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Effectiveness of Teaching Environmental Concepts through Animism-Based Storytelling on Children's Environmental Knowledge and Environmental Attitude

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ABSTRACT

One of the most important recent concerns in the world is the environment and its protection. Environmental education by storytelling, which is based on children's thinking mechanisms, can be considered a method for child education. This study was conducted with the aim of investigating the effectiveness of teaching environmental concepts through animism-based storytelling on children's environmental knowledge and attitude. The research is quasi-experimental, including two groups (experimental and control), a pre-test and a post-test. The statistical population includes all the first-grade elementary school students of Shazand, Markazi Province, Iran, in the academic year 2021-2022, with 17 people in each group selected by convenience sampling. The instrument was Leeming's (1995) questionnaire, which includes two subscales of environmental knowledge and environmental attitude. Data analysis was carried out using multivariate covariance analysis. The findings indicated that there is a significant difference between the environmental knowledge and attitude of the experimental group and the control group. The results indicated that presenting environmental concepts using animism-based storytelling had a significant effect on children's environmental knowledge and attitude. In conclusion, although storytelling can generally affect knowledge and attitude, animism-based storytelling has a more significant effect on children's environmental knowledge and attitude.

KEYWORDS

Animism, Environmental Attitude, Environmental Education, Environmental Knowledge, Storytelling.

نشریه علمی

آموزش محیط‌زیست و توسعه پایدار

«مقاله پژوهشی»

تأثیر آموزش مفاهیم محیط‌زیست با استفاده از قصه‌گویی مبتنی بر جاندارپنداری بر دانش و نگرش محیط‌زیستی کودکان

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چکیده

یکی از مسائل مهم دنیای امروز، محیط‌زیست و حفاظت از آن است. آموزش مفاهیم محیط‌زیست با شیوه‌ای از قصه‌گویی که بر پایه‌ی سازوکار تفکر کودکان شکل گرفته است، می‌تواند در روش‌های آموزش به کودکان مورد توجه قرار گیرد. هدف این پژوهش بررسی تأثیر آموزش مفاهیم محیط‌زیست با استفاده از قصه‌گویی مبتنی بر جاندارپنداری بر دانش و نگرش محیط‌زیستی کودکان بوده است. روش این پژوهش شبه آزمایشی دارای طرح پیش‌آزمون و پس‌آزمون با گروه کنترل است. جامعه آماری پژوهش، شامل تمامی دانش‌آموزان پایه اول ابتدایی شهرستان شازند در سال تحصیلی ۱۴۰۱-۱۴۰۰ بوده است. همچنین روش نمونه‌گیری این پژوهش، غیرتصادفی و از نوع در دسترس (۱۷ نفر گروه آزمایش و ۱۷ نفر گروه کنترل) می‌باشد. ابزار پژوهش، پرسشنامه لیمینگ (۱۹۹۵) است که دو خرده مقیاس دانش و نگرش محیط‌زیستی را در برمی‌گیرد. تجزیه و تحلیل داده‌ها با استفاده از آزمون تحلیل کوواریانس چند متغیری صورت پذیرفت و یافته‌های به دست آمده نشان داد که بین دانش و نگرش محیط‌زیستی دو گروه آزمایش و کنترل تفاوت معناداری وجود دارد در نتیجه ارائه‌ی مفاهیم محیط‌زیستی به شیوه قصه‌گویی مبتنی بر جاندارپنداری بر دانش و نگرش محیط‌زیستی کودکان تأثیر دارد. بنابراین اگرچه قصه‌گویی به شکل کلی می‌تواند بر دانش و نگرش تأثیر داشته‌باشد اما قصه‌گویی با استفاده از جاندارپنداری به شکل معنادار تأثیری بیشتر بر جای می‌گذارد.

واژه‌های کلیدی

آموزش مفاهیم محیط‌زیست، جاندارپنداری، قصه‌گویی، دانش محیط‌زیستی، نگرش محیط‌زیستی.

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Introduction

Currently, the environment is facing serious threats at global and national levels (Poorma'soom et al., 2017), and destructive human activities have endangered biodiversity, stability, and balance of the environment the most (Marzban et al., 2019). It is crystal clear that many environmental problems and crises, loss of resources, and environmental pollution have been caused by human actions (Meiboudi et al., 2013). The environmental response to such damages can gradually or even quickly reach a stage where recovery is costly and almost impossible (Botkin & Keller, 2014); for example, damages such as the loss of rare plant species or excessive emission of permitted pollutants in the air are far from compensable (Montazeri et al., 2022). With his actions and attitudes towards the environment and the changes he forces on the environment, man has led to the destruction of the environment and caused grave crises. In fact, the major damage to the environment has been caused by human actions and behaviors (Salehi & Emamgholi, 2012). Yet, expressing these concerns may further the understanding of environmental crises, which may have been overlooked (O'Neill et al., 2008).

The sum of actions and behaviors that people display with respect to the environment is influenced by certain emotions, desires, and preparatory measures that constitute responsible behaviors towards the environment. In addition, people express different attitudes towards the environment under the influence of social and cultural issues; these behaviors may be positive and beneficial to the environment or negative and detrimental (Khoshfar et al., 2010). Any prevention or abandonment of the process of environmental destruction requires the adoption of new behavioral models (Afrouz, 2018). In other words, there needs to be a change in the way humans live and behave in nature (Bahmanpour et al., 2022). The environment has been receiving increasing attention from experts in recent decades since it is a vital element for human life and since it has been exposed to serious threats at national and global levels (Mirfardi & Salamatian, 2022). In general, environmental experts posit that alleviating the environmental crisis hinges on teaching environmental concepts and changing people's attitudes and knowledge about the environment surrounding them (Saeidi &

Meiboudi, 2022).

Most of the current environmental problems are rooted in a lack of awareness and cultural weakness regarding how humans and nature interact (Shobeiri & Meiboudi, 2013). One of the main causes of people's carelessness about environmental protection is their lack of awareness in this respect (Jowkar & Mir Damadi, 2010). Proper education should be provided to resolve the environmental crises (Abedini et al., 2021). The interdisciplinary nature of environmental-protecting organizations requires that both real and legal persons gain proper knowledge and attitude toward environmental protection (Meiboudi et al., 2013). According to the Belgrade International Conference in 1975, the general goals of teaching environmental concepts are to improve people's knowledge, attitude, skills, and behavior (Hodson, 2011).

It should be borne in mind that such an attempt to change people's behavior cannot be merely led by emotions; rather, appropriate educational approaches are also needed to improve environmental conditions based on facts (Botkin & Keller, 2014). Needless to say, the expansion of knowledge and formation of proper attitudes and behavior among the members of a society begins in childhood and elementary school, which is the most critical period for shaping knowledge, attitudes, and basic behaviors in an individual.

By knowledge, it is meant the information stored in the mind. Traditionally, environmental educators have strived to ultimately change one's behavior by providing them with knowledge and awareness (Carmi et al., 2015). What is called environmental knowledge or knowledge of environmental issues consists of the information people have acquired about environmental conditions, climate change, environmental visions, and environmental consequences of production and consumption (Saari et al., 2021). Current environmental challenges, such as climate change, loss of biodiversity, and the like, are only noticeable to citizens who have environmental knowledge (Stevenson et al., 2014).

Wilson (1996) maintains that teaching environmental concepts has been founded on two important principles: the protection of the natural world and the healthy development of children. Given the benefits of the environment and the need for caring for attachment to and

affection towards it, man has a weighty responsibility to preserve the environment. Furthermore, the basis of shaping proper behavior and habits starts from childhood; therefore, protecting the environment is also a form of knowledge and habit that must be acquired from childhood so that it becomes a mental belief (Poorma'soom et al., 2017). The second principle is supported by the idea that young children need nature and that their healthy development depends on healthy interaction with the natural environment. Evidently, man needs to interact with nature not only to meet his physical needs but also to meet his psychological and emotional ones (Wilson, 1996).

The goal of teaching environmental concepts to children is to educate them and transform them into responsible citizens and adults committed to the environment (Mohammadi Bolbanabad et al., 2022). Although there are some disagreements among experts regarding some of the basics, goals, contents, teaching methods, and evaluation methods for teaching environmental concepts, the general consensus underlines the importance of applying environmental concepts to daily life in the family and school (Karimi et al., 2017). The main goal of teaching environmental concepts is to help people know how to improve the quality of life of all beings, both for the present and future generations, without endangering the environment (Garcia Hernandez, 2017).

While there are many differences among the instructional models, there is a consensus on the ultimate goal of teaching environmental concepts — shaping human behavior and fostering a wide and complex range of cognitive and emotional capacities (Carmi et al., 2015). Acquiring knowledge does not necessarily entail creating a desirable behavior (Ramsey & Rickson, 1976), but extending environmental knowledge is regarded as an essential component of environmental education, so the analysis of its impact on environmental behavior is significant (Liobikienė & Poškus, 2019). As environmental knowledge advances, citizens' attitude toward the environment is upgraded to a higher level; as a result, environmental behaviors also change in concordance with environmental protection (Malekzadeh et al., 2022).

Environmental attitude is a set of feelings,

behavioral tendencies, opinions, judgments, and beliefs of an individual toward an environmental phenomenon or issue, as well as a concern for the preservation of the environment. Such an attitude can preserve or destroy the environment in two ways (Feili et al., 2022; Asadi & Mehrabi, 2018). It can be said that there is a direct and meaningful relationship between environmental concern and environmental behavior. People perform behaviors with positive environmental consequences only when they have a positive attitude toward the behavior and also receive support from others regarding such behavior (Mirfardi & Salamatian, 2022).

Retrospective studies on adults highlight the crucial role of early childhood experiences with nature. Children may not have the cognitive capacity to understand complex and global environmental issues, yet they grow up in a world with many environmental problems. Thus, appropriate education can be effective in shaping lifelong environmental attitudes in children and how they deal with the environment (Strife, 2012). What is evident is the significant role of feelings and emotions in shaping environmental behaviors. Intrinsic motivation derived from personal gains, interests, and values affects the performance and maintenance of learned behavior (Frensley et al., 2022). Having environmental sensitivity or an empathetic approach toward the environment exerts a significant effect on behavior, with those expressing positive feelings toward the environment being more likely to display environment-friendly behavior (Carmi et al., 2015).

Acquiring knowledge and improving attitudes by children is sought to achieve the outward representation of learning, i.e., behavior. Human behavior is influenced by a set of factors such as culture, attitude, emotions, values, ethics, communication, encouragement, punishment, and heredity (Sarmadi et al., 2021). Environmental literacy, which also entails environmental knowledge and attitude, can induce changes in environmental behaviors, which are clear and visible actions performed by an individual in response to the environment (Asadi & Mehrabi, 2018). Obviously, one way to prevent damage to nature is to change human behavior (Abedini et al., 2022).

Storytelling is a facilitative tool in education that develops the learning activity through the

narrative presented (Hägström, 2022) and can affect children's attitudes by means of efficient education (Kalhori & Karimi, 2017). The narrative is one of the basic mentalization practices. A narrative, a special form of which is a story, deals with facts, ideas, theories, dreams, fears, and hopes from the general vision of life or an individual's viewpoint (Alterio & McDrury, 2003). Most people understand the world through narratives, and stories serve as their main means of understanding (Abdolahian & Razi, 2012). Stories emerge from human experiences, and narratives are the primary form through which human experience finds meaning (Van Gils, 2005). Stories enrich children's minds, fuel their imagination, and provide them with valuable experiences (Forouzandeh, 2009). They hand down the traditions and customs of a culture from one generation to the other (Rahmandoost, 2012). A story comprises three components: the story, the storyteller, and the listener, and should any of these components be removed; storytelling would be impossible (Mazeki, 2018).

The main features of a story include following a single, clearly defined topic, using words that help visualize the scenes, optimal use of time, keeping the stories simple and concise, adjusting the story with the audience's characteristics, and appropriate characterization (Greene & Del Negro, 2010). Through the lens of stories, children learn how people resolve their problems and deal with their emotions, and accordingly, they fuel imagination, critical thinking, and realistic thinking. Stories provide children with the opportunity to expand their understanding of the world (Rahiem et al., 2020). They also help children get acquainted with new thoughts, theories, and ideas (Suzuki et al., 2018). One of the advantages of a story is adding new experiences and perspectives to the audience's cognitive structure without requiring the individual to be present at the actual event (Flanagan, 2015). Stories form one of the major ways through which the human brain can structure experiences. Humans contextualize information and experiences through stories so that they become meaningful (Cajete, 2017).

Learning is achieved by drawing attention, reflection, and analysis. The advantage of stories is their ability to draw attention through their narrative structure, so the concepts in the

stories can be noticed and adapted better (Flanagan, 2015). For centuries, stories and storytelling have served as the common language of humans in explaining signs and meanings and handing concepts down from one generation to the other (Rahmandoost, 2012). The particular framework of storytelling for children is more attractive than other frameworks and paves grounds for the child to identify with the character of the story (Babaei et al., 2020). To be successful, the story must communicate the relevant content, yet the way the story is narrated is also important (Schank & Berman, 2006). The storyteller should have mastered the storytelling technique, i.e., to find a proper way to convey the message (Greene & Del Negro, 2010).

Publishers of children's stories benefit from various techniques to achieve these goals and to exert a greater effect on the audience (Abdolahian & Razi, 2012). The narrator and the point of view are important elements affecting the presentation and understanding of the story. Point of view is the window through which the reader looks at the events (Khoshnamay et al., 2022). The one who views the events forms the point of view, and the one who narrates is the storyteller (Poornaddaf Hagi et al., 2016). The narrator can be considered the spirit of the narrative (Khoshnamay et al., 2022). The third-person point of view is the most common form of narration in children's literature (Rashidi & Yahyaei, 2014).

One of the writing styles in children's literature is animism, by which the life principles of organic development dissolve in abstractions (abstract and immaterial concepts); in other words, animism attributes conscious life to natural phenomena and inanimate objects (Merriam, 2017). It is perceiving all things in the world as alive and animated. Animism can facilitate the communication of messages by forming emotional and empathetic interactions. Using behavioral, physical, and social metaphors, an animate object can subtly change its behavior, form, and state and thereby communicate with others. Animistic objects aim to engage in a poetic dialogue between themselves and humans. Animism gives depth to such a relationship and improves it in value and aesthetics. Animism is like seeing through a window from which the inanimate world

comes to life and speaks out (Ko, 2017).

The seminal study of animism by Jean Piaget envisages four age ranges to distinguish the animate from the inanimate. In the first stage, i.e., for children aged 4–6, anything that is active or moves is alive. Therefore, the first grade of primary school was selected for the purpose of the current study. In her *Educational Psychology*, Kadivar (2021) discusses animism in Piaget's theory in the pre-operational stage (3–7 years old) and notes that the child tends to consider inanimate objects as alive and is alert and to attribute life-like qualities to them and believes that inanimate objects have a purpose, like living objects. One of the important differences between children's beliefs in the preoperational stage and adults is distinguishing between animate and inanimate objects (Mosapoure & Talebian, 2001). Animism is the embodiment of the soul as the ultimate cause of life in all creatures in nature, whether they are animate (like animals and plants) or inanimate (like rocks and mountains) (Asadi & Cheraghizadegan, 2022). In the animistic stage, the child enjoys attributing the qualities of animate objects to inanimate ones (Falahi & Karimisani, 2016). Once a sense of aliveness of the environment is internalized in a child, they will treat it as an animate object that needs to be taken care of (Karimi et al., 2017).

Sharefkin and Ruchlis (1974) showed that based on Piaget's theory, using animism is useful for children in the pre-operational stage and helps them understand the world around them better. Also, Taber and Watts (1996) and Watts and Bentley (1994) maintain that anthropomorphism and animism can be beneficial for students in understanding and learning science.

To be able to protect the environment, we need to change human behavior toward nature and mend his way of life, which requires changing his attitude. Many environmental challenges have arisen from the wrong attitude of humans towards nature, yet, a positive attitude can improve the environment (Feili et al., 2022; Arameahinia et al., 2021). Benefitting from storytelling and narration to teach concepts has a long history, and the literature has indicated their positive effect (Shah hosseini & Sepahvand, 2020, Zebregs, et al., 2015, Soleimani & Akbari, 2013, Farokhi, 2011). There is also evidence that storytelling can change the attitude of the audience (Hong

et al., 2022, Nam, 2017). Storytelling has been used both in children's educational films and in educational books. Animism has been used in these stories as well, where the sun, the moon, and the wind are present even as male and female characters, and plants, mountains, and the earth talk to each other. In children's books, a tree broken by the wind asks another tree to support it until the storm is over. Along the same line, the findings of psychologists such as Piaget lend scientific validity to such a tendency in children (Kadivar, 2021).

Therefore, it seems that using stories in which the elements of nature have a tragic or happy fate, like living creatures, will lead to a greater apprehension of the child with the fates of these creatures, and it will stimulate the child's mind, cause a greater relationship between the child and these elements, and shape a positive attitude towards them. Since storytelling is a means to facilitate a type of education that develops learning activities through the narrative (Häggström, 2022) and since animism is considered an attractive element for children in this form of education, the present study seeks to find out whether storytelling using animism with environmental concepts leads to the further development of children's environmental knowledge and attitude.

Research Methodology

The current research is quantitative. It is a quasi-experimental study including two groups (control and experiment) with a pre-test and a post-test. The statistical population of the study includes all the first-grade elementary school students of Shazand, Marakzi Province, Iran, who were studying in the academic year 2021-2022. The sampling method is (non-random) convenience sampling. First, Neshat School (a female school) in Shazand was selected, and then out of the two first-grade classes, one was randomly selected as the experimental group (17 people) and the other as the control group (17 people). First, a pre-test was administered to measure environmental knowledge and attitude in both groups and after 12 sessions of animism-based storytelling in the experimental group and 12 sessions of teaching environmental concepts with storytelling which lacked animism in the control group, the environmental knowledge and attitude were measured by the post-test. The stories were

designed by the researcher in both groups based on the domains and topics of the questionnaire used, with the independent variable of animism

being included in the experimental group. Table 1 shows the training course protocols.

Table 1. Training Course Protocol

Session	Environmental field	Core concepts of the story
First session	Animals	The importance of attention to animals, their habitat, and making nests for birds
Second session	Recycling	Expressing the concepts of recycling, recyclable waste left in nature, reducing energy consumption to make recycled paper, the necessity of abundant space to bury all the garbage
Third session	Pollution	Air pollution, production of carbon dioxide by factories and cars, acid rain, burning coal
Fourth session	Energy	Saving energy, recognizing the most energy-consuming device in the house
Fifth meeting	Water	Groundwater and the problem of using it
Sixth session	Energy	Renewable and non-renewable energy, fossil fuels
Seventh session	Animals	Elephant ivory trade, Leather and animal skin trade, killing wild animals such as wolves
Eighth session	Water	The presence of phosphate in seawater and the increase of algae, which leads to suffocation of the fish
Ninth session	Animals	Testing products on animals
Tenth session	Water	The passage of water through farming fields, which leads to pollution with nitrates and phosphates
Eleventh session	General	Ecology, the extinction of animals due to the destruction of their habitat
Twelfth session	General	The increase in the population and the increase in the number of cars, the presence of lead in the smoke of cars, the necessity of adjusting the cars' engine

As can be seen in Table 1, the stories were designed in six environmental areas. The validities of the stories written by the researcher were confirmed by a group of story-writing experts and children's literature experts. Reading the stories was avoided in both groups; instead, the stories were presented with proper storytelling techniques. Also, given the short concentration time in children, special attention was paid to the length of the stories and their simple presentation. Other important points accounted for were using a proper point of view in writing and using a good narrator so that children could realize the designed stories better. The data collection instrument was the standard Leeming (1995) questionnaire, which includes two subscales: environmental knowledge and environmental attitude. The content validity of the questionnaire has already been confirmed by many instructors and a board of environmental as well as test-making experts. Also, the convergent and divergent

validities indicate that there is a convergence between the items of each construct and a divergence between the attitude and knowledge scales, and the average correlation between the two scales shows that they measure independent constructs. Also, the reliability of the questionnaire for the knowledge questionnaire was 0.73 in the first implementation and 0.78 in the second implementation by using Cronbach's alpha coefficient. The Cronbach's alpha coefficient of the attitude was 0.89 in the first implementation and 0.91 in the second. The subscale of knowledge comprises 30 items that systematically measure six content-dependent sub-domains (i.e., five items for each of the six sub-domains, including animals, energy, pollution, recycling, water, and general issues). The attitude subscale includes 36 items, which measure students' attitudes towards environmental issues (12 items verbal commitment, 12 actual commitment, and 12

assess affect). The attitude items were systematically sampled from the six content-related subdomains (two items from each subdomain). The attitude questions are measured using a five-point Likert scale, with the highest score being 5 and the lowest being 1. The data analysis was carried out by multivariate analysis of the covariance test.

Research Findings

First, the data were presented in descriptive form using mean and standard deviation. Table 2 shows the descriptive data collected from the pre-test and post-test scores of environmental knowledge and attitude (for the three dimensions of verbal commitment, actual commitment, and assess affect) in the control and experimental groups.

Table 2. Descriptive Data of Environmental Knowledge and Environmental Attitude

Variable	Dimension	Group	Pre-test		Post-test	
			Mean	Standard deviation	Mean	Standard deviation
Environmental knowledge	-	Control	3.24	1.52	11.41	2.60
		Experimental	4.41	1.58	26.00	3.67
	Verbal commitment	Control	39.59	2.90	46.06	2.16
		Experimental	41.18	3.49	49.29	2.57
Environmental attitude	Actual commitment	Control	33.53	4.19	40.76	3.17
		Experimental	34.65	4.36	47.12	2.32
	Assess affect	Control	38.35	3.39	43.35	3.16
		Experimental	39.35	3.12	47.82	3.26

The statistical method used for examining the general hypothesis was multivariate covariance analysis. Also, univariate covariance analysis was used to examine the significance of each of the variables in the sub-hypotheses.

General hypothesis: Teaching environmental concepts using animism-based storytelling exerts an effect on children's

environmental knowledge and attitude.

Multivariate covariance analysis was used to investigate the general hypothesis. Before performing the multivariate covariance analysis, the important assumptions of the statistical test were checked, and after establishing all the assumptions, the Wilks' lambda test was used. The results of the test are reported in Table 3.

Table3. Results of Multivariate Covariance Analysis Test

Variables	Wilks' lambda	F	Degree of freedom1	Degree of freedom2	P	2η
Verbal commitment	0.42	8.47	4	25	0.01	0.58
Actual commitment	0.64	3.46	4	25	0.02	0.36
Assess affect	0.59	4.26	4	25	0.01	0.41
Environmental knowledge	0.80	1.55	4	25	0.22	0.20
Group	0.06	102.67	4	25	0.001	0.94

As can be seen in Table 3, the multivariate statistic, i.e., the lambda effect, is significant at a 95% confidence level (P=0.001, F=102.67, and Wilks' lambda=0.06). Thus, the linear

combination of the dependent variables (the scores of environmental attitude and environmental knowledge in the post-test) were affected by the independent variable (teaching

environmental concepts) after adjusting the differences of covariate variables (pre-test). Therefore, the multivariate covariance analysis is generally meaningful. In other words, the results of the analysis show that the independent variable was effective on the linear combination of the dependent variables, and it can be claimed that teaching environmental concepts was effective on at least one of the dependent variables. Examining the general hypothesis of the research shows that the mentioned multivariate test was significant, and the linear combination of the dependent variables was affected by the independent variable. Subsequently, a more detailed

examination of the variables in the sub-hypotheses was carried out. The results of the univariate covariance analysis would show if each of the dependent variables was separately affected by the independent variable.

Hypothesis 1: Teaching environmental concepts by animism-based storytelling exerts an effect on children's environmental knowledge.

Table 4 presents the results of studying the effectiveness of teaching environmental concepts by animism-based storytelling on children's environmental knowledge using a univariate test of covariance analysis.

Table4. Results of Univariate Covariance Analysis Test (Environmental Knowledge)

Variable	Pre-test	Degree of freedom	Mean of squares	F	P	η^2
Environmental knowledge	Pre-test	1	2.74	0.30	0.59	0.01
	Group	1	1539.36	170.44	0.001	0.86
	Error	28	9.03	-	-	-

As can be seen in Table 4, there is a significant difference between the average post-test scores of environmental knowledge scores between the experimental and control groups after removing the pre-test effect ($P < 0.05$). As a result, it can be said that teaching environmental concepts using animism-based storytelling exerts an effect on children's environmental knowledge.

Hypothesis 2: Teaching environmental concepts using animism-based storytelling exerts an effect on children's environmental attitudes.

Table 5 presents the result of the univariate covariance analysis comparing the three dimensions of environmental attitude between the experimental and control groups.

Table5. Results of Univariate Covariance Analysis Test (Environmental Attitude)

Variable	Source	Degree of freedom	Mean of squares	F	P	η^2
Verbal commitment	Pre-test	1	67.48	18.54	0.001	0.40
	Group	1	31.67	8.70	0.01	0.24
	Error	28	3.64	-	-	-
Actual commitment	Pre-test	1	59.10	11.49	0.001	0.29
	Group	1	341.22	66.35	0.001	0.70
	Error	28	5.14	-	-	-
Assess affect	Pre-test	1	110.40	14.48	0.001	0.34
	Group	1	98.46	12.91	0.001	0.32
	Error	28	7.62	-	-	-

As can be seen in Table 5, there is a significant difference between the mean post-test scores of all three dimensions (verbal commitment, actual commitment, and assess affect) in the post-test stage between the control and experimental groups at a 95% confidence

level ($P < 0.05$). Therefore, based on the obtained empirical evidence, it can be claimed that teaching environmental concepts using animism-based storytelling exerts an effect on children's environmental attitudes.

Conclusion

This study was conducted to examine the effect of teaching environmental concepts using animism-based storytelling on children's environmental knowledge and attitude, and the results showed that teaching environmental concepts with the mentioned method affects children's environmental knowledge and attitude.

Based on the results obtained, teaching environmental concepts using animism-based storytelling affects children's environmental knowledge. More specifically, animism-based storytelling exerts a positive effect on the acquisition of environmental knowledge. As Shahhosseini and Sepahvand (2020), Zebregs et al. (2015), Soleimani and Akbari (2013), and Farrokhi (2011) have emphasized, storytelling can be effective in learning even without benefiting from animism. However, the findings of this study showed that animism can amplify this effect. Sharefkin and Ruchlis (1974), Watts and Bentley (1994), and Taber and Watts (1996) have already reported evidence indicating the effect of teaching by animism on understanding and learning. It seems that increased interaction between objects and humans as a consequence of animism (Ko, 2017) has led children to pay more attention to the details. The expansion in the child's imagination and visualization by facing animated phenomena and the concretization of the concepts makes their understanding more plausible. Botkin and Keller (2014) consider knowledge as a combination of scientific data and understanding of issues, which leads to finding solutions to problems. This form of storytelling could help advance understanding. The desire in children to give life to dolls and to the sun that wakes up in the morning and sleeps at night is undeniable. Most children imagine happiness, pain, and suffering while playing with dolls and empathize with them. Animism evokes friendship, and friendship with the environment becomes a bridge for empathy and a supportive relationship and establishes a bond based on love and respect. The mutual intimacy and trust created by animism is intensified by storytelling, breaking the boundaries of time and space.

As Liobikienė and Poškus (2019) and Abedini Baltork and Saffar Heidari (2022) emphasize that environmental knowledge is, a

fundamental component in teaching environmental concepts, and analyzing its impact on environmental behavior is crucial. Of course, as Ramsey and Rickson (1976) hold, acquiring knowledge does not simply mean that the desirable behavior is shaped in the individual. Indeed, good behavior requires a proper attitude. The role of attitude is crucial in achieving environmental behavior; for example, Feili et al. (2022) note that the solution to improving human behavior toward the environment is changing his attitude.

The findings of this study showed that teaching environmental concepts using animism-based storytelling has a positive effect on children's environmental attitudes. Arameshinia et al. (2021) reported a significant effect of environmental education on the attitude level of local communities in protecting biodiversity. In the same line, Kalhori and Karimi (2017) reported that education through poetry and stories exerts a significant effect on improving the attitude of normal children toward blind and deaf children.

Presenting natural phenomena by animism makes them more believable, and the child identifies with their destiny or establishes an emotional connection between himself/herself and nature. Animism in storytelling leads to a feeling of concern for the fate of the objects in the story, which can lead to the cultivation of a positive attitude to preserve them. Early childhood experiences are effective in fostering lifelong attitudes. Stories are a mediator for further experiences that make children change or improve their attitude and vision towards issues by identifying with the characters of the story.

As Sarmadi et al. (2021) maintain, behavior is influenced by many factors, yet a large part of it originates from attitude. Environmental attitude, as shown by Asadi and Mehrabi (2018), can lead to either preservation of the environment or its destruction. Environmental knowledge and environmental attitude correlate. As stated by Malekzadeh et al. (2022), the expansion of knowledge and attitude can also improve and direct behavior.

Mosapoure and Talebian (2001) view children's imagination and thinking as poetic, and Ko (2017) states that the purpose of animated objects is to engage in a poetic dialogue between themselves and humans; thus, it is conceivable that children can also manage

to understand the environmental problems and the suffering of nature in animated stories. In other words, it could be said that behavioral, physical, and social metaphors such as moving, talking, being sad, and laughing make establishing communication easier and deeper.

Stories have long been used to hand down the values and culture of a nation from one generation to the other. As Frensey et al. (2022) hold, internal motivations that result from values lead to better behavior toward the environment. Therefore, it is expected that by improving attitudes, we will get closer to maintaining the health of the environment.

Given the effect of animism-based storytelling on children's environmental knowledge, it is suggested that this method be used in teaching different lessons to children. Also, it is possible to amplify this influence by integrating animism into other teaching

methods, such as using drama.

Considering the effect of animism-based storytelling on children's environmental attitude, it is suggested to use animism in parts of the education that require encouraging and arousing children's emotions because animism can affect emotions, which are one of the variables affecting attitude, which in turn affects behavior and reinforces the tendency to change behavior. Integrating emotions through animism into other educational methods can make the educational message more effective. Using animism to change attitudes about various issues can lead to reorganization and interpretation of diverse information and ultimately lead to behavior change. By and large, it can be said that animism-based storytelling can lead to more effective educational and behavioral achievements.

REFERENCES

- Abdolahian, F. & Razi, A. (2012). "Narrative Elements in Mostafa Rahmandost's Poems for Children". *Iranian Children's Literature Studies*, 2(2), 103-124. [In Persian] doi: 10.22099/jcls.2012.432
- Abedini Baltork, M. & Saffar Heidari, H. (2021). "Investigating the Degree of Attention to the Environmental Crisis in the Content of Elementary School Textbooks". *Environmental Education and Sustainable Development*, 9(4), 47-60. doi: 10.30473/ee.2021.56557.2293
- Abedini Baltork, M., & Saffar Heidari, H. (2022). "Environmental Education in Iran's Educational System: Analysis of the Primary School Curriculum". *Journal of Environmental Studies*, 48(3), 279-300. doi: 10.22059/jes.2022.340394.1008297
- Afrouz, s. (2018). *The Environment and Green Organization*. Tehran: Atraan. [In Persian]
- Alterio, M. & McDrury, J. (2003). *Learning through Storytelling in Higher Education: Using Reflection and Experience to Improve Learning* (1st Edition.). London: Routledge. doi :10.4324/9780203416655
- Arameshinia, P., Shobeiri, S. & Larijani, M. (2021). "The Effect of Environmental Education on the Amount of Knowledge Level, Attitude and Behavior of Local Society to Protect the Biological Variety (Subject of Study to Reserve Dena Sphere of Living)". *Journal of Environmental Science and Technology*, 23(3), 103-116. [In Persian] doi: 10.30495/jest.2021.18848.2755
- Asadi, A. & Cheraghizadegan, F. (2022). "A Study of the Mana Archetype and Animalism Idea in Tazkirat Al-Awliya Stories Based on Jung's Views". *Mysticism*, 1(1), 11-36. [In Persian] doi: 10.22054/msil.2022.64483.1019
- Asadi, M. & mehrabi, M. (2018). "Studying the Background and Social Factors Influencing the Environmental Behavior of Bandar Abbasi Residents". *Journal of Hormozgan Cultural Research*, 10(15), 118-132. [In Persian]
- Babaei, A., Salehi, M. & Kianian, E. (2020). "The Purpose of This Study Was to Compare the Effectiveness of Social Skills Training on Aggressive Behaviors of Children with Aggressive Behavior in Ahvaz City". *Medical Journal of Mashhad University of Medical Sciences*, 63(1), -. [In Persian] doi: 10.22038/mjms.2019.17438
- Bahmanpour, H., Zaeimdar, M. & Salajegheh, B. (2022). "Designing an Optimal Educational Model to Improve the Level of Knowledge of Tehran Citizens towards

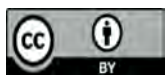
- Biodiversity Using Digestra Algorithm and Ant Algorithm”. *Environmental Education and Sustainable Development*, 11(2), 9–28. doi: 10.30473/ee.2023.64487.2537
- Botkin, D. B. & Keller, E. A. (2014). *Environmental Science: Earth as a Living planet* (9th Edition). Chichester: Wiley.
- Cajete, G. A. (2017). “Children, Myth and Storytelling: An Indigenous Perspective”. *Global Studies of Childhood*, 7(2), 113-130. Doi.org/10.1177/2043610617703832
- Carmi, N., Arnon, S. & Orion, N. (2015). “Transforming Environmental Knowledge into Behavior: The Mediating Role of Environmental Emotions”. *The Journal of Environmental Education*, 46(3), 183-201. doi: 10.1080/00958964.2015.1028517
- Falahi, V. & Karimisani, P. (2016). “The Effectiveness of Narrative Therapy on Improvement of Communication and Social Interaction of Children with Autism”. *Journal of Applied Psychological Research*, 7(2), 81-104. [In Persian] doi: 10.22059/japr.2016.58414
- Farokhi, M. (2011). *The Effectiveness of Storytelling on Teaching Environmental Concepts to Preschool Children in Qain City*, Master's Thesis, Faculty of Human Sciences, Allameh Tabataba'i University. [In Persian]
- Feili, A., Alipour, S., Sabet, M. & Sabet, A. (2022). “The Relationship between Environmental Knowledge, Attitude and Behavior with the Development of Environmental Ethics”. *Ethics in Science and Technology*. 16(4), 81- 89. [In Persian] doi: 20.1001.1.22517634.1400.16.4.11
- Flanagan, S. (2015). “How Does Storytelling within Higher Education Contribute to the Learning Experience of Early Years Students?” *Journal of Practice Teaching and Learning*, 13(2-3), pp. 146–168. Doi:10.1921/jpts.v13i2-3.822
- Forouzandeh, M. (2009). “Criticizing and Analyzing the Narrative Elements in a Selection of Children’s Stories”. *Journal of Adab Pazhuhi*, 3(9), 151-171. [In Persian]
- Frensley, B. T., Stern, M. J., Powell, R. B. & Sorice, M. G. (2022). “Investigating the Relationships among Students Basic Psychological Needs, Engagement, and Environmental Literacy at a Residential Environmental Education Center”. *The Journal of Environmental Education*, 53(4), 186–198. doi: 10.1080/00958964.2022.2081654
- Garcia Hernandez, M. (2017). *Facilitating Environmental Education and Capacity Development with Children: Using the Storytelling Approach*. Doctoral Dissertation, School of Environmental Design and Rural Development, University of Guelph.
- Greene, E. & Del Negro, J. M. (2010). *Storytelling: Art and Technique* (4th Edition). Santa Barbara, CA: Libraries Unlimited.
- Hägström, M. (2022). “Utilizing a Storyline Approach to Facilitating Pupils’ Agency in Primary School Sustainability Education Context”. *The Journal of Environmental Education*, 53(3), 154-169, doi: 10.1080/00958964.2022.2067110
- Hodson, D. (2011). *Looking to the Future*. Boston, MA: Sense Publishers.
- Hollinger, Keith H. (2008). *Trade Liberalization and the Environment: A Study of NAFTA's Impact in El Paso, Texas and Juarez, Mexico*. Master’s Thesis, Faculty of the Virginia Polytechnic Institute, Virginia State University.
- Hong, J., Yang, J., Wooldridge, B. R. & Bhappu, A. D. (2022). “Sharing Consumers’ Brand Storytelling: Influence of Consumers’ Storytelling on Brand Attitude via Emotions and Cognitions”. *Journal of Product & Brand Management*, 31(2), 265-278.
- Jowkar, G. & Mir Damadi, S. M. (2010). “The Point of View of Female High School Students in Shiraz City towards Environmental Protection”. *Agricultural Extension and Education Research*, 3(1), 1-13. [In Persian]
- Kadivar, P. (2021). *Educational Psychology* (Second Edition). Tehran: Samt. [In Persian]
- Kalhari, F. & Karimi, Q. (2017). “The Investigation of the Effect of Verse and Story Based Training on Improving the Attitudes of Normal Children toward the

- Deaf and Blind Children”. *Journal of Excellence in Counseling and Psychotherapy*, 6(21), 52-62. [In Persian]
- Karimi, B., Kian, M. & Aliasgari, M. (2017). “Designing the Environmental Education Curriculum for Elementary Schools in Iran”. *Environmental Education and Sustainable Development*, 5(4), 9-23. [In Persian] doi: 20.1001.1.23223057.1396.5.4.1.6
- Khoshfar, Gh., Salehi, S. & Emamgholi, L. (2010). “Study People’s Behavior towards the Environment (Case Study: Urban and Rural Areas of Kurdistan Province)”. *4th Conference and Exhibition on Environmental Engineering*, Tehran. [In Persian]
- khoshnamay Bahramir, C. & Malmir, T. (2022). “The Type and the Function of the Narrator in the Narrative of the Story of Rostam and Sohrab”. *Persian Literature*, 11(2), 177-195. [In Persian] doi: 10.22059/jpl.2021.332639.1974
- Ko, J. (2017). *Designing with Animism*. Master’s Thesis, School of Design, Carnegie Mellon University. Doi.org/10.1184/R1/6723284.v1
- Leeming, F. C., Dwyer, W. O. & Bracken, B. A. (1995). “Children's Environmental Attitude and Knowledge Scale: Construction and Validation”. *The Journal of Environmental Education*, 26(3), 22–31.
- Liobikienė, G. & Poškus, M. S. (2019). “The Importance of Environmental Knowledge for Private and Public Sphere Pro-Environmental Behavior: Modifying the Value-Belief-Norm Theory”. *Sustainability*, 11(12), 3324. doi: 10.3390/su11123324
- Malekzadeh, A., Tabatabaei yazdi, F., Boroumand, A. & Noghani Dokht Bahmani, M. (2022). “Biodiversity Profile in Knowledge, Attitude and Practice (KAP) of the Citizens of Mashhad Metropolis applying Sustainable Development”. *Geography and Environmental Sustainability*, 12(2), 37-57. [In Persian] doi: 10.22126/ges.2022.7529.25
- Marzban, A., Barzegaran, M., Hemayatkhah, M., Ayasi, M., Delavari, S., Sabzehei, M. & Rahmadian, v. (2019). “Evaluation of Environmental Awareness and Behavior of Citizens (Case Study: Yazd Urban Population)”. *Journal of Health and Environment*, 12(1), 17-30. [In Persian]
- Mazeki, Sh. (2018). *I Want to Be a Storyteller*. Tehran: Aftabegiti. [In Persian]
- Meiboudi, H., Omidvar, B., Enayati, A. & Rashidi, S. (2013). “Does the Kind of Primary School have Effect on Students' Environmental Awareness?” *Environmental Education and Sustainable Development*, 1(4), 11–19. [In Persian]
- Merriam-Webster. (n.d.). Animism. In *Merriam-Webster.com dictionary*. From <https://www.merriam-webster.com/dictionary/animism>
- Mirfardi, A. & Salamatian, D. (2022). “Environmental Behavior of Shiraz University Students and its Relationship with Environmental Concern and Environmental Awareness Informative Resources”. *Environmental Education and Sustainable Development*, 10(2), 135–151. [In Persian] doi: 10.30473/ee.2022.46127.2017
- Mohammadi Bolbanabad, A., Seifi, M. & Nateghi, F. (2022). “Developing Environmental Education Criteria and Indicators in Iranian Elementary Education System in 1404”. *Environmental Education and Sustainable Development*, 10(2), 99-115. [In Persian] doi: 10.30473/ee.2022.50804.2159
- Montazeri, M., Yaghoobipoor, A. & Jalalian, G. (2022). “Interpretive Structural Model of Sustainable Productivity Drivers Based Upon Environmental Knowledge and Awareness”. *Environmental Education and Sustainable Development*, 11(2), 29-50. doi: 10.30473/ee.2023.55166.2268
- Mosapoure, N. & Talebian, Y. (2001). “The Hidden Links of Childish Animosity and Poetic Imagination”. *Journal of Prose Studies in Persian Literature*. – (7), pp. 119–133. [In Persian]
- Nam, C. W. (2017). “The Effects of Digital Storytelling on Student Achievement, Social Presence, and Attitude in Online Collaborative Learning Environments”. *Interactive Learning Environments*, 25(3), 412–427.

- O'Neill, J., Holland, A. & Light, A. (2008). *Environmental values*. London: Routledge.
- Poorna'soom, B., Fayyaz, I. & Baazargaan, S. (2017). "The Formation of Environmental Literacy Based on a Multidimensional and Multimedia Curricular Perspective". *Quarterly Journal of Education*, 33(1), 9-32. [In Persian]
- Poornaddaf Haghi, Sh., Ashrafzadeh, R., Taslimy, A. & Khaefi, A. (2016). "Point of View in Three Stories in Bizhan Najdi". *Journal of Research in Persian language and literature*. 39(1), 1-10. [In Persian]
- Rahiem, M. D., Abdullah, N. S. M., Krauss, S. E. & Rahim, H. (2020). "Moral Education through Dramatized Storytelling: Insights and Observations from Indonesia Kindergarten Teachers". *International Journal of Learning, Teaching and Educational Research*, 19(3), 475-490. [Doi.org/10.26803/ijlter.19.3.26](https://doi.org/10.26803/ijlter.19.3.26)
- Rahmandoost, M. (2012). *Storytelling Skills*. Tehran: Madreseh. [In Persian]
- Ramsey, C. E. & Rickson, R. E. (1976). "Environmental knowledge and Attitudes". *The Journal of Environmental Education*, 8(1), 10-18. doi: 10.1080/00958964.1976.9941552
- Rashidi, S. & yahyaei, M. (2014). "Study of Point of View and Types of Narrators in Children's Stories". *Journal of Prose Studies in Persian Literature*, 16(33), 133-151. [In Persian] doi: 10.22103/jll.2014.6
- Saari, U. A., Damberg, S., Frömbing, L. & Ringle, C. M. (2021). "Sustainable Consumption Behavior of Europeans: The Influence of Environmental Knowledge and Risk Perception on Environmental Concern and Behavioral Intention". *Ecological Economics*, (189), 107-155. DOI:10.1016/j.ecolecon.2021.107155
- Saeidi, A. & Meiboudi, H. (2022). "Challenges of Evaluating Environmental Education in Iran's Green Schools and Strategies to Improve the Current Situation". *Environmental Education and Sustainable Development*, 11(2), 107-117. doi: 10.30473/ee.2023.63265.2493
- Salehi, M. & Emamgholi, L. (2012). "Experimental Study of the Relationship between Awareness and Environmental Behaviors (Study of Urban and Rural Areas of Sanandaj City)". *Journal of Social Problems of Iran*, 3(1), 121-147. [In Persian]
- Sarmadi, M., Rezaei, M. & Rohanifar, A. (2021). "Effects of Teaching Philosophy for Children on Environmental Behavior in Seventh-Grade High School Students". *Human & Environment*, 19(2), 125-136. [In Persian]
- Schank, R. C. & Berman, T. (2006). "Living Stories: Designing Story-Based Educational Experiences". *Narrative Inquiry*, 16(1), 220-228.
- Shahhosseini, S. & Sepahvand, T. (2020). "Comparison of the Effectiveness of Narrative and Non-Narrative Documentary Films on Learning and Retention of Environmental Concepts". *Quarterly Journal of Environmental Education and Sustainable Development*, 8(4), 7-14.
- Sharefkin, B. D. & Ruchlis, H. (1974). "Anthropomorphism in the Lower Grades". *Science and Children*, 11(6), 37-40.
- Shobeiri, S. M. & Meiboudi, H. (2013). "The Evolution of Environmental Education in Iran: Presenting Some Suggestions for its Promotion". *Environmental Sciences*, 11(1), 119-130. [In Persian]
- Soleimani, H., & Akbari, M. (2013). "The Effect of Storytelling on Children's Learning English Vocabulary: A Case in Iran". *International Research Journal of Applied and Basic Sciences*, 4(11), 4005-4014.
- Stevenson, K. T., Peterson, M. N., Carrier, S. J., Strnad, R. L., Bondell, H. D., Kirby-Hathaway, T. & Moore, S. E. (2014). "Role of Significant Life Experiences in Building Environmental Knowledge and Behavior among Middle School Students". *The Journal of Environmental Education*, 45(3), 163-177. doi: 10.1080/00958964.2014.901935
- Strife, S. J. (2012). "Children's Environmental Concerns: Expressing Ecophobia". *The Journal of Environmental Education*, 43(1), 37-54. doi: 10.1080/00958964.2011.602131
- Suzuki, W. A., Feliú-Mójer, M. I., Hasson, U., Yehuda, R. & Zarate, J. M. (2018). "Dialogues: The Science and Power of Storytelling". *Journal of Neuroscience*,

- 38(44), 9468-9470. doi: 10.1523/JNEUROSCI.1942-18.2018
- Taber, K. S. & Watts, M. (1996). "The Secret Life of the Chemical Bond: Students' Anthropomorphic and Animistic References to Bonding". *International Journal of Science Education*, 18(5), 557-568
- Van Gils, F. (2005). "Potential Applications of Digital Storytelling in Education". In *3rd Twente Student Conference on IT*, (Vol. 7), Enschede.
- Watts, M. & Bentley, D. (1994). "Humanizing and Feminizing School Science: Reviving Anthropomorphic and Animistic Thinking in Constructivist Science Education". *International Journal of Science Education*, 16(1), 83-97.
- Wilson, R. A. (1996). "Environmental Education Programs for Preschool Children". *The Journal of Environmental Education*, 27(4), 28-33. doi: 10.1080/00958964.1996.9941473
- Zebregs, S., van den Putte, B., de Graaf, A., Lammers, J. & Neijens, P. (2015). "The Effects of Narrative Versus Non-Narrative Information in School Health Education about Alcohol Drinking for Low Educated Adolescents". *BMC Public Health*, 15(1), 1-12.

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