
Movement Dribbling Skills	Value	0.65	0.56	0.69	0.46	0.738	*0.000

Note: *Correlation Coefficient Value at the Level ($\alpha \leq 0.05$) is 0.422.

Table 3 shows the mean values, standard deviations, and correlation coefficient between the first and second applications of the skill ability tests under study. By reviewing the correlation coefficient values, we find that they ranged between 0.738 for ball bouncing from motion skill and 0.931 for ball bouncing from stability skill. All of these values indicate a high degree of stability for the skill tests.

2.4. Steps of Conducting the Study

2.4.1. The Survey Study

The researchers conducted a survey study on a sample of 6 individuals (deaf and hearing) from the same study community, after obtaining consent from their parents, and they were excluded from the original study sample. The study was conducted between March 1-7, 2021, where the application was in the form of two educational units. The aim of this study was to identify the suitability of the remote technology and software used for conducting the study, and to train the assistant team on how to conduct the tests and how to record the data. The study also aimed to

identify the most important obstacles that may face the researchers and assistants in implementing the program and educational units.

2.5. The Second Procedural Stage

Pre-test measurement: The skill pre-test was conducted for the experimental and control groups in the first week by skill performance assessors, and assessment scores were given to individuals in both groups remotely using available programs such as Teams, Zoom, or any other program.

Table 4. Mean, Standard Deviation, T-Value, and Significance of Differences for the Pre-Test Skill Test for the Experimental and Control Groups are Under Study.

Skill Variables	Measurement Unit	Group	Mean	SD	T Value	Sig.
Static Dribbling Skills	Value	Experimental	1.31	0.47	0.63	0.569
		Control	1.43	0.59		
Movement Dribbling Skills	Value	Experimental	1.18	0.32	0.41	0.684
		Control	1.23	0.28		

Note: *T Value at the Level ($\alpha \leq 0.05$) is 2.07.

Table (4) shows the mean, standard deviation, and calculated t-value for the pretest skill assessment for the experimental and control groups. The significance level values calculated were (0.69) for the stationary ball bouncing skill test and (0.684) for the moving ball bouncing skill test. These values indicate that there were no statistically significant differences between the experimental and control groups in these tests, as the significance level value was greater than 0.05. Therefore, it can be concluded that the two groups were equivalent in these tests.

2.6. Program Implementation

- The partial-whole method was used to teach the skill to individuals in both the experimental and control groups.
- A QR code link for each instructional unit was sent separately to the students, and their progress was monitored using the agreed-upon visual programs.

2.7. Post Assessment (Skill Performance Assessment)

The performance score for the basketball dribbling skill was calculated by assessing the student's application of the technical and legal aspects of the skill correctly. A score of five points was assigned to each skill, taking into account the division of the skill into main parts, which are the ability to control and manipulate the ball, as well as the fluidity of performance and proficiency in performing ball movements from stability and motion.

Table 5. Mean, Standard Deviation, t-value, and Significance of Differences between Pretest and Posttest Scores on the Skill Test for the Experimental Group Members.

Skill Variables	Measurement	Measurement Unit	Mean	SD	T Value	Sig.
Static Dribbling Skills	Pretest	Value	1.31	0.45	26.02	*0.000
	Posttest		4.23	0.33		
Movement Dribbling Skills	Pretest	Value	1.18	0.29	35.09	*0.000
	Posttest		4.41	0.24		

Note: *T Value at the Level ($\alpha \leq 0.05$) is 2.20.

3. RESULTS AND DISCUSSION

Table (5) shows the mean, standard deviation, and calculated t-value for the pretest and posttest scores of the experimental group members who were studying the skill of ball bouncing from a stationary and moving position. The computed significance level of (0.000) indicates that there are statistically significant differences between the

pretest and post-test scores for the two measures, with the significance being in favor of the post-test scores. The standard deviation values suggest that the scores in the post-test measure were less variable than those in the pretest measure. The results indicate that there is a significant improvement in the ball bouncing skills from the stationary and moving position, and this improvement is more evident in the posttest measure than in the pretest measure.

Table 6. Mean, Standard Deviation, t-value, and Significance of Differences between Pre- and Post-Test Scores on the Skill Test among the Control Group Members.

Skill Variables	Measurement	Measurement Unit	Mean	SD	T Value	Sig.
Static Dribbling Skills	Pretest	Degree	1.43	0.61	12.63	*0.000
	Posttest		3.58	0.82		
Movement Dribbling Skills	Pretest	Degree	1.23	0.29	15.02	*0.000
	Posttest		3.56	0.67		

Note: *T Value at the Level ($\alpha \leq 0.05$) is 2.20.

Table (6) displays the mean, standard deviation, and calculated t-value for the pretest and posttest scores of the control group members who were studying the skill of ball bouncing from a stationary and moving position. The computed significance level of (0.000) indicates that there are statistically significant differences between the pretest and posttest scores for the two measures, with the significance being in favor of the post-test scores. The standard deviation values suggest that the scores in the post-test measure were less variable than those in the pretest measure. The results indicate that there is a significant improvement in ball bouncing skills from the stationary and moving position, and this improvement is more evident in the posttest measure than in the pretest measure.

Table 7. Mean, Standard Deviation, t-value, and Significance of Differences between Experimental and Control Groups in the Dimensional Assessment of the Skill Test under Study (Posttest).

Skill Variables	Measurement	Measurement Unit	Mean	SD	T Value	Sig.
Static Dribbling Skills	Pretest	Degree	4.18	0.37	2.68	*0.013
	Posttest		3.52	0.84		
Movement Dribbling Skills	Pretest	Degree	4.34	0.29	4.49	*0.000
	Posttest		3.49	0.66		

Note: *T Value at the Level ($\alpha \leq 0.05$) is 2.07.

Table (7) shows the mean, standard deviation, and calculated t-value between the experimental and control groups for the post-test scores of the ball bouncing skill measured dimensionally. The computed significance level of (0.015) for the ball-bouncing skill from a stationary position and (0.000) for the ball-bouncing skill from a moving position indicates that there are statistically significant differences between the experimental and control groups in these measures in the dimensional assessment. The results suggest that the experimental group performed significantly better than the control group in these tests. The standard deviation values suggest that the scores in the experimental group were less variable than those in the control group. These findings demonstrate that the intervention had a significant positive effect on improving ball bouncing skills from a stationary and moving position, and this improvement is more evident in the post-test measure in the experimental group compared to the control group.

Based on the results presented in tables 5, 6, and 7, researchers believe that these results are logical and expected for both the experimental and control groups on several fronts. The reason for this is due to the nature of the selected study sample, which consists of non-basketball players in schools who do not practice basketball officially with any clubs or school teams. If they do practice, it is only in a random and spontaneous manner through imitation. Therefore, they are not basketball players. The evidence for this is the level of both groups in the pre-measurement skill tests and their low performance in the skill level test, as shown in table 4 through the significance level values of the individuals in both groups in the pre-measurement, indicating a low skill level for both groups.

Furthermore, the aim of the study was to investigate the impact of an educational program using the QR technique on this non-basketball-playing population, given the students' distance from school during the COVID-19 pandemic, and to measure the effectiveness of this technique on teaching the skill aspect to the study sample and both groups. The sample of this study is consistent with the samples of Karmajouna et al (2021), Firmansyah (2019), Carr (2002), Al-Saleh (2014), Al-Taieb et al (2017), Al-Hamouli (2006), Al-Mahamid (2007), Khatatbeh (2006), Al-Shaalan (2006), Shahin (2004), Leigh, et al, (2015), Al-Aqad (2003), and Makasci (2000), in terms of the absence of prior knowledge or practice of the sport under study. However, it differs from the samples of Al-Mitmi (2009), Jabr (2006), Al-Shaloul (2005), Ghazi (2018), and Al-Dagistani (2000), and Krause (2017).

To confirm and verify the second hypothesis of the study, the One Way ANCOVA test was used to analyze the performance test results of the experimental group according to the type of students, as shown in Table (8).

Table 8. One-Way ANOVA Results for the Skill Tests of the Experimental Group Members According to the Variable of Student Type.

Skills Tests	Source Variance	Total Grades	Freedom Degree	Sum Squares	F Value	Sig.
Static Dribbling Skills	Pre-Test	0.31	1	0.29	3.06	0.119
	Status	0.05	1	0.02	0.22	0.677
	Error	0.89	9	0.10		
	Total	1.22	11			
Movement Dribbling Skills	Pre-Test	0.03	1	0.01	0.18	0.711
	Status	0.13	1	0.10	1.83	0.216
	Error	0.53	9	0.06		
	Total	0.67	11			

Note: *F Value at the Level ($\alpha \leq 0.05$) is 5.12.

Table (8) shows the results of One Way ANCOVA analysis for the skill tests being studied among individuals in the experimental group according to the variable of student type (healthy and deaf). The significance level values calculated for the skill tests of stationary ball bouncing (0.677) and moving ball bouncing (0.216) indicate that there were no statistically significant differences between healthy and deaf individuals in the skill tests in terms of dimensional measurement, as the significance level value was greater than 0.05.

The researchers attribute this to the fact that both healthy and deaf students in the experimental group were exposed to the same educational content using the QR technique and neither had prior experience playing basketball, as well as to the same duration and level of training and its diversity during the application. The researchers also explain this due to the nature of the growth stage that both groups go through, as the stage of adolescence which they both are in is referred to as "early adolescence" which extends from 11 to 14 years old as mentioned by Al-Shahat (2008), as well as clarified by Al-Hindawi (2001) and Al-Zoubi (2001), Leigh, et al, (2015), who indicated that this stage extends from 12 to 14 years old. Both cases share many physical and morphological growth characteristics, including the appearance of specific bodily changes, and sexual maturity begins in both except for the sense of hearing. Psychomotor characteristics also appear through a focus on competitive activities, significant improvement in neuromuscular coordination, and reaction time for both genders.

Referring to the previous Table 3, which confirms the validity of the researchers' findings regarding the equivalence of the study sample individuals in terms of height and weight variables in both groups. The results of this study are consistent with the findings of other studies, including Gabov et al. (2022), Krause (2017), Ghazi (2019), Stewart & David (2005), Kattleen (2005), Karmajouna et al (2021), Abu Al-Kashk (2003), Al-Rifai (2003), Homs & Assem (2016), Carter (2004) and Gabov et al. (2022).

4. CONCLUSIONS

Based on the study results presented and discussed, the researchers concluded the following:

1. QR technology increases learning opportunities for both deaf and hearing students and improves their performance and comprehension of the skill in an engaging and effective manner.
2. There is a clear positive impact of using QR technology in teaching and developing ball-bouncing skills in deaf students.
3. Using QR technology during the COVID-19 pandemic in teaching ball bouncing skills has helped in learning other related skills, such as catching, bouncing, passing, etc., due to the improvement and development of mental images seen through correct computer-modeled performance.
4. Using QR technology enhances the concentration and attention of students (deaf and hearing) in receiving information during the instructional unit, thus increasing their desire to perform these skills correctly.

5. RECOMMENDATIONS

Based on the aforementioned conclusions, the researchers recommend the following:

1. The effectiveness of using QR technology during the COVID-19 pandemic should be encouraged in both public and private schools, as well as in schools for deaf and hearing-impaired students.
2. Disseminate study results to the Ministry of Education and provide physical education teachers with digital programming skills, and investigate the possibility of creating an instructional guide for physical education teachers or a computerized curriculum.
3. Work on enhancing collaboration between educational institutions and multimedia software production companies to design and produce software in different sports fields and for various educational levels.
4. Adopt the use of QR technology during the COVID-19 pandemic in teaching basketball to deaf and hearing-impaired students in physical education colleges at Jordanian universities, and work on digitizing other curricula and courses for them.
5. There is a need to expand similar studies and compare the impact of the program on deaf students and their hearing peers, and to conduct programs and studies for other sports, as well as differences between genders.

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