

## ORIGINAL ARTICLE

# The Effects of Multimedia-Based Puberty Health Education on Male Students' Self-Esteem in the Middle School

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### ABSTRACT

**Background:** Adolescents, as a large group of the world population, face many physical and psychological changes in their puberty period. They struggle with adjusting to the intensive changes that can lead to the development of low self-esteem. This study was conducted to determine the effect of multimedia-based puberty health education on male students' self-esteem in the middle school.

**Methods:** It is a quasi-experimental study by using multi-stage sampling method which was done on 118 boys from two middle schools in Ilam (an Iranian city) from November 2017 to April 2018. Students were divided into two intervention (N=58) and control (N=60) groups. Then, the intervention group students were trained using a multimedia application. Data were gathered using a demographic questionnaire and Rosenberg's Self-Esteem Scale completed by students in three phases including before, immediately after, and three months after the end of the educational program. The collected data were analyzed using independent t-test, Chi-square, Fisher's exact test, post hoc test, and repeated measures ANOVA. Statistical analysis was performed using SPSS 16, and  $P < 0.05$  was considered significant.

**Results:** Mean and standard deviation of the self-esteem scores in the intervention and control groups were  $28.37 \pm 3.58$  and  $27.89 \pm 3.82$  before the education,  $32.17 \pm 3.12$  and  $27.50 \pm 3.56$  immediately after the education, and  $33.83 \pm 3.32$  as well as  $27.32 \pm 4.37$  three months later, respectively. Mean self-esteem scores were significantly different post-intervention ( $P < 0.001$ ) and three months later ( $P < 0.001$ ) between the two groups.

**Conclusion:** Education on puberty health assisted by multimedia application can increase self-esteem in adolescent boys.

**KEYWORDS:** Adolescent, Health education, Multimedia, Puberty, Self-esteem

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## INTRODUCTION

Adolescence is a stage of development in which physical, cognitive, psychological, and socio-cultural changes occur. Physical and cognitive changes are crucial aspects, since they precede and portend psychological and social challenges to which adolescents are confronted to form the foundation of different methods of response by them. Early adolescence years are difficult for most adolescents as psychological growth does not match the rate of physical growth.<sup>1</sup> Most of the changes at this stage are stressful since they may feel less valuable than their peers, leading to a decrease in their self-esteem.<sup>2</sup>

Self-esteem is the degree of approval, confirmation, and value. If adolescents enjoy their self-esteem sufficiently, it will act as the basic factor in their social and emotional compatibility, thereby resulting in feeling happy and being productive.<sup>3</sup>

Researchers have found out that health-risk behaviors in vulnerable adolescents, especially those with lower levels of self-esteem, are more serious than in others.<sup>4</sup> Having low self-esteem results in eating disorders<sup>5</sup>, poor academic achievements, risky behaviors, drug use, bullying behaviors,<sup>6</sup> alcoholism, depression, aggressive behaviors, and a disorderly life.<sup>7</sup> However, an increase in self-esteem can prevent such problems caused by low self-esteem in adolescents.<sup>4</sup>

In addition, some researchers believe that physical changes during puberty are a type of crisis that can intensify low self-esteem and increase anxiety.<sup>2</sup> Adolescent boys have a limited knowledge of the physical changes during puberty. They get information about these changes mostly from their friends who usually share their own experiences or perceptions that are most often incorrect or incomplete.<sup>8</sup> The results of a study in India showed that the internet was the key source of wrong and misleading information. The results also indicated that 47% of boys watched porn films on the internet, 46% of them watch blue movies, and 25% of them have homosexual experiences.<sup>9</sup> However,

adolescents' knowledge of sexually transmitted diseases and the transmission methods, the resulting complications, including sex organ secretions, pain in the sex organs, and urination problems is too low.<sup>8</sup> Moreover, qualitative studies on identifying Iranian male adolescents' experiences during puberty have demonstrated that most of the adolescents do not receive any special education on physical and sexual changes in puberty; hence, they resort to their peers for information.<sup>10</sup>

Since the above-mentioned issues are considered taboo among the adolescents and in the society, and finding a proper source of information about them is hard, many of them are ignored.<sup>9, 11</sup> Therefore, if the purpose of education is to educate adolescents in adapting to new physical and mental conditions, it will raise their self-esteem,<sup>12</sup> improve their social and relational skills, increase their satisfaction with life, and make them feel elated.<sup>13</sup>

Educational methods are the most important factors in learning. New educational methods such as multimedia have some advantages over the traditional educational model, including being clearer, more active, more interesting and more diverse in the content, and having a higher learning speed, so they can encourage the students in better learning.<sup>14</sup> Considering these points, multimedia-based trainings can increase the education quality and students' ability in putting their knowledge into practice.<sup>15</sup> Multimedia-based education not only provides a good chance for access to more adolescents and inhibits the feeling of shame for learning about the human body, but also develops proper conditions to perceive a substantial amount of information about puberty. For instance, a study results indicated that by using body-related graphical effects, adolescents' knowledge of puberty had increased.<sup>16</sup>

According to the above-mentioned issues enough attention has not been paid to the physical and mental health education of adolescent boys, while their knowledge of this field is insufficient. In addition, most of

the previous studies have used the traditional educational model and no study has been conducted on provision a comprehensive program based on new educational methods, such as multimedia-based educational methods that promote the self-esteem of adolescent boys, with a content specifically designed for boys and suitable for the Iranian community.<sup>2, 10</sup> Therefore, the present study was conducted aiming at determining the effects of multimedia-based puberty health education on the male students' self-esteem in the middle school.

**MATERIALS AND METHODS**

The present quasi-experimental study with the pre-test/post-test design was conducted on 118 male students aged 13-14 years from November 2017 to April 2018, with a control group in Ilam (an Iranian city). The sample size was calculated as 47 in each group based on the data of a similar study (confidence interval: 95%, power: 80%,  $\alpha$ : 0.05,  $\beta$ : 0.2, SD in the intervention group ( $S_1=4.7$ ), SD in the control group ( $S_2=4.6$ ), effect size ( $d=2.7$ ) according to the following formula.<sup>17</sup> Given a dropout rate of 20%, a total of 56 individuals were assigned to each group.

$$n = \frac{(z_{1-\alpha/2} + z_{1-\beta})^2(S_1^2 + S_2^2)}{d^2} = \frac{(1.96 + 0.84)^2((4.7)^2 + (4.6)^2)}{(2.7)^2} \sim 47$$

Multi-stage sampling method was used for selection of schools and classes. Since only one educational district exists with 9 public male middle schools in Ilam city, being similar in cultural, economic, and social aspects, two schools were selected using simple random sampling method. A number was given to each school. Each number was placed in a bowl and mixed thoroughly; the blind-fold researcher then picked the numbered tags from the bowl. Then, the participants of the intervention and control groups were selected from separate middle schools to prevent the exchange of

information between the groups. Thus, one middle school was selected as the intervention group (Javad al-Aeme School) and another school as the control group (Dehkhoda School) through simple random sampling method and using the lottery. At the end, in each middle school, two out of the three 8<sup>th</sup> grade classes were selected. In general, there were 58 students in the intervention group and 60 in the control group.

The inclusion criteria of this study were having Iranian nationality, living with one's own parents (not stepparents), having no experience of any specific puberty education, having experienced no stressful events during the last three months, with parents not educated in psychological, educational or medical sciences. The exclusion criteria included failing to complete the questionnaire, stopping cooperation in the research, being absent in more than one session, and suffering stressful events during the research, or three months after the end of the educational program. It is worth noting that three participants in both groups were absent and did not complete the questionnaires within three months after the end of the educational program, so they were excluded from the study.

The data collection tools included the demographic information questionnaire and the Rosenberg's Self-Esteem Scale (RSES). The demographic questionnaire included information on the students' age, last year Grade Point Average (GPA), number of family members, parental occupation, parental education, and parental age. The RSES was developed by Rosenberg (1965); it includes 10 questions and uses the 4-point Likert-type scale, ranging from "strongly agree" (4) to "strongly disagree" (1), with five questions reverse scored. The scores range from 10 to 40, with higher scores reflecting a greater level of self-esteem.<sup>18</sup> This scale has been widely used in measuring self-esteem in adolescents.<sup>12, 19, 20</sup>

Greenberger et al. (2003) reported that Cronbach's alpha was 0.88 for the original RSES. They also assessed the construct

validity by convergent and divergent validity. They found a correlation between RSES and parental warmth and acceptance (0.42) ( $P < 0.001$ ), life satisfaction (0.61) ( $P < 0.001$ ), and depressive symptoms (-0.64) ( $P < 0.001$ ).<sup>21</sup>

The Persian version of this tool was translated by Shapurian et al. (1987) in Iran. The reliability reported by Cronbach's alpha was 0.83. The coefficient of the correlation between the RSES and the depression and anxiety scales were -0.49 and -0.39, respectively; they were statistically significant ( $P < 0.05$ ).<sup>22</sup> In the present study, the reliability of this scale was 0.76 as indicated by Cronbach's alpha.

After obtaining informed consent forms from the students and their parents, the students in the control group were only provided with the general education by teachers, and the researchers did not get involved in the current programs of the school. They just completed the demographic questionnaire and RSES at 3 stages (before, immediately after, and three months after the end of the educational intervention), concurrent with the intervention group. Then, puberty health education was presented as a multimedia application to the intervention group.

In this study, all multimedia capacities, including educational movies, animations, pictures, texts, voices (from a male person), PowerPoint formats, music, and graphical body effects were employed to teach them puberty health. Three professors of Iran University of Medical Sciences who were experts in the field of puberty validated the present training content. The multimedia application was provided by a multimedia designer who was a graphic artist and highly skilled in programming and developing tools, as well as information design. Furthermore, the content of multimedia application was confirmed by Ilam Department of Education. The education content was presented in 4 sessions, with each session 60 minutes long. The training sessions were presented in the groups of 10 individuals, with a session per week, in a class in the schools specified.

The application was presented using a video projector. The users had control over the presentation of the animation using control buttons provided. The outlines of the sessions included: Session 1: Physical and mental changes in puberty - Anatomy and physiology of the male reproductive system; Session 2: Puberty health - Sexually transmitted diseases - High-risk behaviors; Session 3: Nutrition - Exercise; and Session 4: Life skills - Self-esteem.

The statistical analysis was performed in SPSS 16.0, using chi-square test, independent t-test, Fisher's exact test, post hoc test and repeated measures ANOVA.  $P \leq 0.05$  was considered significant in this study.

In the current research, the following ethical considerations were applied by the researchers:

Written permissions were received from the Ethics committee of Iran University of Medical Sciences (under the code "IR.IUMS.FMD.REC1396.9411373010"), concerned authorities, and Ilam Department of Education. Informed consent forms were received from adolescents and their parents. The participants were assured of the confidentiality of the entire information obtained and their withdrawal from the study in case they were reluctant to be present at each stage of the study. An instructional pamphlet on puberty health was given to the control group after the study.

## RESULTS

The independent t-test, chi-square test, and Fisher's exact test demonstrated that the two intervention and control groups were similar in terms of demographic variables such as age ( $P = 0.73$ ), the number of family members ( $P = 0.90$ ), last year GPA ( $P = 0.68$ ), the father's age ( $P = 0.40$ ), the mother's age ( $P = 0.34$ ), the father's educational level ( $P = 0.57$ ), the mother's educational level ( $P = 0.91$ ), the mother's job ( $P = 0.48$ ), and the father's job ( $P = 0.66$ ), with no significant difference demonstrated between the two groups (Table 1).

The result of independent t-test showed that

**Table 1:** Comparison of demographic variables in the intervention and control groups

Variables	Intervention group N=57 Mean±SD	Control group N=58 Mean±SD	P value
Age of students(years)	13.91±0.28	13.92±0.25	0.73*
Age of father (years)	46.53±4.64	47.50±7.36	0.40*
Age of mother(years)	40.82±4.79	39.91±5.35	0.34*
Last year GPA <sup>a</sup>	18.90±1.05	18.97±0.80	0.68*
Number of family members	4.41±0.92	4.39±0.70	0.90*
	N (%)	N (%)	P value
Father's educational level			
Diploma and lower	11 (19.3)	14 (24.13)	0.57**
Associate degree	9 (15.78)	12 (20.68)	
Bachelor degree	19 (33.35)	17 (29.34)	
Master degree	13 (22.8)	12 (20.68)	
PhD degree	5 (8.77)	3 (5.17)	
Mother's educational level			
Diploma and lower	16 (28.07)	18 (31.05)	0.91***
Associate degree	11 (19.3)	6 (10.34)	
Bachelor degree	18 (31.57)	20 (34.48)	
Master degree	12 (21.06)	14 (24.13)	
Father's job			
Self-employed	16 (28.07)	19 (32.75)	0.66**
Employee	38 (66.67)	33 (56.9)	
Retired	3 (5.26)	6 (10.35)	
Mother's job			
Housewife	32 (56.14)	37 (63.8)	0.48**
Employed	22 (38.6)	19 (32.75)	
Retired	3 (5.26)	2 (3.45)	

a: Grade Point Average; \*Independent t-test; \*\*Fisher's exact test; \*\*\* Chi-Square test

the mean score of self-esteem in the control and intervention groups was not significantly different before the intervention (P=0.49). However, the mean score of self-esteem was significantly different in the intervention and control groups immediately after the education (P<0.001) and three months later (P<0.001). Besides, the mean score of self-esteem in the intervention group was higher than that of the control group (Table 2).

To assess the trend of changes in the self-esteem score in the intervention group, we used repeated measures ANOVA. The results of the test demonstrated that the trend of changes in the self-esteem score was significantly ascending in the intervention group (P<0.001). In addition, post hoc tests (Bonferroni Procedure) showed that the self-esteem score was significantly higher than that of the pre-education period, immediately

after the education (P<0.001) and three months later (P<0.001). Besides, the mean self-esteem score was significantly higher three months after the education than immediately after the education (P=0.01). However, the change in the self-esteem score was not significant in the control group (P=0.66) (Table 2).

## DISCUSSION

This study was conducted aiming at determining the effects of multimedia-based puberty health education on the male students' self-esteem. The results of this study showed that the mean self-esteem score increased in the intervention group immediately after the education compared with the control group, with the increase being considered as statistically significant. The findings of this research were in line with those of similar studies.<sup>13,23</sup> In these studies, the effects

**Table 2:** Comparison of the mean scores of self-esteem before, immediately after and 3 months after education in the two intervention and control groups

Self-esteem	Intervention group N=57 Mean±SD	Control group N=58 Mean±SD	P value* (between)
Before education	28.37±3.58	27.89±3.82	0.49
Immediately after education	32.17±3.12	27.50±3.56	<0.001
3 months after education	33.83±3.32	27.32±4.37	<0.001
P value** (within)	<0.001	0.663	

\*Independent t-test; \*\* Repeated Measures Analysis of Variance test

of training were investigated on the mental health increase, and it was observed that the levels of self-esteem could be increased by means of education-based interventions. In another study which aimed at exploring the effects of a self-esteem program incorporated into the general health and physical education curriculum of students, the results implied that physical self-esteem in all participants and family self-esteem only in girls had significantly increased in the intervention group immediately after the training, compared with the control group. However, there was no significant difference between the two groups in terms of global self-esteem.<sup>24</sup> In explaining the difference between the findings of this study and the present study, it can be stated that in this study the content of education was not specific for boys and girls and used the traditional method for education, but in our study a special program by multimedia application was provided only for boys that was suitable for their needs in puberty period. This issue can be of high significance in offering specific information to boys and girls in this critical condition.

Also, the present study results showed that the mean self-esteem score increased in the intervention group three months after the education, compared with the control group; the increase was statistically significant. In a study which aimed to determine the effects of puberty health education on adolescent girls' self-esteem, the findings were in line with our results.<sup>2</sup> In addition, the trend of changes in self-esteem was significantly increased in the intervention group. The results of the current study demonstrated that adolescents with more knowledge and awareness about their

puberty-related physical and psychological changes could better adapt to their new conditions, resulting in an increase in their self-esteem. This fact is in line with the findings of another study which revealed that by using education programs similar to the one used in this study, adolescents can better accept physical and apparent changes as well as their inappropriate body-related impressions that result from hormonal changes, bone enlargement, as well as sexual and non-sexual hormone releases, so that they will be protected from the risk of low self-esteem.<sup>25</sup>

In the same vein, in a study which aimed to determine the effects of the school-based Maum meditation program on self-esteem and school adjustment in primary school students, the results showed that when teenagers face challenges in new environments, their anxiety and worries will decrease and their self-esteem will increase if they receive enough information about the subject.<sup>23</sup>

Another important point in puberty education is selecting the proper target groups. In a study on the impact of an Internet-based program, on pubertal knowledge, body esteem and self-esteem of adolescents, the results indicated that the program was beneficial only for participants in the intervention group who had begun puberty. This may be due to the fact that educating adolescents is beneficial when they experience some degrees of change in puberty. In this study, more girls than boys were in the puberty period. Hence, girls in the intervention group improved on several self-esteem scales, whereas the boys' scores

decreased on both global self-worth subscale and the total self-esteem score.<sup>26</sup> However, in the present study, the boys had experienced puberty, so it was the best time for educating them.

On the other hand, one of the major factors that leads to the success of a learning process is the educational method. Mayer stated that individuals learn better from “words” and “pictures” than from words alone.<sup>27</sup> Moreover, one study has reported that the multimedia-based education can improve the comprehension and recollection in students and affect them positively during education and learning processes. This is because this type of education transfers information from static textbooks to a new learning pattern that is more interesting, dynamic, and interactive, due to using additional media such as audio and video materials, animations and graphics.<sup>28</sup> In addition, using multimedia in the field of education develops a new concept of learning, i.e. the combination of education and entertainment termed as edutainment that replaces traditional textbooks with electronic ones with a user-friendlier approach.<sup>29</sup> Many computer-based interventions have been presented for adolescent health on some topics, including smoking cessation,<sup>30</sup> adolescent pregnancy prevention,<sup>31</sup> and the prevention of excessive weight gain<sup>32</sup> that have been effective.

One of the advantages of this study is the suggestion of a multimedia-based education design for puberty health issues for Iranian boys. The user-friendliness, easy availability, short completion time, and relative inexpensiveness of the method allow for the content to be developed according to the requirements of age, gender, community, and culture. Quite interestingly, providing the multimedia-based puberty education can also serve to prevent the embarrassment of learning about bodily changes in group settings and allow for a more concentrated effort to understand complex information.

One of the limitations of this study was the short follow-up interval that was limited

to three months. Therefore, further studies are recommended to be conducted on this issue with longer follow-up intervals. The other limitation of this study was that it was a quasi-experimental research, so its internal validity may have declined due to the lack of the random assignment and blinding.

## CONCLUSION

The present study results indicated that multimedia-based puberty health education could be effective in increasing the male adolescents' self-esteem. This indicates the potential of this method for imparting puberty information to adolescents. Therefore, it is firstly recommended that this multimedia application should be utilized in the promotion of self-esteem in the middle school and other educational environments for Iranian adolescent boys. Secondly, the present study just addressed adolescent boys; nevertheless, the findings may not be generalizable to adolescent girls. Hence, it is recommended that similar studies should be conducted on using multimedia-based puberty health education for adolescent girls.

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## REFERENCES

- 1 Ferreira M, Bento M, Chaves C, Duarte J. The Impact of self-concept and Self-esteem in Adolescents' Knowledge about HIV/AIDS. *Procedia-Social and Behavioral Sciences*. 2014;112:575-82.
- 2 Kheyrkhah M, Mokarie H, Neisani L, Hoseini F. The impact of puberty health

- education on self-concept of adolescents. *Iranian Journal of Nursing Research*. 2013;8:47-57. [In Persian]
- 3 Branden N. *The six pillars of self-esteem*. New York: Bantam Books; 1994.
  - 4 Fisher M, Schneider M, Pegler C, Napolitano B. Eating attitudes, health-risk behaviors, self-esteem, and anxiety among adolescent females in a suburban high school. *Journal of Adolescent Health*. 1991;12:377-84.
  - 5 Mcgee R, Williams S. Does low self-esteem predict health compromising behaviors among adolescents? *Journal of Adolescence*. 2000;23:569-82.
  - 6 Donnelly J, Young M, Pearson R, et al. Area-specific self-esteem, values, and adolescent substance use. *Journal of Drug Education*. 2008;38:389-403.
  - 7 Santrock JW. *Adolescence*. 6th ed. USA: Brown & Benchmark Publishers; 1996.
  - 8 Aktar B, Sarker M, Jenkins A. Exploring Adolescent Reproductive Health Knowledge, Perceptions, and Behavior, Among Students of Non-Government Secondary Schools Supported by BRAC Mentoring Program in Rural Bangladesh. *Journal of Asian Midwives*. 2014;1:17-33.
  - 9 Singh BP, Singh G, Singh KK. Pubertal Changes in Teenagers of Varanasi - A Spiritual City of India. *Indian Journal of Youth and Adolescent Health*. 2014;1:39-43.
  - 10 Koohestani HR, Roozbahani N, Baghcheghi N. Adolescent Boys' Lived Experience of Puberty: A Qualitative Study. *Iran Journal of Nursing*. 2009;22:53-65. [In Persian]
  - 11 Mobredi K, Hasanpoor-Azghady SB, Azin SA, et al. Effect of the Sexual Education Program on the Knowledge and Attitude of Preschoolers' Mothers. *Journal of Clinical & Diagnostic Research*. 2018;12:6-9.
  - 12 Lee JE, Ahn HY, Choi HS. A Study of Body Image, Self-esteem and Depression in Girls with Precocious Puberty and Normal Girls. *Advanced Science and Technology Letters*. 2015;116:21-5.
  - 13 Tavakoli P, Setoodeh G, Dashtbozorgi B, et al. The influence of assertiveness training on self-esteem in female students of government high schools of Shiraz, Iran: A randomized controlled trial. *Nursing Practice Today*. 2014;1:17-23.
  - 14 Barzegar N, Farjad S, Hosseini N. The Effect of Teaching Model Based on Multimedia and Network on the Student Learning (Case Study: Guidance Schools in Iran). *Procedia - Social and Behavioral Sciences*. 2012;47:1263-7.
  - 15 Zhang D. Study on the Teaching Model Based on Multimedia and Network Environment. *International Education Studies*. 2010;3:161-4.
  - 16 Cousineau TM, Franko DL, Green TC, et al. Body Morph: Feasibility Testing of an Interactive CD-ROM to Teach Young Adolescents about Puberty. *Journal of Youth and Adolescence*. 2006;35:1015-21.
  - 17 Moshki M, Ghofranipoor F, Azad Fallah P, Hajizadeh E. Effect of an educational program with self-esteem and health control beliefs on mental health promotion of university students. *Feyz Journal of Kashan University of Medical Sciences*. 2009;12:38-45. [In Persian]
  - 18 Rosenberg M. *Society and the adolescent self-image*. New Jersey (USA): Princeton University Press; 1965.
  - 19 Erol RY, Orth U. Self-esteem development from age 14 to 30 years: a longitudinal study. *Journal of Personality and Social Psychology*. 2011;101:607-19.
  - 20 Joshi S, Srivastava R. Self-esteem and academic achievement of adolescents. *Journal of the Indian Academy of Applied Psychology*. 2009;35:33-9.
  - 21 Greenberger E, Chen C, Dmitrieva J, Farruggia SP. Item-wording and the dimensionality of the Rosenberg Self-Esteem Scale: do they matter? *Personality and Individual Differences*. 2003;35:1241-54.
  - 22 Shapurian R, Hojat M, Nayerahmadi H. Psychometric characteristics and

- dimensionality of a Persian version of Rosenberg Self-esteem Scale. *Perceptual and Motor Skills*. 1987;65:27-34.
- 23 Yoo YG, Lee IS. The effects of school-based Maum meditation program on the self-esteem and school adjustment in primary school students. *Global Journal of Health Science*. 2013;5:14-27.
  - 24 Lai HR, Lu CM, Jwo JC, et al. The effects of a self-esteem program incorporated into health and physical education classes. *The Journal of Nursing Research*. 2009;17:233-40.
  - 25 Verplanken B, Velsvik R. Habitual negative body image thinking as psychological risk factor in adolescents. *Body Image*. 2008;5:133-40.
  - 26 Cousineau TM, Franko DL, Trant M, et al. Teaching Adolescents About Changing Bodies: Randomized Controlled Trial of an Internet Puberty Education and Body Dissatisfaction Prevention Program. *Body Image*. 2010;7:296-300.
  - 27 Mayer RE. *The Cambridge Handbook of Multimedia Learning*. New York, Cambridge: University Press; 2005.
  - 28 Wiebe E, Annetta L. Influences on visual attentional distribution in multimedia instruction. *Journal of Educational Multimedia and Hypermedia*. 2008;17:259-77.
  - 29 Harun J. *Multimedia dalam pendidikan*. Malaysia: PTS Publications; 2003.
  - 30 Patten CA, Croghan IT, Meis TM, et al. Randomized clinical trial of an Internet-based versus brief office intervention for adolescent smoking cessation. *Patient Education and Counseling*. 2006;64:249-58.
  - 31 Tebb KP, Rodriguez F, Pollack LM, et al. Assessing the effectiveness of a patient-centred computer-based clinic intervention, Health-E You/Salud iTu, to reduce health disparities in unintended pregnancies among Hispanic adolescents: study protocol for a cluster randomised control trial. *BMJ Open*. 2018;8:e018201.
  - 32 Ezendam NP, Brug J, Oenema A. Evaluation of the web-based computer-tailored FATaintPHAT intervention to promote energy balance among adolescents: Results from a school cluster randomized trial. *Archives of Pediatrics & Adolescent Medicine*. 2012;166:248-55.