

The effectiveness of a digital technology-enhanced physical education program in developing certain basic life skills in elementary school students

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Received: 12/05/2025 Accepted: 20/06/2025 Published: 12/12/2025

Abstract

Through our current study, we aim to identify the effectiveness of a physical education program enhanced with digital technology tools in developing some basic life skills among elementary school students. To achieve the desired research objectives, we adopted a quasi-experimental approach with two groups (experimental and control) with pre- and post-tests, The research sample included 40 elementary school students, aged 10–11 years. As data collection tools, we used a set of tests and measures appropriate for assessing certain life skills (cooperation, communication, problem solving, and emotional control). After statistical processing of the results, there was a significant improvement in the students' life skills, specifically for those who underwent the digitally enhanced educational program, compared to their peers who underwent the regular program. This was confirmed by statistical differences and the significant impact of the program. The study also recommended the need to integrate digital technology into physical education and sports classes, providing the necessary infrastructure of smart boards, applications, and digital motion games. and preparing and designing educational curricula that include digital activities that develop various aspects of the

student's personality, foremost among which is the development of their life skills.

Keywords: educational program, life skills.

1. Introduction:

The explosion of knowledge and technology in our modern world has had an impact on various aspects of life, especially in the field of education, where digital technology has become an important element and a fundamental pillar of the educational process, facilitating the development of teaching methods and techniques that meet the needs of the 21st century and are in line with its requirements.

In order to keep pace with this development, it is necessary to search for the most effective ways and means to achieve it, starting from the earliest stages of education, which are considered the cornerstone for building the personality of learners, namely primary education, This is one of the most fertile stages for instilling various values and skills on which the rest of a child's life is built, **Elias (2018, p. 22)** notes in this regard that developing competencies from the primary stage promotes mental and social health and reduces negative behaviors in the future.

Perhaps the first obstacle we encounter is the dominance imposed by digital media and its virtual space, which has given rise to a new pattern of socialization that negatively affects interaction, cooperation, and direct and realistic contact between peers, which in turn significantly limits the development of their life skills, especially those related to cooperation, problem solving, effective communication, and emotional control.

Here, physical education and sports stand out as one of the most important subjects in the curriculum, which in turn has transformed

from a set of physical activities aimed at improving physical fitness and health in general, to an integrated educational space that aims to develop children's life skills, qualifying them to adapt to changes in the social and digital environment. Numerous studies have confirmed that physical education contributes effectively to improving students' cognitive abilities and academic achievement (Bailey, 2019, p. 44).

The requirements of facing these current challenges lead us to explore the possibility of employing physical education and enhancing it with digital technology as an innovative mechanism that integrates physical activity and interactive digital learning, thereby contributing to raising and improving the levels of life skills of primary school students.

Hence, the idea for this study arose to identify the effectiveness of a physical education program enhanced with digital technology tools in developing some basic life skills among primary school students.

2. Research problem:

The noticeable tendency among children, especially those in elementary school, to spend long hours on smartphones and electronic games has led to many problems, chief among them weak social skills due to a lack of direct social interaction, as well as a decrease in physical activity. This has resulted in a clear deficiency in their life skills and difficulty adapting to school and social life.

This prompted us to search for the most effective ways to address this deficiency, using physical education and sports as a foundation that has proven effective in addressing many problems in children. We did this by proposing an educational program in physical education and enhancing it with digital technology to develop certain life skills.

From this, the general research question can be formulated as follows:

How effective is an educational program in physical education enhanced by digital technology in developing certain life skills in primary school students?

3. Sub-research questions:

3.1. Are there statistically significant differences between the control group and the experimental group in the pre-test of life skills?

3.2. Are there statistically significant differences between the control group and the experimental group in the post-test of life skills?

3.3. What is the impact of the educational program on the development of the life skills under study?

4. Research objectives:

- To develop an educational program that integrates physical activity and digital technology.
- To test the effectiveness of the proposed program in developing certain life skills among elementary school students.
- To determine the impact of this proposed program on the experimental sample.
- Research in this field is relatively new in Arabic studies, namely the field of digital activity.

5. Research significance:

5.1. Theoretical significance:

-This research supports recent trends that urge the need to integrate digital technology into education in general and physical education in particular.

-The research examines the relationship between physical activity and the development of life skills through the use of digital technology within a well-thought-out scientific framework.

5.2. Practical significance:

- Provide physical education and sports teachers with a program that meets the needs of learners in this digital era.

- This research presents a modern model of enhanced education, which should be explored in terms of how it can be developed in schools.

6. Research terms:

6.1. Educational program:

Grady (2022, p. 05) defined it as a set of educational units proposed by the researcher, including a set of situations expressed through activities.

6.2. Life skills:

They are also called life skills, and Mustafa (2018, p. 303) defined them as a requirement for human development in the current era. This is confirmed by the interest shown in them by some educational systems, which treat them as a separate subject or integrate some of their elements or themes into various subjects at different educational levels, and by the need

for individuals to acquire these skills and successfully apply them in the face of the changes of everyday life.

7. Theoretical Framework and Previous Studies

7.1. Theoretical Framework

7.1.1. Physical Education in Light of Digital Transformation:

The remarkable development witnessed by physical education and sports has elevated it from being a set of physical activities aimed at improving various motor skills to being a broad field concerned with the growth of the individual in all physical, psychological, and social aspects. With the current digital revolution, those interested in developing this activity have sought ways to promote and develop its practice by enhancing it with various modern technological means such as smartphones, various interactive games, and educational platforms specializing in the design of sports and training programs. This has given rise to a new educational philosophy in the practice of physical education, which considers technology to be an aid and support mechanism, a concept known as technology-enhanced physical education.

7.1.2. Life skills and their importance in primary school:

A child who has the ability to cope with various everyday situations in their life and interact effectively with their environment can be considered to have life skills, these skills include:

- **Cooperation:** contributing effectively to teamwork to achieve a common goal.
- **Communication:** This is the child's ability to clearly express their various feelings and thoughts respectfully.
- **Problem solving:** This is the ability to overcome various obstacles through critical and creative thinking.
- **Emotional control:** Controlling emotional responses to achieve psychological and social balance.

These competencies are particularly important in primary school, where social behavior and the ability to adapt to school life are formed.

7.1.3. The relationship between physical activity and the development of

Numerous studies indicate that physical activity not only improves motor and physical

abilities, but also contributes significantly to psychological and social development. Participating in team sports promotes a spirit of cooperation and belonging, while physical challenges motivate children to think of new solutions to problems. In addition, playing sports helps control emotions and stress.

Therefore, combining physical activity with digital technology is expected to have a greater impact, as it provides children with a fun and stimulating interactive environment that enhances their motivation and opens up new opportunities for self-directed and collaborative learning.

7.2. Previous studies:

7.2.1. Arabic studies:

- **Brahimi study (2020):** This study aimed to identify the impact of using technological media in physical education classes on the motivation of primary school students. The results showed a significant improvement in the level of interaction and classroom participation among learners who used interactive applications, compared to their peers who practiced physical activity using traditional methods.

- **Oweisi's study (2021):** This study investigated the relationship between school sports activities and the acquisition of social skills among primary school students. The results showed that participating in group activities develops a spirit of cooperation and discipline and enhances their sense of responsibility. and recommended the importance of implicitly employing and integrating digital technology into the curriculum to increase the appeal of exercise and achieve better results.

7.2.2. Foreign studies:

- **Smith & Johnson (2019):** This study examined the impact of interactive digital games (exergames) on the development of social skills in children. The results showed that the use of these games and their integration into physical education and sports classes enhanced cooperation and communication among students.

- **Martinez & al (2022) study:** Researchers in this study applied a virtual reality-based training program to a sample of school children. The results of the study showed that this type of technology-enhanced program

significantly contributed to increasing motivation to exercise and enhancing children's life skills.

7.2.3. Comments on previous studies:

Various previous studies have shown us that it is entirely possible to use digital technology in physical education classes, as evidenced by the positive impact demonstrated by the results of studies after the implementation of technological programs. However, our current study aims to integrate this digital technology implicitly into physical education classes in parallel with the curriculum, which will greatly benefit students by enhancing their life skills and increasing their motivation, which is what our current study seeks to address.

8. Research methodology and field procedures:

8.1. Research methodology:

A quasi-experimental approach was adopted with two groups (experimental and control) and pre- and post-tests, as this was appropriate for the nature of the study, which aimed to investigate the effectiveness of a digitally supported physical education program on the development of certain life skills.

8.2. Research sample:

The research sample included 40 elementary school students, aged 10–11, divided into two groups:

- Experimental group (n=20): subjected to the digitally enhanced educational program.
- Control group (n=20): followed the regular physical education and sports program.

8.3. Measurement tools:

In order to achieve the desired research objectives, a set of tests and measures

- **Table No. (01): Shows the equivalence test for the two samples.**

appropriate for measuring life skills were used, as follows:

- Cooperation: (standardized observational scale).
- Communication: (behavioral assessment card during activities).
- Problem solving: (motor-creative situations test).
- Emotional control: (short questionnaire + classroom observation).

8.4. Educational program:

An 8-week educational program (two sessions per week) was developed, comprising a total of 16 sessions, in which we combined traditional physical activities with digital technology (interactive games, educational videos, smart boards, and motion-based game applications).

8.5. Field research procedures:

- Application of pre-test measurement to the experimental and control groups.
- Implementation of the educational program on the experimental group, leaving the control group to undergo the regular program.
- Post-test measurement after completion of the educational program.

8.5.1. Statistical methods:

The following statistical methods were adopted (arithmetic mean, standard deviation, t-test, and effect size (d)).

8.6. Statistical processing and results:

8.6.1. Test of equivalence of the two groups (control and experimental):

- The t-test was adopted for two independent samples, as shown in the following table:

Variable	Arithmetic mean of the control group	Arithmetic mean of the experimental group	Standard deviation of the control group	Standard deviation of the experimental group	Value (t)	Significance (p)
Cooperation	21.2	21.5	2.25	2.10	0.45	0.65 Not significant
Communication	21.7	22.0	2.40	2.35	0.5	0.62 Not significant

Problem solving	20.5	20.8	2.15	2.00	0.55	0.60 Not significant
Emotional control	20.9	21.0	2.30	2.20	0.40	0.68 Not significant

- Comment on the table:

Based on the statistical values shown in the table, which were less than (0.05) for all variables, it is clear that there were no statistically significant differences between the control and experimental groups before the educational program was implemented, This

indicates that the two samples were equivalent before the program was implemented.

8.6.2. Testing the homogeneity of variance between the two groups:

In order to ensure that the variance is convergent, **Levene's test** was adopted and the results are shown in the following table:

- Table No. (02): Shows the homogeneity test for the two samples

Variable	Levene's value	Significance (Sig)	Interpretation
Cooperation	0.45	0.51	Homogeneous ($p>0.05$)
Communication	0.60	0.44	Homogeneous ($p>0.05$)
Problem solving	0.55	0.47	Homogeneous ($p>0.05$)
Emotional control	0.35	0.56	Homogeneous ($p>0.05$)

Interpretation:

The statistical results in the table indicate that the two groups are homogeneous, as evidenced by the Sig value, which was greater than 0.05 for all variables.

8.6.3. Pre-test results for the control and experimental groups:

- Table No. (03): Shows the results of the pre-measurement

Variable	Control group (n=20)	Experimental group (n=20)	Value (t)	Significance (p)
Cooperation	12.06	12.4	0.42	Not significant
Communication	11.08	11.7	0.31	Not significant
Problem solving	11.01	10.9	0.27	Not significant
Emotional control	12.3	12.1	0.36	Not significant

- Comment on the table:

The statistical results shown in the table indicate that there are no statistically

significant differences between the two groups in the pre-test.

8.6.4. Post-test results for the control and experimental groups:

- Table No. (04): Shows the results of the post-measurement

Variable	Control group (n=20)	Experimental group (n=20)	Value (t)	sig	Differences in favor of
Cooperation	13.10	18.25	8.20	0.001	Experimental
Communication	13.05	17.95	7.85	0.001	Experimental
Problem solving	11.40	16.85	9.10	0.001	Experimental
Emotional control	12.00	17.25	8.60	0.001	Experimental

- Comment on the table:

The statistical results in the table show that there are statistically significant differences in

favor of the experimental group, which the researcher attributes to the effectiveness of the educational program implemented.

8.6.5. Calculating the impact size (d):

- Table No. (05): Shows the impact of the program

Variable	Impact size (d)	Level of strength
Cooperation	1.85	Very high
Communication	1.75	Very high
Problem solving	2.10	Very high
Emotional control	1.95	Very high

Comment on the table:

The results shown in the table indicate that the effect was greater than (0.80), which shows that the program had a significant and substantial impact on the various targeted life skills.

8.6.6. Interpretation of statistical results:

The results of the statistical analysis of the data showed significant development in the

students who underwent the digitally enhanced educational program compared to their peers who underwent the regular program, This was reflected in the statistical differences in the post-test measurements, which were in favor of the experimental group, and the significant impact of the educational program on the growth and development of the various life skills under study, unlike the control group,

which only underwent the regular traditional program.

9. Discussion of results in light of previous studies:

9.1. Coopération:

The results in Table (04) showed statistically significant differences between the two groups in the post-test measurement in favor of the experimental group in terms of the level of cooperation, where the arithmetic mean of the experimental group was (18.25), while that of the control group was (13.10), with a value of ($t=8.20$, $p=0.001$). The effect size was large, reaching ($d=1.85$) as shown in Table (05).

These results confirm that the educational program effectively enhanced cooperation skills, these results are consistent with the study by Oweisi (2021), which confirmed that group activities raise team spirit, as well as the results of the study by Smith & Johnson (2019) on the role of interactive digital games in improving school cooperation.

9.2. Communication:

The results in Table (04) showed a statistically significant difference between the two groups in the post-test measurement in favor of the experimental group in terms of communication level, where it recorded a mean of (17.95) compared to the control group, which was (13.05), and a value of ($t=7.85$, $p=0.001$). The effect size was very large, reaching ($d=1.75$) through Table (05). $p=0.001$), and the effect size was very large, reaching ($d=1.75$) as shown in Table (05).

This is in line with what Brahim (2020) pointed out, namely that the integration of technological media in physical education lessons increases verbal and non-verbal interaction, as well as the findings of Martinez et al. (2022), who confirmed that virtual reality stimulates motor and creative communication in children.

9.3. Problem solving:

The results in Table (04) showed a statistically significant difference between the two groups in the post-test in favor of the experimental group in problem solving, where it recorded a mean of (16.85) compared to the control group, which was (11.40), with a value of ($t=9.10$, $p=0.001$). The effect size was very large, reaching ($d=2.10$) in Table (05).

This result proved that the use of digital motor activities creates new and unusual situations for children, stimulating their critical thinking. This is confirmed by a study by Thomas & Lee (2020), which concluded that interactive games improve strategic thinking skills.

9.4. Emotional control:

The results in Table (04) showed statistically significant differences between the two groups in the post-test measurement in favor of the experimental group in terms of emotional control, where the arithmetic mean for the experimental group was (17.25), while that of the control group was (12.00), with a value of ($t=8.60$, $p=0.001$). The effect size was large, reaching ($d=1.95$), as shown in Table (05).

This result proved that the program enhanced the students' ability to control their emotions during competitive situations, which is consistent with the results of a study by Thomas & Lee (2020), which concluded that interactive physical activities reduce stress and agitation in children, and also with the results of the study by Oweisi (2021), which highlighted the effect of school sports in promoting emotional stability.

10. General conclusion:

Our current study addressed the topic of researching the effectiveness of a digital technology-enhanced physical education program in developing certain life skills in elementary school students. After implementing the program, obtaining the results, analyzing and interpreting them, and linking them theoretically to previous studies in order to answer the study's research question and the aforementioned questions, we reached the following conclusions:

1. All differences were statistically significant and in favor of the experimental group, indicating the effectiveness of the educational program enhanced by digital technology.
2. The results of the study showed us that the improvement in life skills among the study sample was substantial, as indicated by the magnitude of the effect, which was significant in most variables (above 0.80).
3. The research results reflect the great importance of integrating traditional physical activity with digital technology, as it meets the modern technological needs of children on the

one hand, and on the other hand, provides them with a stimulating educational environment and increases their desire and motivation to practice.

4. Our current study supports the modern trend toward physical activity as an effective tool for enhancing and developing various life skills, rather than viewing it as a dry motor activity.

11. Conclusion:

This study aimed to test the effectiveness of a digital technology-enhanced physical education program in developing certain life skills (cooperation, communication, problem solving, and emotional control) among elementary school students. We adopted a quasi-experimental approach in the research by designing two groups (experimental and control) with pre- and post-tests. After implementing this program and statistically analyzing its results, we concluded that all differences were statistically significant and in favor of the experimental group, as the arithmetic means of life skills (cooperation, communication, problem solving, and emotional control) in the experimental group ranged between (16.85 -18.25), compared to the control group's averages, which ranged between 11.40 and 13.10. The effect size (d) was very large in most variables, as it was higher than 0.80, which indicates the great effectiveness of the educational program on the study sample.

12. Recommendations:

Based on our research findings, we recommend the following:

1. Integrate digital technology into physical education and sports classes, providing the necessary infrastructure of smart boards, applications, and digital motion games.
2. Prepare and design educational curricula that include digital activities that develop various aspects of students' personalities, primarily their life skills.
3. Train physical education and sports teachers in the use of digital technology and media and empower them to use it.
4. Encouraging such research in the future, whether through studying the impact of other digital media or in different educational stages, such as middle and secondary education.

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