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Effectiveness of an Educational Program via Animated Movies Improving a Number of Cognitive Visual and Dynamic Visualisation Skills and Learning Some Rhythmic Gymnastics Skills (Comparative Study)

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Abstract: Animated movies could be very useful comprehending and promptly applying motional skills. In addition to animated movies watched on computers, Flipbooks are very interesting for children and illustrating skills. Both researchers chose the topic, with a suggestion of an educational program for children under 6 years old, comparing both animated means, aiming to illuminate their effect on a number of cognitive visual and dynamic visualisation skills and learning some rhythmic gymnastics skills, The experimental method was the most suitable for the research. The research community was selected to be 40 under six-year old junior athletics, of Alexandria Sporting club gymnastics school. Application consumed six and a half months. Results shed light on indicative statistical differences between average telemetry degrees of both experimental groups concerning improving skills, some visual cognitive skills for a number of rhythmic gymnastics skills; for the group using computers.

Key words: Computers · Flipbooks · Rhythmic gymnastics skills · Visual cognitive skills

INTRODUCTION

Rhythmic gymnastics is considered one of the competitive activities; its results are counted indications of highly developed countries. It is a sport where the human body vastly deals with the laws of nature, mechanics, physiology, anatomy, psychology and education [1]. Rhythmic gymnastics aim at reaching highest performance levels. This target is achieved through learning, acquiring and developing special skills and advancing physical and innovative abilities, in addition to forming the psychological and mental characteristics suitable for performance demands [2,3].

The education process basically depends on a number of factors, like means of educating, means of presenting educational experiences.Therefore, education based on experiment, appliance and variability of educational situations is transferred easier and faster. This makes the lesson more interesting and exciting and fills it with desired ideal performance [4]. Othman [5] confirmed, based on Ukran and Shwes, that acquiring, learning and mastering physical skills basically depend on dynamic visualization. It is the process of obtaining the primary image of the movement, which is the first priority in the importance of physical learning. It is essential for a teacher of physical education to have modern teaching methods, allowing him to convey correct information to the learner.

Animated movies displayed via computers is one of the modern methods of education, that works on activating the child's imagination, educates him and entertains him. And it is important for learning physical skills, in taking and quick performance. Also the Flipbook is one of the best well-known animated cartoons. It is based on an interesting idea for children to visualise skills in animation in addition to animated movies on computers. Accordingly the idea was elaborated on how to make use of both methods in the teaching process by holding a comparison to conclude which method is best for rhythmic gymnastics female players, as far as teaching and skilful performance level improvement are concerned. No research or study has ever approached this topic, especially concerning the Flipbook. Both researchers chose the topic, with a suggestion of an educational program for children under 6 years old, comparing both animated means, aiming to illuminate their effect on dynamic visualisation, some visualisation skills and learning some rhythmic gymnastics skills [6, 7].

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Target of Research: Designing an animated cartoon program using computers and flipbooks, for children under six years old and identifying the effect of each of them on:

- Improving some cognitive and visual skills.
- Improving the dynamic visualization to some rhythmic gymnastics skills.
- Learning some rhythmic gymnastics skills.

Hypotheses:

- There are statistical differences between average telemetric degrees of measurement for each group improving some cognitive and visual skills. The statistics are in favour of the group using computer.
- There are statistical differences between average telemetric degrees of measurement for each group improving dynamic visualisation of some rhythmic gymnastics skills. The statistics are in favour of the group using flipbook.
- There are statistical differences between average telemetric degrees of measurement for each group improving performance level of some rhythmic gymnastics skills. The statistics are in favour of the group using computer.

MATERIALS AND METHODS

This research depends on the experimental methodology through creating two equal experimental groups. Evaluation took place for both groups before and after the experiment.

Areas of Research

Time Interval: Main experiment was applied from 8 March 2009 to 11 June 2009.

Location: Alexandria Sporting Club.

Human Sphere: Including

Research Sample: The sample was chosen randomly from a group of 4-6 year-old girls with an average age of (±5.220 years old) from Alexandria Sporting Club gymnastic school. 40 girls were selected as a sample after excluding those who did not complete their evaluation and those with no consistent attendance. Girls were divided into two experimental groups, 20 girls in each group. Animated cartoon on the computer program was applied on the first experimental group; while flipbooks program was applied on the second experimental group.

Homogeneity of Research Sample: Homogeneity of research sample was set through calculating torsion coefficient of the following variables: basic variables, which are the variables related to individual factors (height, weight, age) general intelligence, testing the ability of physical learning.

Variables related to experimental factors, cognitive and visual skills test, dynamic visualisation test and level evaluation of rhythmic gymnastics skills "subject of research". It was concluded that torsion coefficient for basic variables for each group and for both together is characterised by normal distribution. Results are within ±3 which indicates rationality and coherence of members of sample.

Measurements and Tools of Research

First: Measurements

Height: using the Rest meter to the nearest cm - Weight: using medical scale, to the nearest kg - Age: to the nearest 1 month.

Second: Tools

IQ Test: (Good Enough): drawing the man. The target is measuring the children's' general intelligence. Steady percentage reached was (0.98 - 0.80) accuracy factor (0.79) [8-10].

Physical Learning Ability Test: Lutzner Cells (1974): This particular cell was chosen because it is easy to apply and has been applied before in pre-school stage in Egypt [9-11]. Lutzner Cell is composed of three tests: Personal test - Change test - Backward directed test.

Consistency and Accuracy of the Test: Accuracy factor reached (0.908-0.891), while consistency factor reached (0.941-0.894).

Tests of Physical Abilities Related to Skills (Subject of Research): All physical abilities related to rhythmic gymnastics skills were specified through previous researches [2, 3, 12, 13]. A number of tests were selected to measure the physical abilities related to the eight skills (subject of research) through references and previous studies. Consistency and accuracy of the tests: accuracy factor reached (0.977-0.848), while consistency factor reached (0.948 - 0.864).

Dynamic Visualization Test: This test was used by Abdallah and Fathi [14], Lead by these tests, the researchers prepared for the tests as follows: Every skill was divided according to basic stages, a number of unanimated pictures was selected for the same cartoon character - one of the characters used in animated cartoon program - illustrating stages of every skill (Appendix 1).

Consistency and Accuracy of the Tests: Accuracy factor reached (0.961-0.773), while consistency factor reached (0.858-0.964).

Cognitive and Visual Skills Test: This test was used by Ismail [15]. It was applied on junior rhythmic gymnasts. The test is comosed pof seven dimensions and it was applied on an age stage that is different from the research sample, therefore two appropriate tests were chosen: OCR (Optical Character Recognition) and (Visibility Determination).

Consistency and Accuracy of the Tests: Accuracy factor reached (0.831-0.931), while consistency factor reached (0.945-0.927).

Skills Observation Card: This study relied on a legalized observatory card indicating performance level.

Consistency and Accuracy of the Tests: Accuracy factor reached (0.950-0.979), while consistency factor reached (0.903-0.964).

Suggested Animated Cartoon Program: This study mainly depends on two means of displaying animated cartoons: computer and flipbooks. The program was designed through a number of stages:

Specifying Program Content: Targeted physical skills were specified, according to age stage compatible with rhythmic gymnastics code of point [16] and Egyptian Federation Gymnastics regulations.

Designing Animated Cartoon Program: The current study depended on displaying physical skills using computers and flipbooks. Both were designed as follows:

First: Steps of Designing a 3 Dimension Animated Cartoon Program Using Computers: 8 Video shots were taken for previous skills for a rhythmic gymnast in Alexandria Sporting Club. Video shots were flawless and with a high resolution. Both researchers worked on saving the video shots on the computer. The skills were separated via Vegas program and downloaded on a CD and handed to a programmer, with an elaborated explanation of the idea and requirements of each skill. Researchers assisted by the programmer selected a popular cartoon character through the internet called Sadie (Fig. 1).

Fig. 1: A popular cartoon character

Table 1: Number of Shots, Units and Lessons; Animated Cartoon Program

Skill's name	No. of shots	No. of units	No. of lessons
Flexible stand	48	2	6
Flexibility of the kneeling	56	1	3
pivot(Horizontal)	63	2	6
pivot (Passé)	56	1	3
balance (Passé)	141	1	3
Front scale	141	2	6
Split leap	101	2	6
Vertical Jump	51	1	6

The programmer used 3D Max for designing a 3dimension animated cartoon through the following steps: Create Model, Install a Himation Biped, Lighting adjustment, Create Surrounding Environment. After primary preparation, the researchers examined the program to ensure validity and that it is free of deficiencies. Some technical issues were amended for a number of skills:

Head positions, foot positions and knee positions in Dashes (jumps) and balancing skills. Completing rotations to 360 degree Built upon Rotations, in addition to amending the basin position in both flexibility skills. After the program was received from the designer, it was primarily ready.

Second: Steps of Making the Flipbook: After amendments were done the program was directed by a Render Sequence for each skill. Using the computer, skills in the program were divided into animated cartoon shots. Every skill was elaborated in a number of shots, illustrated in Table 1.

Fig. 2: Model Of Flipbook

Using these shots, both researchers worked on producing pictures via Adobe photo shop.Pictures were printed and divided into 14.5 × 10.5 cm, then hardened by on-sided board, in order to facilitate turning pages (Fig. 2). Application was designed to meet age group features and targets of the proposed study.

Accordingly the content was now primarily ready. The content of the animated cartoon program was displayed to a number of computer experts, rhythmic gymnastics experts and teaching methods experts in order to ensure compatibility of the content with the age group of the girls and the logical upgrading of learning physical skills. Based on experts' suggestions, the content was edited and formed in its final version.

Based on the experts opinions and lead by scientific references the content of the program was divided into 12 units, each unit including three lessons. Contents of each unit was specified and divided into lessons. The program was now complete in its final version and applicable.

Content of Educational Program Using Animated Cartoons

General Objectives

Psycho-Physical Objective: Learning rhythmic gymnastics skills.

Cognitive Objective: Knowing and understanding the correct performance of the skill.

Emotional, Psychological Objective: Relaxation and visualising the skill - effort during appliance - cooperation with partner - bearing responsibility.

Content of Warming up (5 Minutes in Each Lesson): E.g. 1: Back to back game. Every child has a partner, one catcher is left without a partner, as the coach calls back to back and every child leaves the partner and finds another one. The child left without a partner plays the catchers role this time. E.g. 2: Sheep, goat, cow and horse game. Each picture of sheep, goat, cow and horse is to be placed on a corner of the room. Music plays, as the music stops, children should choose a corner. The teacher looking elsewhere calls the name of one of the animals; all children are to move towards the animal's picture imitating its movement. The one who stays on a wrong corner is excluded. The winner stays last.

Content of Physical Fitness (25 Minutes in Every Lesson): E.g.1: Flexibility of spine and strengthening of back muscles:

- Lying face down, arms ahead, pulling body high backwards and stability as much as possible. The activity is to be repeated with or without assistance.
- Standing up, arms up (the assistant to place her hands behind the player's waist). Bend the back backwards to touch the ground with both hands, arms and knees stretched. Could be repeated without assistance.
- Lying face down, the assistant puts one hand on the back of the gymnast the other hand under the thighs to assist push the legs upwards.
- (standing, facing wall bars, arms up) bending the back backwards to touch the ground with arms and knees stretched.
- Lying face down on a box, feet hooked in wall bars, arms waist bent, moving body upward and back. E.g. 2: Flexibility of thigh joints.
- Standing back to wall bars, swinging right leg forward and repetition, then staying still in the highest point possible, with assistance. Repetition with the other leg.
- Standing facing the wall bars, fixing the right leg upwards on the wall bars, bending elbows, holding bars by arms; trying to get legs closest to face, assisted by the arms. Repetition using the other leg. E.g. 3: Strengthening leg muscles.
- (Standing) raising right leg upwards, standing still and raising heels of the other leg for the longest time possible. Repetition to other leg.
- Standing, leaning on the wall, bending the knees and staying still, in addition to raising the heels for the longest time possible. E.g. 4: Flexibility and strength of ankle.
- Kneeling hands on the floor. Lifting the knees high and staying still - lifting the hips upwards with arms stretched and staying still. Content of educational part (30 minutes in every lesson).
- Both researchers worked on introducing the skill verbally to the learners in order to drag their attention.
- Queuing the learners in a form that allows them see and listen carefully.

- For the first experimental group: displaying parts of the animated cartoons via computers, along with both researchers' explanations.
- For the second experimental group: displaying parts of the animated cartoons via flipbook, along with both researchers' explanations.
- Displaying parts and stages of the skill performance and keeping the computer image steady and highlighting the involved parts of the body.
- Displaying stages of the skill performance, by the flipbook and highlighting the involved parts of the body.
- Redisplaying the whole skill activity performance, closing the eyes and breathing a number of times.
- Keeping the eyes closed, the learners shall imagine themselves performing the skill exactly as the model.
- Encouraging the learners apply mental performance of the model.
- The learner is asked to try performing the watched skill.
- Repetition and Tendency to correct the mistakes rapidly.
- Facing incorrect performance via repeating displaying the model skill. Gradually correcting the mistakes according to importance.
- After correcting the basic mistakes, the learners are asked to repeat the performance continuously.

Content of Applied Part (25 Minutes Each Lesson):

- Perform individual exercise and bilateral exercise.
- The learner is asked to try performing the skills and correct there position.
- The learner is asked to close her eyes, relax and remember the animated cartoon. Then repeat performance successively, in all skills.

Content of Relaxation (5 Minutes in Each Lesson):

Stretches for All Parts of the Body:

- Lying face down, bending elbows beside the body, bending the body backwards, to touch the knees.
- (Long sit - arms up) bending the body forward to touch the knees, while bending the elbows and staying still.

Relaxations:

- (Sitting) normal several breaths - concentrating on a distant object for 30 seconds.
- (Sitting) massaging the eyes with hand palm to decrease eye muscles exhaustion.
- (Sitting) closing the eyes a number of times and relaxing.

Main Study

Before Study Evaluation: Was applied for both experimental groups, in all tests: physical abilities, dynamic visualisation, cognitive and visual skills and evaluation of skill performance level.

Applying The Suggested Program: The first experimental group was illustrated using the computes, while the second experimental group was illustrated using the flipbook.

The application on sample was during the period from 8 March 2009 to 11 June 2009.The program was applied as follows:

Application Duration: 12 weeks, including 12 units, each divided into 3 lessons per week. The program included 36 lessons (Table 1). Each lesson duration is 90 minutes.

After Study Evaluation: After all experimental program units were applied, the after study evaluation was held to all samples on the same tests held before study.

Statistical Treatments: The following methods were used: mean, broker, standard deviation, torsion coefficient, simple correlation coefficient, percentage of improvement; test of two different groups, test of differences in the same group.

Appendix 1: Dynamic visualization test

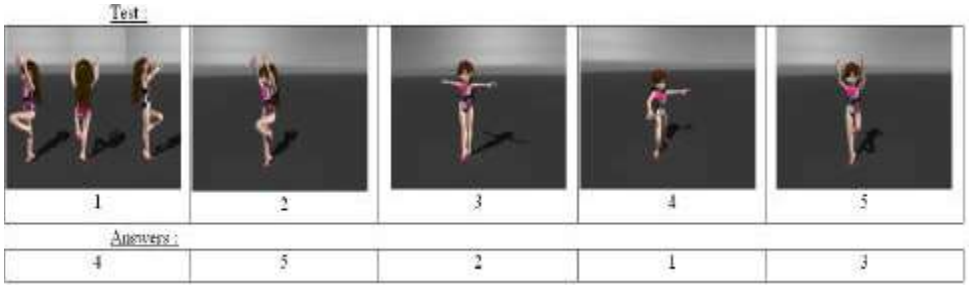

Fig. 1: The dynamic visualization test of pivot (Passé)

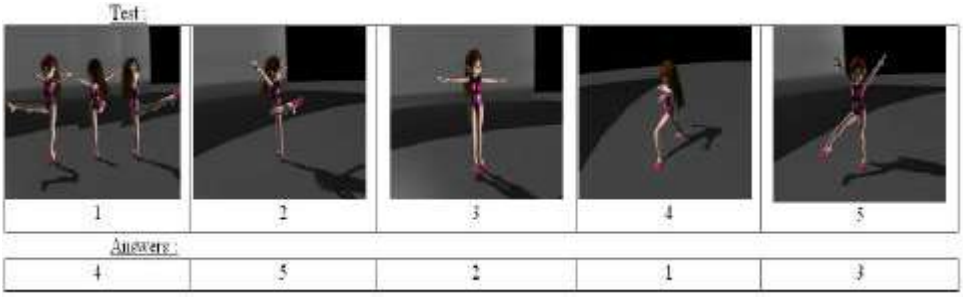

Fig. 2: The dynamic visualization test of pivot (Horizontal)

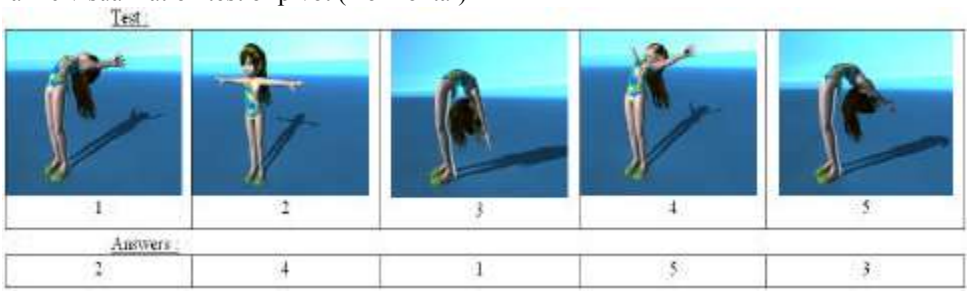

Fig. 3: The dynamic visualization test of Flexible stand

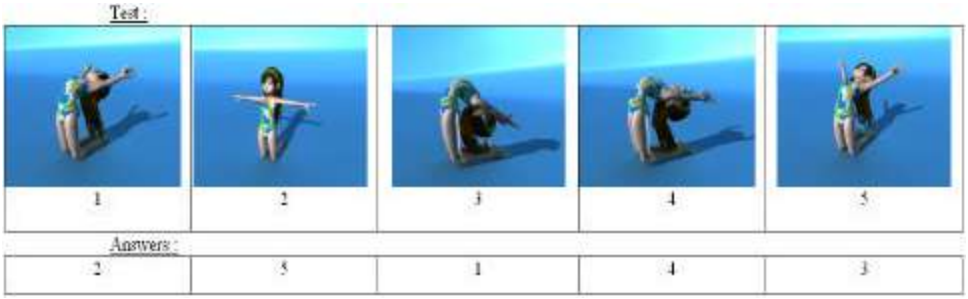

Fig. 4: The dynamic visualization test of Flexible stands Flexibility of the kneeling

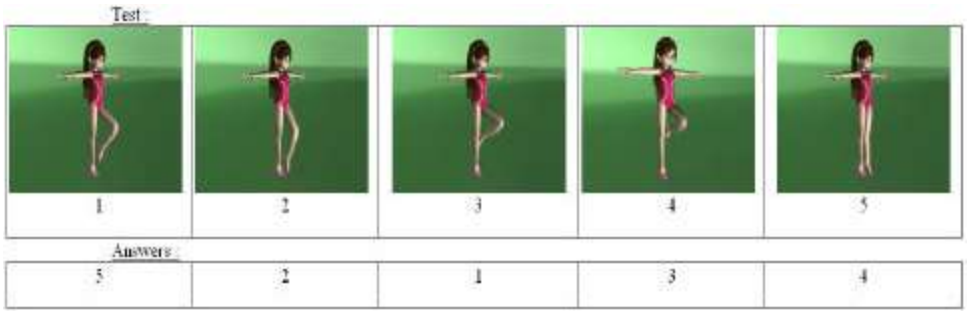

Fig. 5: The dynamic visualization test of balance (Passé)

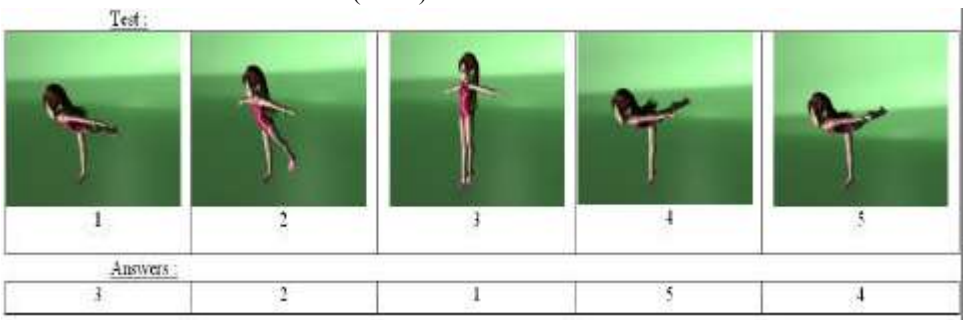

Fig. 6: The dynamic visualization test of balance Front scale

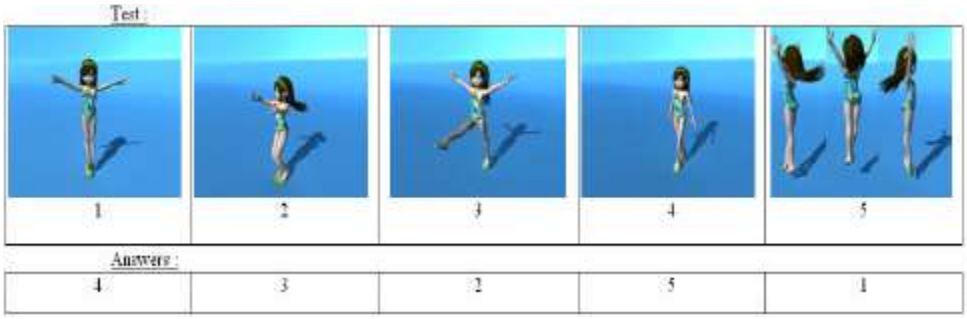

Fig. 7: The dynamic visualization test of Vertical Jump

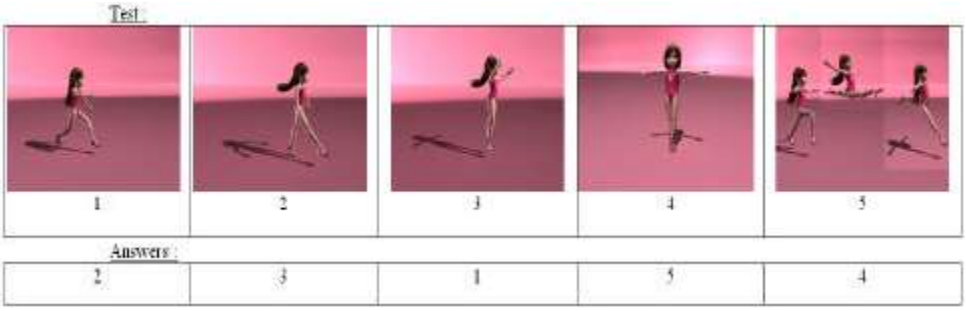

Fig. 8: The dynamic visualization test of Split Leap

RESULTSAND DISCUSSION

Results of Cognitive and Visual Skills: Table 2 showed that there were statistical differences at level 0.01 between computer group and flipbook group. Results recommend computer group.

Results of Dynamic Visualization: Table 3 showed that there were statistical differences between computer group and flipbook group in dynamic visualization, only in fore - balance at 0.01 recommending computer group, No further differences between Computer group and flipbook group in dynamic visualization rhythmic gymnastics activity skills subject of research.

Results of Performance Level Evaluation: Table 4 showed that there were statistical differences at level 0.01 between computer group and flipbook group in performance level evaluation of rhythmic gymnastics skills subject of research, recommending computer group.

As illustrated in Table 2, statistical differences between average degrees after study for both groups improving some cognitive and visual skills and recommending computer using group. Both researchers advise using computers to display animated cartoon, as their experiment resulted in effective training on proper thinking, attention concentration, which fulfilled a number of their needs, accordingly dragged the students' attention. Also the students tried to imitate the physical skills they have watched during the lessons, which affected positively increasing implementation duration and utmost benefit of time.

This result matches the opinion of Merrill *et al.* [17] Amin and Azmy [18] that success of skilful performance primarily requires visual cognition, which cannot be achieved only through the visual system; it also requires mental applications, followed by practical performance. Usually before performance the learner watches a practical illustration affecting knowledge, imagination and understanding. Animated cartoons using computers are

Table 2: Indications of differences between both experimental groups (computer - Flipbook) concerning cognitive visual skills after experiment

		PC n=20		Flip book n=20				
The statistical implications		M	± SD	M	± SD	The diff between middle	T test	Percentage diff %
Visual cognitive skills	Visual discrimination	16.400	1.501	12.400	1.142	4.000	9.484**	24.390
	Determine the visibility	14.100	1.071	9.800	1.361	4.300	11.103**	30.496

Not: Level of significance ** 0.01 = 2.71 * *0.05 = 2.02

Table 3: Indications of differences between both experimental groups (computer - flipbook) in the test of dynamic visualization after the experiment

The statistical implications		PC n=20 M	PC n=20 ± SD	Flip book n=20 M	Flip book n=20 ± SD	The diff between middle	T test	Percentage diff %
Dynamic visualization	Flexibility of the kneeling	3.800	0.834	3.600	0.940	0.200	0.712	5.263
	balance (Passé)	3.800	0.696	3.700	0.801	0.100	0.421	2.632
	pivot(Horizontal)	4.050	0.826	3.650	0.875	0.400	1.487	9.877
	Split leap	4.100	0.968	3.700	0.865	0.400	1.378	9.756
	Front scale	4.050	0.887	3.250	0.967	0.800	2.727**	19.753
	Vertical Jump	3.850	0.745	3.700	0.657	0.150	0.675	3.896
	Flexible stand	3.850	0.813	4.000	0.918	0.150	0.547	3.896
	pivot (Passé)	3.800	0.834	3.400	0.883	0.400	1.474	10.526

Not: Level of significance ** 0.01 = 2.71 * 0.05 = 2.02

Table 4: Indications of differences between both experimental groups (computer - flipbook) in the in the evaluation of performance level

The statistical implications		PC n=20 M	PC n=20 ± SD	Flip book n=20 M	Flip book n=20 ± SD	The diff between middle	T test	Percentage diff %
The level of performance	Flexibility of the kneeling	9.000	1.124	7.400	0.940	1.600	4.883**	17.778
	balance (Passé)	8.550	1.146	7.550	0.999	1.000	2.942**	11.696
	pivot(Horizontal)	8.400	1.046	7.000	0.795	1.400	4.765**	16.667
	Split leap	8.050	0.945	7.150	0.933	0.900	3.031**	11.180
	Front scale	9.150	0.745	7.350	1.182	1.800	5.761**	19.672
	Vertical Jump	8.850	0.813	7.350	1.089	1.500	4.935**	16.949
	Flexible stand	8.600	0.883	6.800	0.894	1.800	6.406**	20.930
	pivot (Passé)	8.550	1.050	7.000	1.076	1.550	4.610**	18.129

Not: Level of significance ** 0.01 = 2.71* 0.05 = 2.02

used to illustrate an idea or a physical activity; they also enrich the emotional effect towards the events displayed on the screen. It is important for learning, understanding and performing physical skills; which proves credibility first assumption.

Results illustrated in Table 3 indicate the following: Statistical differences between the experimental groups, computer using and flipbook using groups in the test degrees after study in dynamic visualisation only at fore - balance 0.01 for the computer using group. There were no other statistical differences between the two experimental groups, the computer using and flipbook using in the after study test degrees in dynamic visualisation rhythmic gymnastics skills subject of research; which indicates closeness of both groups, computer and flipbook.

Salama [19] states that using modern technology learning physical skills, especially ways that have the ability of slowly presenting physical movement details in addition to verbal instructions, are one of the best and most important means of improving dynamic visualisation. Both researchers also affirm that dynamic visualisation improvement depended on improving children's attention, due to a number of factors: watching animated pictures, interesting issues for a first time learner, in addition to repetition of displaying the interesting items [20], also the popular cartoon character assisted on coherence of information and facilitated remembering and recalling images; which partly proves the credibility second assumption.

Results illustrated in Table 4 indicate the following: Statistical differences between average degrees before and after improving skills performance level of some rhythmic gymnastics skills for the computer using group after study application. This study matches Wilkinson's study [21-24]. These studies confirm the effectiveness of animated cartoons displayed using computers, improving the performance level of a number of physical skills. The development of computers and programming allowed using computers as other educational tools, in addition computer quality is not negatively affected as other educational tools. These results match the results of Alzoghby and Aly [25], which concluded that animated cartoons affected positively the skills performance

level of the students. It also matches the results of Abdel Samie *et al*. [26], that pictures and animated cartoons are one of the best effective methods acquiring experience, as animation and colours creates a lively show, with a closer image to reality, which attracts the learners' attention and speeds up the educational procedure; which proves the credibility of the third assumption.

CONCLUSION

Based on the research results, both researchers concluded the following:

- The educational program using animated cartoons displayed via computers was proved better than using animated cartoons on flipbooks, concerning improving a number of cognitive visual skills for junior rhythmic gymnasts.
- As far as dynamic visualisation is concerned, experiment results were close for both groups, computer using and flipbook, for junior gymnasts.
- Concerning skills performance level improvement, the computer using program has proved better results than the flipbook using program, for junior gymnasts.

RECOMMENDATIONS

Further benefit of research concerning animated cartoons program, by publishing on the internet for rhythmic gymnasts training. Necessity of including technology skills in general and animated cartoons in particular within the program of teaching skills.

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