



## Effectiveness of an educational game on contraception with school adolescents: a quasi-experimental study

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### ABSTRACT

**Objective:** to analyze the effectiveness of educational technology on contraception with adolescent students. **Method:** quasi-experimental study with 85 adolescents from the Federal Institute of Ceará, Campus Aracati. The effectiveness of the educational game was analyzed using statistical tests, comparing the difference in knowledge before and after the intervention. **Results:** the most known contraceptive methods were oral contraceptives (33.1%) and condoms (44.1%). The adolescents had poor prior knowledge and after the intervention, there was an increase in the percentage of correct answers in all items, with a statistically significant difference in five of them ( $p < 0.001$ ). The effectiveness of the game was confirmed by the comparative analysis of the average number of correct answers before and after the intervention ( $p < 0.001$ ). **Discussion:** educational actions on the theme must use creative and innovative technologies, leading to improved knowledge that favors the promotion of sexual and reproductive health of this audience. **Conclusion:** the educational game was effective in improving the knowledge of adolescents regarding contraception.

**Descriptors:** Contraception; Adolescent; Educational technology; Health education; Nursing.

## INTRODUCTION

Adolescence is characterized as the period of physical, psychological and social maturation that marks the change from childhood to adulthood and, according to the World Health Organization, comprises the age group between 10 and 19 years old<sup>(1)</sup>. In this phase, adolescents are awakened to sexuality and, combined with the characteristics of their psycho-emotional development and the desire to experience new experiences, they adopt risky behaviors, and thus become more vulnerable<sup>(2)</sup>.

Studies show that, in general, adolescents have knowledge about contraceptive methods, but most of them are restricted to male condoms and oral contraceptives, with superficial information acquired through friends and family and that do not seem to influence their attitudes. They are limits on the way of learning, which may justify the adoption of risky behaviors with regard to contraception and exposure to Sexually Transmitted Infections (STIs) and the occurrence of pregnancy<sup>(3,4)</sup>.

It should be noted that, unlike what happens with the general population, the fertility rate of adolescents is increasing, which was verified in the last National Survey of Demography and Health of Children and Women, showing that more than half of Brazilian women became pregnant in adolescence, with greater prevalence in the North and Northeast regions of the country<sup>(5)</sup>. In view of these indicators, associated with increasingly early sexual initiation, teenage pregnancy is a social and public health problem, considering the risks to the health and biopsychosocial development of the adolescent mother<sup>(6)</sup>.

The school environment is recognized as a social space that allows teenagers to experience the formation of their identity beyond the family. Therefore, it should be seen as a space for information, which motivates reflection and promotes young people's awareness of health issues, including sexuality, contributing to the formation of human beings capable of making conscious and responsible decisions<sup>(2)</sup>. Within this scope of action, health professionals, essentially nurses, based on scientific knowledge, professional skills and competences, use health education as a strategy to promote the health of students, provide critical awareness and encourage the development of autonomy in order to adopt healthy behavior<sup>(2)</sup>.

Thus, several studies in the field of nursing aim to produce educational technologies that assist the teaching-learning process in health, such as posters, booklets, videos, games and applications, enabling a shared construction of knowledge. However, these tools need to be validated so that professionals can use them safely, through their proven effectiveness in scientific research<sup>(7)</sup>.

Thus, the research question is: what is the effectiveness of an educational game as a health technology for increasing the knowledge of adolescents about contraception? The objective of the study is to analyze the effectiveness of an educational technology on contraception with school adolescents.

## METHOD

A Quasi-experimental study using a before and after time series with a single group, developed at the Federal Institute of Education, Science and Technology of Ceará (IFCE),

Campus Aracati, from May to September 2018. The population was composed of school adolescents and a calculated sample of 80 participants, following the formula:  $n=2\sigma^2(z\alpha+z1-\beta)^2\delta^2$ , in which  $\delta$  and  $\sigma$  are equal to the mean and standard deviation, respectively, of the difference between the total score verified by the questionnaire before and after applying the game and  $z\alpha$  and  $z1-\beta$  correspond to the value of the associated standardized variable ( $z$ ), respectively, at the level of significance (5%;  $z=1.96$ ) and the power of the study (90%;  $z=1.28$ ) adopted. Adding a safety percentage of 5% for possible losses, a total of 84 participants was established.

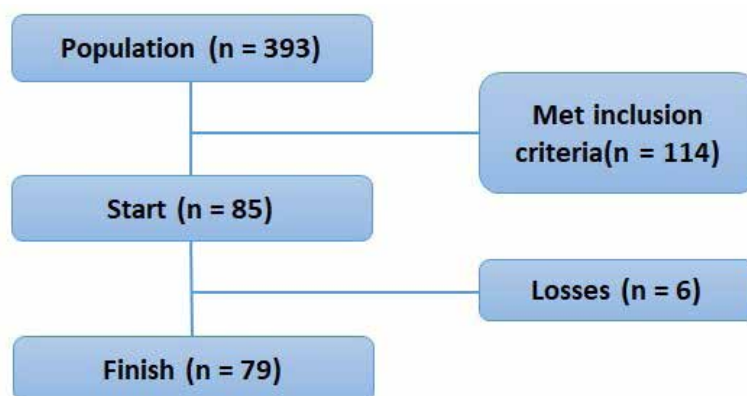
The inclusion criteria for the participants were: adolescents aged 14 to 19 years old with regular enrollment in an integrated technical course at the institution under study. Exclusion criteria were observed for adolescents who had difficulty communicating, which caused responding to the instrument unfeasible. In addition, as this is a follow-up survey, discontinuity criteria were also adopted: adolescents who decided not to participate in the study after the start of data collection or were not present on the day of

the questionnaire re-application and those who dropped out of the course in IFCE in the survey interval.

The sampling was done for convenience and was initially composed of 85 adolescents, who were present in the classroom at the beginning of data collection. During the study, six losses occurred, according to the previously mentioned discontinuity criteria. After data collection, the final sample included 79 participants, as shown in figure 1.

The quasi-experiment involved three distinct stages. In the first stage, the adolescents were invited after the research objectives and participation method were presented. After, they received the terms of consent in order to confirm their participation (free and informed consent term for the adolescent and free and informed consent term for those responsible) which contained information concerning the risks, benefits and participant autonomy.

The second stage consisted of receiving the signed consent terms, applying the pre-test questionnaire, followed by the intervention with the educational game. The game was applied in six groups ranging from 12 to 16 teenagers. Each group was divided into two teams, following the rules of the game, which



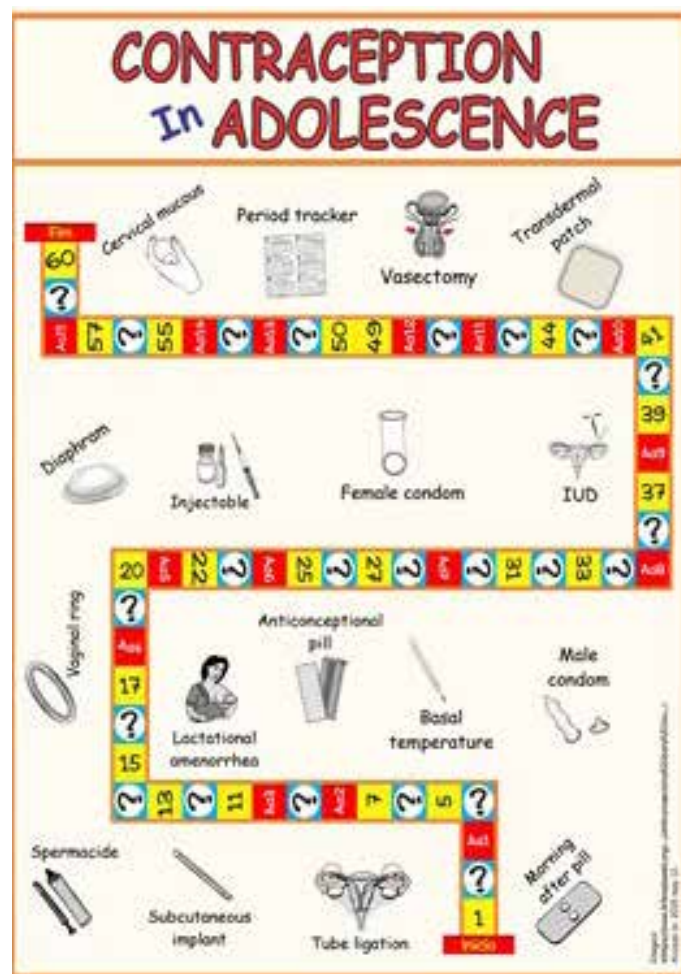
**Figura 1.** Flowchart with the study sample. Aracati-CE, 2018.  
Source: Prepared by the authors.

were read before the start of each match. The board was placed on the floor of the room and each team was in front of the other. The researcher acted as a mediator, reinforcing the rules and answering any questions. The matches ended with the victory of one of the teams.

Finally, in the third stage, thirty days after the intervention, the post-test was applied with the same participants. All phases of data collection were carried out in classrooms, during regular class hours, after prior agreement with the course coordinator and teachers. The educational game "Contraception in Adolescence" was used, which was created and validated with experts by Vieira<sup>(8)</sup> in a

master's thesis, obtaining a Content Validity Index (CVI) > 0.78. It is a board game that aims to provide interaction between adolescents, acquire knowledge and give awareness regarding behaviors associated with the use of contraceptives in a safe way. The game consists of a board with 60 squares, accessories (dice and pawns), 42 cards with questions and 15 cards with information about contraception (figure 2). The game was chosen because it is considered instructive, informative and easy to apply, thus favoring the education and promotion of adolescent sexual health.

The data collection instrument used as pre and post-test was developed and validated



**Figure 2.** Board game "Contracepción in Adolescence". Aracati-CE, 2018.  
Source: Prepared by the authors.

by Costa<sup>(9)</sup> and brings variables related to sociodemographic characterization, information on sexual practices and contraceptive use, in addition to questions that address the adolescents' knowledge about contraceptive methods. The adolescents' knowledge about contraception was analyzed based on the sum of the 10 questions that make up the knowledge block, in which each question answered correctly is worth 1 point, with the level of knowledge of each participant ranging from "no knowledge" to "very good" knowledge", according to the knowledge level classification scale, adapted from Zernike and Henderson<sup>(10)</sup>, described in chart 1.

The data were tabulated using the Excel 2013 program and exported to the Statistical Package for the Social Sciences (SPSS) 23.0. In the analysis, descriptive statistics (absolute and relative frequencies, means and standard deviation) and inferential statistics (parametric and non-parametric statistical tests) were

used. The normality of the data was verified using the Kolmogorov-Smirnov test. The effectiveness of the educational game was observed by the comparative analysis of the pre and post-tests, as paired samples, through the Wilcoxon and McNemar test, in order to assess the difference in the average of correct answers of the participants in the knowledge block before and after intervention. Mann-Whitney and Kruskal-Wallis tests were also used to verify the association between the difference in score in the knowledge block (score after the intervention - score before the intervention) and the variables "sex", "age", "Sexual initiation" and "contraception information". A 95% confidence interval and a p-value <0.05 were considered statistically significant.

The research was submitted to and approved by the Ethics Committee of the State University of Ceará and received a favorable opinion on March 6, 2018 under number 2,528,626.

**Chart 1 - Scale of classification of knowledge levels. Aracati-CE, 2018**

Knowledge level	Level	Criteria
No knowledge	1	No correct answer
Very little knowledge	2	1-2 correct answers
Little knowledge	3	3-4 correct answers
Good knowledge	4	5-6 correct answers
More than good knowledge	5	7 correct answers
Very good knowledge	6	9-10 correct answers

Source: Adaptado de Zernike e Henderson (1998).

In all phases of the research, ethical aspects were observed and the terms of consent and consent were signed by the adolescents and their guardians, respectively, confirming the consent of participation.

## RESULTS

The initial study sample consisted of 85 adolescents, with a predominance of females (54.1%), age ranging from 14 to 19 years and an average of 16.34 years (SD + 1.175), maternal level of education (55.3%) and paternal (57.7%) predominantly up to basic education and the Catholic religion (58.8%). With regard to sexual and contraceptive practices, almost all adolescents (97.6%) cited at least one known contraceptive method, however only 21.2% had already started sexual activity. Among these, the majority (77.8%) had already used contraception in some sexual relationship and none reported

the occurrence of pregnancy. Regarding information about contraception, 80% of the adolescents reported having already talked to someone about the subject, while just over half (51.8%) already advised someone to use some type of contraceptive method (table 1). Among the contraceptive methods best known to adolescents, barrier and hormonal methods are highlighted, with an emphasis on condoms (44.1%) and oral contraceptives (33.1%). Regarding the contraceptive methods used by sexually active adolescents, condoms (77.7%) are highlighted again, with emergency contraceptives (27.8%) and injectable hormones (5.5%) also mentioned. Consequently, the contraceptive methods most recommended by them were also condoms (88.6%), oral contraceptives (34%) and emergency contraceptives (4.5%). Regarding sources of information about contraception, adolescents referred mainly to

**Table 1 - Distribution of adolescents according to information on sexual and contraceptive practices. Aracati-CE, 2018.**

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>Know Contraceptive Methods(n=85)</b>		
Yes	83	97,6
No	2	2,4
<b>Started sexual activity(n=85)</b>		
Yes	18	21,2
No	67	78,8
<b>Uses contraception (n=18)</b>		
No	4	22,2
<b>Pregnancy (n=18)</b>		
Yes	-	-
No	18	100
<b>Information about contraception (n=85)</b>		
Yes	68	80
No	17	20
<b>Guidance about contraception (n=85)</b>		
Yes	44	51,8
No	41	48,2

parents or relatives (32.5%) and friends or boyfriends (25.7%).

The data regarding the adolescents' knowledge about contraceptive methods at the two evaluated moments are described in table 2. It is observed that only three items of the questionnaire had a percentage of correct answers above 50% before the intervention,

these were items 3 (69.4%), 4 (83.5) and 5 (54.1%). These results show that the greatest knowledge of the participants referred to condoms and oral contraceptives, which were the methods most cited as known by the participants initially. Furthermore, the item that obtained the lowest percentage of correct answers in the pre-test was item

**Table 2 - Distribution of correct answers in the knowledge block on contraception before and after the intervention. Aracati-CE, 2018.**

Questions	BEFORE		AFTER		p*
	(n=85)		(n=79)		
	n	%	n	%	
1. The most important thing to use the table correctly is to have a regular menstrual cycle	27	31,8	49	62	<0,001
2. Through the cervical mucus method it is possible to know the days of the fertile period because the vagina gets wetter before and during ovulation.	14	16,5	21	26,6	0,022
3. The condom is considered the only method for preventing pregnancy that offers double protection because it protects against STIs and breanancu.	59	69,4	57	72,2	0,71
4. If the condom is used correctly and in all relationships it is a reliable method.	71	83,5	68	86,1	0,581
5. The birth control pill is able to prevent pregnancy because it prevents ovulation.	46	54,1	50	63,3	0,286
6. Emergency contraceptives (morning-after pill) should only be used when it is not possible to use another, safer method.	33	38,8	39	49,4	0,134
7. The injection that prevents pregnancy prevents ovulation.	27	31,8	35	44,3	0,031
8. The IUD is placed inside the uterus to prevent pregnancy for more than a year.	41	48,2	53	67,1	<0,001
9. Tubal ligation leaves the woman sterile.	34	40	33	41,8	0,678
10. Vasectomy is a method that removes sperm from ejaculation.	37	43,5	48	60,8	0,015

STI: Sexually Transmitted Infections

IUD: Intrauterine Device

\*McNemar Test

2 (16.5%), which concerns cervical mucus. After the intervention with the educational game, there was an increase in the percentage of correct answers in all evaluated items, and this increase was statistically significant in items 1 ( $p < 0.001$ ), 2 ( $p = 0.022$ ), 7 ( $p = 0.031$ ), 8 ( $p < 0.001$ ) and 10 ( $p = 0.015$ ), as seen in Table 2. In addition, it is noteworthy that item 1 obtained the greatest difference before and after the intervention (30.2%). Next, the adolescents' knowledge was classified into six levels, according to the knowledge levels scale by Zernike and Henderson (1998), comparing them in the two studied moments (table 3).

It is noticed that the lower levels, referring to deficient knowledge, showed a decrease in their percentages, with a predominance in the level "little knowledge" (reduction of 22.9%), while the upper levels grew considerably, with an important increase in the level "good knowledge" (11.8%).

Furthermore, when proceeding to the comparative analysis of the pre and post-tests based on the average of correct answers in the

knowledge block before and after the intervention, a statistically significant difference ( $p < 0.001$ ) was evidenced, characterizing the effectiveness of the educational intervention carried out by through the "Contraception in Adolescence" game.

Finally, the statistical association between the difference in score in the knowledge block at the two studied moments (score after the intervention - score before the intervention) and the variables "sex" ( $p = 0.421$ ), "age" ( $p = 0.173$ ), "sexual initiation" ( $p = 0.894$ ) and "information on contraception" ( $p = 0.904$ ), verifying that there was no statistically significant association with any of the variables tested, as shown by the respective  $p$  values. Therefore, it can be inferred that the highlighted variables do not contribute significantly to a greater acquisition of knowledge regarding contraception with the intervention employed. Therefore, the educational game proved to be effective in improving the knowledge of adolescents on the subject, regardless of sex, age, sexual initiation or receiving prior information on the subject.

**Table 3 - Distribution of adolescents' level of knowledge about contraception before and after the intervention. Aracati-CE, 2018.**

Level of knowledge	BEFORE	AFTER
	(n=85) n (%)	(n=79) n (%)
No knowledge	1 (1.2)	1 (1.3)
Very little knowledge	11 (12.9)	5 (6.3)
Little knowledge	35 (41.2)	19 (24.1)
Good knowledge	19 (22.4)	27 (34.2)
More than good knowledge	14 (16.5)	15 (19.0)
Very good knowledge	5 (5.9)	12 (15.2)

Source: Adapted from Zernike and Henderson (1998).



## DISCUSSION

The study showed that barrier and hormonal methods are the most known contraceptives, used and recommended among participants. This finding corroborates the results of other studies carried out in several scenarios, national and international, which observed that male condoms and oral contraceptives were the methods most known to adolescents, the first being the most used<sup>(3-4,11-13)</sup>. This is believed to occur due to the educational campaigns promoted annually by the Ministry of Health, in addition to being the main methods offered free of charge in Primary Health Care Units.

However, it was learned that the information received by adolescents on the topic of contraception is varied; while some studies highlight the family as the main source of information<sup>(3)</sup>, others emphasize health and teaching institutions<sup>(13)</sup> and the media, internet and friends<sup>(12)</sup>. Thus, it is a consensus that everyone has an important role in guiding this audience with regard to sex education. The relevance of the performance of health professionals is also emphasized who, despite being little mentioned in the studies, are among the most qualified to address the various issues involving human sexuality and, therefore, must act in partnership with the school and the community in promoting healthy behaviors.

In the studied population, a high percentage of adolescents who were not yet sexual active was verified, which reiterates the relevance of discussing this topic at school, in partnership with the other sectors involved, and promoting adequate guidance, which supports the exercise of sexuality safely and

responsibly from the beginning among teenagers and continuing into adult life.

Although condoms are the method most known to adolescents and they recognize their use as the main way to prevent unwanted pregnancies and STIs in all sexual relations, it is common to find adolescents who assume the risk of unprotected sexual practices in stable relationships, or with a person they know or if they do not have a condom available at the time of intercourse<sup>(13)</sup>. This fact reinforces that knowledge goes beyond just knowing how to quote existing contraceptive methods, but the need to obtain information about its mechanism of action, correct way of using it, indications, advantages and disadvantages, as well as the consequences of not using it.

The results also show that behavioral methods are little known by adolescents. These are methods that only use knowledge about the physiology of the female body to control conception. Although they are not commonly recommended for this public, they should also be included in the discussion on contraception, in order to guide them regarding the countless options available, favoring decision-making regarding the means of STI prevention and unplanned pregnancy<sup>(3-4,14)</sup>. Thus, health education is a promising action that promotes sexual and reproductive health when creative and reflective strategies are used, which support the subjects' autonomy in choosing contraceptives<sup>(4)</sup>. In this research, it was observed that the intervention with the educational game, by addressing all methods, favored the acquisition of knowledge about the variety of contraceptives, such as the rhythmic method, the cervical

mucus method, the injectable hormonal, the IUD and the vasectomy, not as widespread among adolescents as condoms and oral contraceptives.

It is worth noting that, unlike the behavioral and definitive methods, the IUD is a long-term reversible contraceptive method, which presents itself as a viable and recommended option for adolescents, with eligibility criteria 2 (benefit greater than risk) by the World Health Organization<sup>(15)</sup>, as it is an easy-to-use, effective method, which does not interfere in sexual relations, does not require the participation of the partner and whose effectiveness does not depend on the user<sup>(16)</sup>. In this sense, its use can be encouraged by health professionals, considering that adolescents need contraception for long periods, in a safe and effective way, contributing to the reduction of unplanned teenage pregnancy rates<sup>(11,16)</sup>. The results of this study show the effectiveness of the educational game "Contraception in Adolescence" in improving adolescents' knowledge about contraception. In the literature, similar research tests various possibilities of educational practices and technologies in promoting sexual and reproductive health in adolescent audiences. In Africa, the effectiveness of a comprehensive curriculum on reproductive health with a focus on STI prevention and teenage pregnancy was assessed, through the inclusion of participatory methodologies, and observed a significant improvement in the knowledge, behavior and self-efficacy of the population studied<sup>(17)</sup>. In the United States, a study found the effectiveness of a sexual health application in improving the knowledge of adolescents and its ability to influence them in the decision to

use effective contraceptive methods<sup>(11)</sup>.

It is noteworthy that information and communication technologies (ICT) have been increasingly incorporated into health education for adolescents, through applications, text messages, virtual learning environments, virtual games and websites, with positive results for their broad reach and influence power, which are ideal for providing information about healthy behaviors<sup>(7,11)</sup>.

The school environment shows itself as an important scenario regarding action in this series. A systematic review that aimed to investigate the effectiveness of educational interventions on contraception in adolescence found significant improvement in the knowledge, attitude and/or behavior of adolescents in more than 80% of the studies analyzed, with more than half of these being carried out in the school context, noting the relevance of action in this scenario<sup>(18)</sup>. On the other hand, the study performed by Campos<sup>(19)</sup> showed that, despite the adolescents recognizing the accomplishment of educational practices about sexuality in the school environment, they evaluate the information received as insufficient or not very enlightening. This fact reinforces the idea that in order to promote changes in knowledge and attitude, it is essential to create increasingly innovative strategies aimed at specific audiences, in order to achieve the desired results.

It is worth mentioning that discussing sex education at school is one of the transversal themes regulated by the Law of Guidelines and Bases of National Education (Law nº 9.394/96), and should be included in the National Curriculum Parameters (NCP)<sup>(2)</sup>. Approximately twenty years after the imple-

mentation of these guidelines, a systematic review of sex education in Brazilian schools found that there is an effort on the part of professionals, especially those in the health field, to develop interventions addressing this issue in the school context, but there are still many barriers that hinder the consolidation of the practices provided for in the PCN, especially with regard to transversalization, which need to be recognized and overcome<sup>(20)</sup>.

In order for this work to truly achieve its objectives, there must be a partnership between Health and Education in promoting impactful and continuous actions that culminate in the training of health professionals and educators and, consequently, in the sexual education of students<sup>(2)</sup>.

In view of the results, it is emphasized that a satisfactory level of knowledge does not necessarily imply favorable attitudes. However, it is the first step towards achieving concrete changes in adolescent behavior, especially when it involves sexual and reproductive health issues. Therefore, the technology tested here, proven effective, can assist the various actors involved in the construction of this continuous sexual education process in schools.

It is evident that health education on contraception in adolescence must use creative and innovative technologies, in order to provoke the interest of this group, with possibilities for improving knowledge, but also attitudes and practices to protect sexual and reproductive health. Health professionals and educators must take ownership of these technologies and implement them in their health education activities.

This study is limited due to the reduced time of the intervention, in class hours, as a result of the restrictions regarding the institution's academic calendar, and the difficulty of controlling the variables, such as the acquisition of information on the theme in the time interval between the application of the game and the post-test, not being able to guarantee that all the knowledge acquired by the participants came from the educational intervention.

## **CONCLUSION**

The study aimed to test a creative and low-cost technology with teenagers, using the educational game "Contraception in Adolescence", which proved effective in improving the knowledge of the studied population. This technology provided interest among adolescents, provoking discussion and improving knowledge about the variety of contraceptives, including those that are not widespread among this population, as the best known and used among them are the barrier and hormonal methods.

After proving its effectiveness, this tool can be used as an educational technology to assist educators and health professionals to teach sex education, considering that this theme, transversal in character, must be developed among the adolescent's health issues in schools. However, further studies need to be carried out to test its effectiveness in other socio-cultural contexts, observing changes beyond knowledge, including attitude and practice. Therefore, it is concluded that the educational game was effective in improving adolescents' knowledge about contraception, in addition to other health education strate-

gies that encourage the development of safe and responsible sexuality in adolescence.

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### 1 Marcela Lima Silveira Praxedes

Participation in the literature review, submission of a research project to the Research Ethics Committee, research development (collection, analysis and discussion of data) and writing of the article.

### 2 Maria Veraci Oliveira Queiroz

Participation in the literature review, submission of a research project to the Research Ethics Committee, research development (data analysis and discussion) and article writing.

### 3 Roberta Peixoto Vieira

Participation in the literature review, assignment of the educational game "Contraception in Adolescence" for the development of research and writing of the article.

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