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Effectiveness of education based on Eisner's Seven Step Approach on creativity and academic emotions in high school students

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Abstract

The aim of this research was to investigate the effectiveness of education based on Eisner's Seven Step Approach on the creativity and academic emotions of the male high school students in Boushehr city. The method of the current research was pre-test-post-test semi-experimental with the control group design and the statistical population included 4766 students of the first secondary school in Boushehr city in 2022. The sample was 40 people who were selected by accessible sampling method that randomly assigned to experimental and control groups. The research tools included Torrance's creativity questionnaires (1992) and Academic Emotions Questionnaire (AEQ). The findings exhibited that training based on Eisner's Seven Step Approach improves each of the components of creativity, i.e., flexibility, originality, fluency and elaboration in the experimental group compared to the control group. Also, training based on Eisner's Seven Step Approach reduces the component of negative academic emotions and improves positive academic emotions in the experimental group compared to the control group. In the general it is concluded that by using education based on Eisner's Seven Step Approach, it is possible to help increase students' strengths and skills in the field of creativity and academic emotions of high school students.

Keywords
education based on Eisner's seven step approach, creativity, academic emotions, high school students

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Introduction

The tasks of educational centers are to promote moral values among students, in order to provide an environment for the comprehensive growth of their personal, emotional, behavioral, and intellectual character (Aro, 2018). The importance of secondary education is apparent after primary education. This stage is one of the important, sensitive, and effective periods in the personal and social life of students, which due to its biological, social, and psychological conditions has its own commonalities and advantages compared to other educational stages (Khodarahmi, 2019). In secondary education, the majority of adolescents' specific talents emerge, their learning power reaches its peak, their curiosity finds a direction, and new life issues such as choosing a major, a profession, managing a family, and tendency towards morality and religion occupy their minds, and they reach the stage of perceiving social, economic, and spiritual values. Therefore, this stage is highly valued in the education systems of different countries of the world and is a stage that links general education to higher education. One of the main features of this stage is the need for guidance and counseling towards academic success and the acquisition of growth skills, and one of the key effective factors in the academic success of students in this stage is academic motivation (Chen, 2019).

On the other hand, one of the variables that is influenced by the education based on the seven-stage model of Eysenck is creativity. Creativity means increasing or decreasing a phenomenon, changing its shape, or combining it with other phenomena, objects, and things. Therefore, creativity means creating something new and unique that is suitable and useful, and solves a scientific, social, or other need (Koyatkowska, 2019). The use of mental abilities in combining old elements to create a new idea or valuable and targeted solution is called creativity. Creativity is the ability to take initiative and create, and exists potentially in every individual and at every age, and is closely related to the social-cultural environment (Sugara, 2019). Creativity is an innate talent in human beings from childhood, but it is not fully developed in the early stages of life and for this reason, it requires attention, guidance, and education.

Attention to creativity today, especially in schools, has become much more significant than in the past (Schulz, 2018). Creativity is a powerful talent that exists in human beings from childhood. As Rogers put it, humans are inherently creative. However, creativity is not fully developed in the early stages of life and for this reason, it requires attention, guidance, and education. Attention to creativity today, especially in schools, has become much more significant than in the past (Soh,

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2017). On the other hand, creativity has four dimensions of fluidity, initiative, flexibility, and expansion. Fluid creativity is the ability to establish a meaningful relationship between thinking and expression, which enables individuals to offer multiple solutions to problem-solving. Initiative creativity is the ability to think in a non-traditional and unconventional way, based on authenticity and innovation in presenting unusual, strange, and cunning solutions to issues (Susman, 2018). On the other hand, flexible creativity is the ability to think in different ways to solve new problems. Flexible thinking designs new patterns of thinking (Tasang, 2019). Creativity expansion is the ability to pay attention to the details of an activity. Expanded thinking deals with all necessary details for a plan and does not overlook anything (Suki, 2017).

Another variable related to the academic progress of students that can have a significant impact on their lives is academic emotions. The ways in which emotions arise in individuals vary and are influenced by learning and biological and genetic backgrounds (Rashidzadeh, 2019). However, what is certain is that emotional behaviors are more influenced by environmental patterns, and because these behaviors have a learning aspect, programs can be designed to create balance and coordination in the emergence of emotions, indirectly helping children express their emotions correctly (Dachattle, 2021). Some researchers name emotions as important factors that explain academic motivation and success. The results of studies show that emotions have a significant impact on the study and learning of students, making it easier or hindering it (Huang, 2019). In other words, academic emotions are directly and indirectly related to the consequences and achievements of learners, including goal orientation, self-concept, mental and physical health, motivation, learning strategies, cognitive resources, self-directed learning, the quality of teacher-student interactions, classroom instruction, focus, information processing, storage and retrieval, learning, and academic progress (Barzegar Bafrooei, 2019). In this regard, some researchers expect that positive and pleasant emotions such as joy have a positive impact on academic progress. Conversely, unpleasant and inactive emotions such as fatigue can reduce motivation and damage information processing (Artoch Gardi, 2017).

The learning cycle model is an active learning approach that emphasizes the production, control, and dissemination of knowledge. This model, with an increasing emphasis on the importance of inference from students' previous understanding and perception and the extension and transfer of concepts, provides a basis for their growth and success, including in thinking (Abdi, 2014). This pattern consists of 7 stages. The inference stage focuses on compelling learners to retrieve and

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modify existing experiences related to new knowledge. In the engagement stage, the teacher may use a scenario related to a simple experience to grab the attention of students and evaluate their prior knowledge of the lesson topic. The goal of this stage is to excite students and engage them in any possible way with the lesson. During the exploration stage, students are encouraged to delve into materials and topics and discover how things work. This stage provides an opportunity for students to observe, record data, identify variables, design and plan experiments, interpret results, present hypotheses, and organize their findings. Teachers can organize questions, suggest methods, provide feedback, and evaluate knowledge. In the elaboration stage, students become familiar with patterns, laws, and theories. The teacher guides students towards cohesive and consistent generalizations and helps students to use distinct scientific vocabulary and propose questions to use the vocabulary to explain their findings (Abdi, 2014). The extension stage provides an opportunity for students to apply their knowledge in a new range and can include posing new questions and hypotheses for examination. Directly related to the psychological structure of transferring learning, the extension stage supports the expectation and support that the broader applications of knowledge will be used outside of school and beyond the years of study. Transfer of learning can occur within a range of transferring one concept to another (e.g., Newton's law of gravity and Coulomb's law of static electricity), one year to another (e.g., important figures, graphs, mathematical concepts in science), and from academic to non-academic activities (e.g., using a graph to calculate whether joining a video club is cost-effective or paying more to rent a movie). The generalization or expansion stage has been added to emphasize the importance of using transfer of learning for students. Teachers must ensure that knowledge in the new area is being used and is not limited to a simple explanation. The evaluation stage includes strategies that help continuously evaluate the final and evolutionary learning of students. If teachers design and implement the learning cycle and experiments that students do in class well, then they should be able to include some aspect of these experiments in their assessment tools. They should include questions about the experiments that students have done in their designs. For evaluation, students should be asked to interpret the data obtained from a laboratory experiment, similar to the experiment they have performed. Students should also be asked to design experiments as part of their evaluation (Abdi, 2014).

The conducted research has also emphasized the effectiveness and impact of the learning cycle model, including, for example, the study by Eslami Nejad et al. (2021) on the effect of education

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based on the 7-stage Eisner's Learning Cycle Model on the engagement and academic self-efficacy of high school students in Shahre Babak. The analysis showed that the level of self-efficacy and academic engagement in the experimental group was higher compared to the control group. Therefore, it is recommended that educators and instructional designers use new teaching and learning models and strategies based on the effectiveness of this teaching method in improving self-efficacy, engagement, and participation of learners in the learning process.

In another study by Mohammadi Nejadganji (2020) on the effectiveness of education based on the 7-stage Eisner's Learning Cycle Model on improving self-efficacy skills and critical thinking of students in Karaj's District 1, the findings showed that the education based on the 7-stage Eisner's Learning Cycle Model was effective in improving the dimensions of self-efficacy skills (talent, texture, and effort) and critical thinking skills (creativity, elevation, and commitment) of students in Karaj's District 1.

Furthermore, Habibi Kalibar et al. (2019) studied the effect of teaching creativity and the 7-stage learning cycle model on improving the creative thinking of students. The results showed that the teaching model of creativity and the 7-stage learning cycle model had an impact on the creative thinking of students, as it led to an increase in their creative thinking abilities.

In a study by Bani Ardalan (2017), it was demonstrated that teaching based on the 7-stage learning cycle had a significant impact on increasing the creativity and academic progress of sixth-grade students. Abdii (2014) investigated the effectiveness of education based on the 7-stage Eisner's Learning Cycle Model on improving critical thinking skills of male students. The results showed that students who were taught using the learning cycle model had higher critical thinking skills compared to those who were taught using traditional teaching methods.

Kazempour (2013) concluded that the discovery-based teaching method was effective in promoting critical thinking skills among students. Additionally, Ultraoneh (2011) found that the learning cycle model was more effective than traditional teaching methods in improving critical thinking skills. Moreover, Rio Hallowsick (2009) demonstrated that in the exploration model, learners regulate their learning and knowledge construction, leading to an improvement in their self-regulation skills. Sasmaz and Tezkan (2009) showed that the group taught using the 7-stage learning cycle model had a more positive attitude towards science compared to those taught using traditional teaching methods. Finally, Cardak, Dick Menley, and Saritas (2008) demonstrated that the learning cycle model was effective in enhancing the academic success of students. Mosst

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(2006) found that the 7-stage learning cycle model was more effective than traditional teaching methods in improving critical thinking skills of students. Agar (2005) showed that education based on the learning cycle model led to better learning of scientific concepts and more positive attitudes towards science as a subject.

Based on the above, the main question in this study is whether education based on the 7-stage Eisner's Learning Cycle Model is effective in improving creativity and academic emotions of male high school students in Bushehr.

Material and Methods

In this quasi-experimental study with a pretest-posttest design and a control group, the statistical population consisted of all male high school students in Bushehr during the academic year 2021-2022 in the schools of the city of Bushehr, and the sample size consisted of 30 male high school students in Bushehr, 15 of whom were in the control group and 15 in the experimental group. The statistical population of this study included 4766 male high school students in the city of Bushehr. The research sample was selected from the statistical population through cluster sampling method, considering the sample size of the statistical population. The experimental group underwent 9 sessions of education based on the 7-stage Eisner's Learning Cycle Model, while the control group did not receive any intervention.

The inclusion criteria for the study were: 1) no severe mental or personality disorders (based on personality tests); 2) no physical or psychological illnesses; and 3) motivation of the students to attend the sessions regularly. The exclusion criteria were: 1) absence from more than two consecutive sessions; 2) request for non-cooperation by the participant; and 3) lack of motivation to participate in the activities.

In the ethical considerations, the participants were assured that the questions were purely for research purposes and there was no need to write their name and surname. Moreover, the participants were informed that their participation in the study was voluntary and there was no obligation to participate. They were also assured that they could leave the educational sessions at any time if they wished. The data collection tool consisted of two parts.

Torrance Creativity Test (1992): This scale was developed by Torrance and measures four components of creativity, including fluency, originality, flexibility, and elaboration, which consist of 16, 22, 11, and 11 items respectively. Questions 1 to 22 measure fluency, questions 23 to 33

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measure elaboration, questions 34 to 49 measure originality, and questions 50 to 60 measure flexibility. Each item has three qualitative responses, A, B, and C, which are converted into numerical values of 0, 1, and 2. It is assumed that the person who chooses option A has the lowest level of creativity and the person who chooses option C has the highest level of creativity. The total score obtained in each subtest represents the individual's score in that section, and the total score of the individual in the four subtests indicates their overall creativity score. The reliability of Torrance Creativity Test (1992) was obtained using Cronbach's alpha coefficient of 0.84 in the present study. Torrance (1992) reported the validity of the questionnaire in his own research using factor analysis of 0.85.

Academic Emotions Questionnaire (Pekrun et al., 2002): The Academic Emotions Questionnaire was designed by Pekrun et al. (2002) and measures positive and negative emotions. This scale consists of 75 items and has three sections: class emotions, learning, and exams. The two dimensions of positive emotions (with three subscales of pleasure, hope, and pride) and negative emotions (with five subscales of anger, anxiety, shame, hopelessness, and fatigue) are measured using a five-point Likert scale (from never to always), with each item having a value between 1 to 5. Questions such as "I am eager to study" measure academic emotions. A score higher than 6 indicates high self-control. The reliability of the Academic Emotions Questionnaire by Pekrun et al. (2002) was obtained using Cronbach's alpha coefficient of 0.81 in the present study. Pekrun et al. (2002) reported the validity of the questionnaire in their own research using factor analysis of 0.83.

Protocol of the Instruction based on Eisner's seven-stage model (2003): In this study, the instruction based on Eisner's seven-stage model was presented to male high school students in nine sessions. The sessions are summarized in Table 1 (Eisner, 2003; as cited in Abdi, 2014).

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Table 1. Instruction sessions based on Eisner's seven-stage model (2003; as cited in Abdi, 2014)

Session	Content
1	Introducing the method - stating the purpose of implementing the plan - implementing the method - implementing the pre-test
2	Infer (extract). At this stage, the students were asked to recover and modify the existing experiences with the new knowledge related to the subject of the lesson.
3	Involving. At this stage, they were excited and interested in the subject of the lesson in any possible way. The students were grouped and the necessary facilities were provided to them.
4	To explore : In this stage, an opportunity was provided for students to observe, record data, identify variables, design and plan experiments, interpret results, present hypotheses and find Organize them.
5	Explain: At this stage, students were introduced to patterns, laws and theories. At this stage, the students were given the best course of work. They were asked to provide a logical and reasoned explanation for the work and activities they have done. The students were asked to say what they got from these activities.
6	Expand: At this stage, students were given an opportunity to apply their knowledge in new areas. At this stage, materials were presented about the main concepts of the courses. Giving additional examples and more about the main topic helped the students to solve the problems themselves and find the answers to their questions. At this stage, they were able to expand their information using different sources. The students were asked to recount what they had learned. We also helped them in this work until the students fully understood the desired concept.
7	Application: At this stage, students applied knowledge in a new field and were not limited to a simple description. The students were asked to use their previous learning to generalize to other concepts. All students tried to participate in the discussion.
8	Assessment: At this stage, students were asked to design experiments as part of their assessment. At this stage, for the final evaluation, each group was asked to answer the final questions.
9	At the end of the post-test sessions, questionnaires were distributed and collected.

Results

Based on the information presented in Table 2, a discussion was held regarding the normality of the data, and in Tables 3 to 6, the hypotheses of the study were analyzed.

Table 2. Kolmogorov-Smirnov test results for normal distribution assumption

Variable	Group	Statistic	p
Creativity	Experimental	.12	.2
	Control	.19	.12
Academic emotions	Experimental	.16	.2
	Control	.21	.05

Table 2 shows the results of the Kolmogorov-Smirnov test for the normal distribution hypothesis. The results of the Kolmogorov-Smirnov test in Table 2 indicate that the significance level for the variables of creativity and academic emotions is greater than 0.05. Therefore, the Kolmogorov-Smirnov statistic for the variables is not significant at the 0.05 level of error, and thus the

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distribution of the variables is normal. Given the assumption of multivariate covariance analysis, we are allowed to use multivariate covariance analysis.

Table 3 shows the standardized scores for creativity components by group and post-test. The table data indicate that the mean adjusted score for each creativity component, namely, fluidity, elaboration, originality, and flexibility, in the experimental group is greater than that of the control group in the post-test phase.

Table 3. Adjusted indices related to creativity components, separately from control group and non-control group in the post-test stage

Variable	Experimental group			Control group		
	N	**Mean**	**SD**	**N**	**Mean**	SD
Fluidity	**20**	**27.06**	**.34**	**20**	**25.63**	.34
Expansion	**20**	**15.66**	**.59**	**20**	**12.83**	.59
Innovation	**20**	**23.77**	**.35**	**20**	**20.92**	.35
Flexibility	20	15.75	.47	20	12.74	.47

Table 4 summarizes the results of a multivariate covariance analysis of post-test scores for creativity components. The table shows that there is a significant difference between the experimental and control groups in terms of at least one of the creativity components, namely, fluidity, elaboration, originality, and flexibility, at a significance level of 0.001. In other words, it can be said that the seven-step Eysenck-based training program enhances all creativity components in the experimental group compared to the control group.

Table 4. Results of a multivariate covariance analysis of post-test scores of creativity components

Effect	Test	Value	F	DF Hypothesis	Error DF	p	Eta
Group	Pillai's trace	.536	8.94	4	31	.001	0.536
	Wilks Lambda	.464	8.94	4	31	.001	0.536
	Hotelling's trace	1.15	8.94	4	31	.001	0.536
	Roy's largest root	1.15	8.94	4	31	.001	0.536

Table 5 shows the results of a repeated measures analysis of variance (MANOVA) on post-test scores for creativity components with pre-test scores as covariates.

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Table 5. Results of one-way covariance analysis of the pre-test score of creativity components

Source	Variable	SS	DF	MS	F	p	Eta
Group	Fluidity	**8.75**	**1**	**8.75**	**6.18**	**.018**	**.15**
	Expansion	**64.16**	**1**	**34.16**	**8.14**	**.007**	**.19**
	Innovation	**34.65**	**1**	**34.65**	**22.9**	**.001**	**.40**
	Flexibility	**38.52**	**1**	**38.52**	**14.14**	**.001**	**.29**

The results of the one-way ANOVA analysis in the MANOVA text presented in Table 5 show that there is a significant difference between the experimental and control groups in terms of fluidity (F=18.6, p=0.018), elaboration (F=14.8, p=0.007), originality (F=9.22, p=0.001), and flexibility (F=14.14, p=0.001) components of creativity. In other words, it can be concluded that the seven-step Eysenck-based training program enhances all creativity components in the experimental group compared to the control group. The mean adjusted score for each creativity component, including fluidity, elaboration, originality, and flexibility, in the post-test phase is significantly higher in the experimental group than in the control group, indicating a positive effect of the training program on creativity.

Table 6 presents the mean scores and standard deviations of positive and negative academic emotions separately for the experimental and control groups in the post-test phase. The table data show that the mean score of positive academic emotions in the experimental group is higher than in the control group, while the mean score of negative academic emotions in the experimental group is lower than in the control group.

Table 6. Mean and standard deviation of positive and negative academic emotions in the post-test stage

Variable	Experimental group			Control group		
	N	**Mean**	**SD**	**N**	**Mean**	SD
Positive academic emotions	**20**	**53.13**	**.67**	**20**	**44.06**	.67
Negative academic emotions	20	19.44	.66	20	24	.66

Table 7 provides a summary of the results of the multivariate covariance analysis on post-test scores of the emotional components of academic emotions with pre-test scores as covariates. The table shows that there is a significant difference between the experimental and control groups in at least one of the emotional components, namely positive academic emotions (p<0.001) and negative academic emotions (p<0.007). This indicates that the seven-step Eysenck-based training program reduces negative academic emotions and enhances positive academic emotions in the experimental group compared to the control group.

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Table 8 displays the results of the one-way ANOVA analysis on post-test scores of the emotional components of academic emotions with pre-test scores as covariates. The table shows that there is a significant difference between the experimental and control groups in terms of positive academic emotions (F=16.26, p<0.001) and negative academic emotions (F=9.8, p<0.007). This further confirms the positive effect of the training program on reducing negative academic emotions and enhancing positive academic emotions in the experimental group compared to the control group.

Table 7. Summary of the results of multivariate covariance analysis on the post-test scores of academic emotions components

Effect	Test	Value	F	DF Hypothesis	Error DF	p	Eta
Group	Pillai's trace	**.529**	**19.64**	**2**	**35**	**.001**	**.529**
	Wilks Lambda	**.471**	**19.64**	**2**	**35**	**.001**	**.529**
	Hotelling's trace	**1.12**	**19.64**	**2**	**35**	**.001**	**.529**
	Roy's largest root	**1.12**	**19.64**	**2**	**35**	**.001**	**.529**

Table 8. Results of one-way covariance analysis of academic emotions components

Source	Variable	SS	DF	MS	F	p	Eta
Group	Positive academic emotions	**21.49**	**1**	**21.49**	**26.16**	**.001**	**.421**
	Negative academic emotions	**61.04**	**1**	**61.04**	**8.09**	**.007**	**.18**

Discussion

The present study aimed to investigate the effectiveness of a seven-step Eysenck-based training program on creativity and academic emotions of male high school students in Bushehr city. The results of the study showed that initiative and flexibility were significantly higher in the experimental group compared to the control group. Moreover, the Eysenck-based training program led to a reduction in negative academic emotions and an improvement in positive academic emotions in the experimental group compared to the control group. In conclusion, using a seven-step Eysenck-based training program can help increase the strengths and skills of students in the areas of creativity and academic emotions. The findings of this research are consistent with the findings of previous studies by Mohammadi Nezhadganji (2020), Habibi Kalibar et al. (2019), Bani Ardalan (2017), Abdi (2014), Kazempour (2013), Altrawneh (2011), Ryu and Halusic (2009), Sasimazar and Tezcan (2009), Ducrotoy (2008), Agar (2005), Masit (2006), and Cardak et al. (2008). The present study supports the hypothesis that the learning cycle model is an effective approach to knowledge production, control, and dissemination. This model emphasizes the

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importance of inference from students' previous understanding and perception and the expansion and transfer of concepts, providing a basis for their growth and success in thinking (Abdi,2014). On the other hand, creativity is essential for a fulfilling life, and it goes beyond simply inventing new things or creating works of art that others may not appreciate. Creativity has a profound impact on life, far beyond the creative acts of individuals. Creativity can teach students how to have a more fulfilling life and transform themselves into better human beings. Creativity can help with personal development and improve the situation of students.

Students who are equipped with creativity will be better able to help the world around them. On the other hand, attention to the relationship between emotion and cognition and considering the fact that the classroom is a multi-emotional experience that includes emotions related to academic success or failure, acceptance or rejection by friends, etc., has led educational researchers to pay special attention to emotional elements in the classroom. In fact, the number of researchers who have studied the educational context with an emotional perspective has increased in recent years. Although understanding the multiple and reciprocal relationships between motivational, emotional, and cognitive processes is a new topic in educational psychology research, some theoretical attempts have been made to determine these relationships and focus on emotions in the educational context (Farashahi, 2015). Students experience various emotions in educational situations. Emotions are related to motivation, learning strategies, cognitive resources, self-regulated learning, and academic progress of students and have an impact on their psychological and physical health. Academic emotions are directly tied to learning progress or consequences of learning progress. These emotions include various situations of being present in the classroom, exams, and study time (Pecran, 2006).

Therefore, it is suggested that knowledge improvement programs in the field of education be based on the seven-step Eysenck model to determine their impact on the creativity and academic emotions of students. Since education based on the seven-step Eysenck model depends on the developmental processes of individuals in terms of creativity and academic emotions, the relationship between these three variables can be investigated, compared, and followed up on longitudinally at different developmental stages. It is also recommended that similar research be conducted on other populations and educational levels in different geographical regions so that the results can be compared across different groups.

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Data availability statement

The original contributions presented in the study are included in the article/supplementary material; further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by ethics committee of Islamic Azad University, Isfahan (Khorasgan) Branch, Isfahan, Iran.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection and analysis. All authors contributed to the article and approved the submitted version.

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