Research Paper: The Effect of Teaching Philosophy on Metacognitive and Irrational Beliefs of Male Students of Elementary School

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ABSTRACT

Background: Philosophy for Children (P4C) is a wonderful way of bringing teachers and children together to discuss crucial topics. It has many benefits for both groups. This study aimed to evaluate the teaching process-approach of P4C on students' metacognitive and irrational beliefs by using an experimental design with the Pre-test-post-test and control group.

Methods: The statistical population consisted of all male students in the sixth grade of elementary schools, out of whom 50 students were randomly allocated to the experimental and control groups. The measurement tools included the metacognition questionnaire of Jones's irrational beliefs. At first, the Pre-test was done on both two groups. Then, 12 one-hour sessions of philosophy process-approach teaching were provided to the experimental group, while the control group did not receive any specific teaching. In the end, the post-test was done on both two groups.

Results: The findings showed that the use of a process approach in teaching philosophy has decreased the mean score of negative metacognitive and irrational beliefs among the students in the experimental group; however, there was no significant change in the control group.

Conclusion: P4C can affect negative metacognitive and irrational beliefs.

Introduction

Today's modern world requires thinking. People live in such a society receive so many new and various suggestions, thus they should choose among them. Therefore, the educational systems are required to not only depict a broad, rich, and precise picture of the future but also plan to develop the intellectual skills of the young generation [1]. Students will face different phenomena in the unexpected world of the future. Thus, they must obtain the proper skills to control their lives and learn new things [2].

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The distinctive characteristics of the 21st century education are having initiation, autonomy, goal-setting, balanced goals, activity control, independence, surveillance. The learners should be equipped with self-regulated learning strategies, problem-solving, conscious decision-making, and active data search [3]. These policies should become a part of the classroom structure. Making a learning atmosphere with a metacognitive orientation is an effort in this regard. Metacognition is the thinking about thinking process [4]. Metacognitive beliefs are effective factors on individuals' life quality [5, 6].

The fundamental assumption of metacognition is that thinking is not a reflection. It can be regulated and controlled through insight and contemplation because people can assess their responses and those of others and can direct their behaviors to meaningful goals [7]. According to metacognition theory, a disorder in thinking and excitement emerges from metacognitions [8]. The metacognitive model has recognized two kinds of metacognitive beliefs: positive metacognitive beliefs and negative metacognitive beliefs. Positive metacognitive beliefs increase the use of anxiety as a strategy; however, negative metacognitive results in the continuation of negative excitement owing to the failure in controlling thoughts and events and also the negative and threatening perception of mental events [9].

One of the major problems that disturbs the process of thinking is the formation of irrational convictions in children. Irrational or illogical beliefs result in ineffective behavior and feelings, which prevent people from achieving their desires or avoiding what they resent to do [10]. Initial maladaptive schemes lead to interpretation bias of events by the individual. These biases reveal as irrational beliefs in interpersonal mental pathology [11]. Researchers distinguish between irrational beliefs that affect mental health negatively and those that positively affect it. They argued that the beliefs mentioned by Ellis are among those irrational beliefs affecting mental health negatively [12].

The philosophy for children (P4C), proposed by Matthew Lipmann in 1969, is a program by which different aspects of children's thinking process and mental ideas can be enhanced. This program questions the main elements of the traditional education system [13]. Lippmann claims that P4C is a kind of applied philosophy aimed to force learners to philosophize and do personal philosophical activities [14]. Some experts, considering the effective role of teaching philosophy in children's education, talk about "teaching critical philosophy to children" which makes the students get involved in social debates, and fill the gap between school life and daily life [15].

Studies have shown P4C's efficiency in growing philosophical thinking among students [16], decreasing the irrational thoughts among female students [17] and children's spiritual training [18]. P4C has different approaches, one of which is the process approach. This approach, also known as "community research," regards the philosophy as a kind of activity which contributes to detect and understand the affairs. Studying philosophical stories by children and their encounter with ambiguous circumstances provides a basis for discovering various thoughts and hypotheses as conjectural solutions [19].

Worley showed that P4C program can be efficient in growing and improving the ability of reasoning, creativity, critical thinking, and decreasing irrational beliefs [20]. Morris showed that philosophy teaching can be efficient in creating positive metacognitive views as well as rational values among children [21]. Reza Nezahd concluded that the community research method significantly affects the anger related to school and also the irrational beliefs of students in sixth grade [22]. Khadem Sadegh and Fereidooni showed that teaching philosophy to children has significant effects on their philosophical thinking and its elements among sixth-grade students [16].

Evading the trap of impaired and irrational metacognitive beliefs can guarantee the children's cognitive and psychological safety and their mental health to some extent. This research aimed to examine the efficacy of philosophy teaching on some cognitive and metacognitive aspects and eliminating defective metacognitive and irrational beliefs among students to develop a pattern for reviewing and revising the curriculum.

Methods

This study had an experimental design with a Pre-test-post-test and control group in which the effect of the independent variable (P4C process approach) on dependent variables (metacognitive and irrational beliefs) was measured. The statistical population consisted of all male students of sixth-grade elementary schools in Torbat-e-Heydarieh City in the northeast of Iran, 2016-2017.

The sample size was calculated as 50 participants with an error margin of 0.05, an effect size of 0.5, and a test power of 80%. Thus, by using a random cluster sampling method, six classes of three primary schools from different three geographic regions (north, south, and center of the city) were selected. Then, the irrational and metacognitive beliefs questionnaires were applied to them and 50 students were chosen as sample size and, randomly were allocated to experimental and control groups (in each

Table 1. The content of the ten main sessions of intervention

Session numbers	Session topics	Story	Reference	Author	Category
1	Presenting stories and discussions	Dog and cat friendship	Baharestan	Jami	Epistemology
2	Presenting stories and discussions	The secret of human creation	Tarikh-e-Tabari	Rezaei	Epistemology
3	Presenting stories and discussions	Donkey and jackal	Kalila wa Dimna	Monshi	Epistemology
4	Presenting stories and discussions	Ant desert	The stories of the Qur'an	Seyed Mohammad Sahafi	Ontology
5	Presenting stories and discussions	Master and student	Tazkirat al-Awliya	Attar	Ontology
6	Presenting stories and discussions	Back to the world	Kalila wa Dimna	Monshi	Ontology
7	Presenting stories and discussions	Man who has a herd	Qaboos Nameh	Onsor Almaali	Ontology
8	Presenting stories and discussions	Anoushirvan and Shogener	Shah nameh	Ferdowsi	Ethics and aesthetics
9	Presenting stories and discussions	Death or flogging	Baharestan	Jami	Ethics and aesthetics
10	Presenting stories and discussions	White teeth	Good tales for good kids	Mehdi Azar Yazdi	Ethics and aesthetics

A P4C session based on a process approach

Target: increasing the skill of questioning

group 25 participants). The inclusion criteria included having a high average score for irrational and metacognitive beliefs at the screening phase, being interested in philosophy courses, parents' written consent, and the absence of physical and mental illness. Besides, the exclusion criteria included unwillingness to continue cooperation and more than one absence in philosophy classes.

The intervention was as follows: the philosophy was trained in a process-oriented manner (community research) for 12 one-hour sessions (each week 2 sessions) by the researcher. The sessions were held out of school hours with the consent of learners and their parents. The first session was an introduction session for defining goals, motivation creation, and Pre-test. The final session was also for acknowledgment and post-test. However, the other sessions were the main sessions in which the intervention was carried out according to Table 1.

The subject "debate plan" was provided in all sessions in the form of community research. Therefore, to measure the validity, a portion of a philosophical tale (after selecting forty tales from Persian literature by the researcher) was presented to the specialists in literature, educational psychology, and philosophy and after receiving their viewpoints, the final tales were chosen (Table 1). Furthermore, a group of specialists at Ferdowsi University of Mashhad proposed these stories based on the pre-determined criteria [19].

The 'Ant on Paper' tale was read; several questions about this tale were asked by the respondents. Then, the participants reviewed their questions with the assistance of their colleagues and were asked to comment on the tale. The students' opinions were written on the board, and they were asked to talk about their comments with reasons. Thus, the students were debated based on the research community method. During this session, the following issues were discussed:

What's the story's meaning and idea? How did the paintings on paper emerge? How did the pen create the painting on the paper? Can the pen paint the paper by itself alone? Is it possible for all participants to paint by pen? What was the ants' mistake in understanding the painting's meaning? Is it possible to guess about participants' smartness from their writings?

We used children's metacognition questionnaire (MCQ-C) which is developed by Ghadery, Mohammadkhani, and Hassanabadi based on adolescents' metacognition questionnaire (MCQ-A). In MCQ-C the subscale of cognitive confidence has been omitted [9]. The final MCQ-C comprises 24 items and 4 subscales: cognitive

supervision, positive metaworry, negative metaworry, and the subscales of superstition beliefs, penalty, and accountability. Each MCQ-C item is scored on a 4-point Likert-type scale from 1 (not agree) to 4 (totally agree). The MCQ-C scores range from 24-96 and the higher scores indicate a higher negative metacognitive activity. The alpha coefficient was found 0.87 for the total scale and between 0.44 and 0.86 for subscales.

At first, this scale was translated into Persian by some researchers. Then, it was reviewed by four experts. Next, it was distributed among 100 students to measure face validity and examine the initial psychometric measures. Finally, after making the necessary corrections, the revised form was prepared to be implemented in the study sample. The factor structure of the tool was verified by the confirmative factor analysis method. The alpha coefficient of Cronbach for the entire questionnaire was 0.81 and for the subscales of positive metaworry, negative metaworry, superstition beliefs, penalty, and accountability and cognitive supervision were 0.76, 0.61, 0.58 and 0.68, respectively [22]. In the current study, the internal consistency of the questionnaire was equal to 0.84 by calculating the Cronbach alpha.

The original version of Jones's irrational beliefs scale consists of 100 closed-questions for ten factors. Each factor examines one type of irrational thinking. The short form of this scale was designed by Ebadi and Motamedin in Iran. They removed questions after analyzing the subjects' responses and provided a four-factor structure. These four factors were helplessness for change, demand for approval, problem avoidance, and emotional irresponsibility. The questions were rated based on the Likert-type scale from strongly agree (5) to strongly disagree (1). The grading technique is based on being irrational so that higher scores indicate irrational beliefs; however, lower ones indicate rational thinking. The test's reliability was calculated using the Cronbach alpha. Since the coefficients were more than 0.7, the questionnaire has enjoyed an acceptable internal consistency [23].

In the current study, the questionnaire's internal consistency was calculated as 0.79 using the Cronbach alpha. The obtained data were analyzed in SPSS v. 20. The descriptive statistics (Mean±SD), and inferential statistics (covariance analysis) were used. The post-test mean scores were compared with adjusted Pre-test scores at the 0.05 significance level (P<0.05).

Results

This study was carried out on 50 male students of sixth-grade at the elementary schools in Torbat-e-Heydarieh City. They were divided into experimental and control groups. The participants' mean age was about 12 years and their social-economic class was almost identical. The descriptive data are provided in Table 2.

First, to check data normality, we used the Kolmogorov-Smirnov test, the central limit theorem, and the Skew-Kurtosis coefficient. The results showed that the significance level of the main variables (metacognitive and irrational beliefs) for both Pre-test and post-test was higher than 0.05. Thus, the distribution of studied variables for the Pre-test/post-test was normal. Besides, the findings showed that the amount of skewness and kurtosis coefficient of all studied variables was within the safe interval (-3, +3). Then, to check the homogeneity of variables, the Levene's test was used. Its value was bigger than 0.05 for both metacognitive and irrational beliefs. Therefore, all variances were confirmed with 95% confidence. Table 4 presents the results of Wilk's Lambda test for the significance of independent variables in the model.

As seen in Table 4, the significance level for status type (Pre-test/post-test) was less than 0.05 which indicates the effect of status (Pre-test/post-test) on the model. Besides, the significance level of the test for statistical groups (control/experiment) was less than 0.05 which presents the effect of statistical group type on the model. Furthermore, the significance level of the test for the concurrent effect of group type with test status was less than 0.05 indicating the concurrent effect of statistical group and status type (Pre-test/post-test) on the irrational beliefs and metacognitive variables.

The overall mean scores of subjects' irrational beliefs in the experimental group in the post-test (94.40) decreased significantly compared with the Pre-test (144.72), whereas in the control group no significant change occurred (Table 3). Table 5 shows the main result of covariance analysis, which helps in deciding the effect of the P4C process-approach on metacognitive and irrational beliefs.

Status type (Pre-test-post-test) affects both metacognitive and irrational beliefs significantly (P<0.05). In other words, the mean score of metacognitive and irrational beliefs among students in the Pre-test is different from those in the post-test. The statistical group type (control/experimental) affects both metacognitive and irrational beliefs significantly (P<0.05). In other words, the mean score of

Table 2. Descriptive indexes of metacognitive beliefs and its components

Variables	Statistical Groups	Test Status (Before and After the Intervention	Mean±SD	
Metacognitive beliefs	Control	Pre-test	48.44±7.52	
		Post-test	48.56±7.49	
		Total	48.50±7.43	
	Experimental	pre-test	46.32±6.86	
		Post-test	38.60±5.70	
		Total	42.46±7.36	
Cognitive supervision	Control	Pre-test	14.92±3.90	
		Post-test	14.36±4.33	
		Total	14.64±4.09	
	Experimental	Pre-test	13.32±4.48	
		Post-test	10.84±3.44	
		Total	12.08±4.14	
Positive metaworry	Control	Pre-test	11.32±2.82	
		Post-test	11.40±3.27	
		Total	11.36±3.02	
	Experimental	Pre-test	10.40±3.20	
		Post-test	8.72±2.35	
		Total	9.56±2.91	
Negative metaworry	Control	Pre-test	11.04±3.14	
		Post-test	11.20±2.86	
		Total	11.12±2.97	
	Experimental	Pre-test	11.96±3.59	
		Post-test	9.80±2.80	
		Total	10.88±3.37	
Superstition beliefs	Control	Pre-test	11.16	2.84
		Post-test	11.20	2.90
		Total	11.18	2.84
	Experimental	Pre-test	10.72	3.02
		Post-test	9.24	2.40
		Total	9.98	2.80

Table 3. Descriptive indexes of irrational beliefs and their components

Variables	Statistical Groups	Test Gtatus (Before and After the Intervention)	Mean±SD	
Irrational beliefs	Control	Pre-test	140.16±17.18	
		Post-test	139.24±15.47	
		Total	139.70±16.19	
	Experimental	Pre-test	144.72±15.68	
		Post-test	94.40±16.39	
		Total	119.56±29.97	
Helplessness to change	Control	Pre-test	51.56±15.54	
		Post-test	50.04±14.91	
		Total	50.80±15.09	
	Experimental	Pre-test	56.20±13.22	
		Post-test	40.12±15.26	
		Total	48.16±16.29	
The expectation of confirmation from others	Control	Pre-test	36.48±9.54	
		Post-test	35.64±8.93	
		Total	36.06±9.14	
	Experimental	Pre-test	37.16±6.71	
		Post-test	24.24±8.07	
		Total	30.70±9.83	
Avoiding the problem	Control	Pre-test	16.32±3.22	
		Post-test	18.60±3.48	
		Total	17.46±3.51	
	Experimental	Pre-test	15.20±5.97	
		Post-test	8.84±4.55	
		Total	12.02±6.16	
Emotional irresponsibility	Control	Pre-test	35.80	9.48
		Post-test	34.96	7.87
		Total	35.38	8.64
	Experimental	Pre-test	36.16	9.39
		Post-test	21.20	7.99
		Total	28.68	11.47

Table 4. Results of the Wilk's Lambda Test

Effects	Statistic Amount	F	Sig.
Fixed amount	0.007	4776.452	0.000
Status type (Pre-test/ post-test)	0.442	26.490	0.000
Statistical groups (C/E)	0.588	21.980	0.000
Test status* Statistical groups	0.552	25.429	0.000

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Table 5. The results of the tests of the effects between the participants

Source of Changes	Dependent Variables	df	Mean of Squares	F test	Sig.
Fixed amount	Metacognitive beliefs	1	26.53341	6135.2	0
	Irrational beliefs	1	2660803.2	7632.6	0
Status type (Pre-test/post-test)	Metacognitive beliefs	1	840.1	19.5	0
	Irrational beliefs	1	39495.7	113.2	0
Statistical groups effect (C/E)	Metacognitive beliefs	2	2378.4	55.41	0
	Irrational beliefs	2	6967.7	19.98	0
Simultaneous status and group effects	Metacognitive beliefs	2	224.7	5.23	0.006
	Irrational beliefs	2	9377.1	26.89	0
Error	Metacognitive beliefs	144	42.9	-	-
	Irrational beliefs	144	348.6	-	-

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metacognitive and irrational beliefs among students in the control group differs from those of the experimental group.

Therefore, the main hypothesis of this research, i.e., the effect of the P4C process-approach on irrational and meta-cognitive beliefs among students, was confirmed with 95% confidence.

Discussion

The research results showed that community-based process-approach P4C affects students' metacognitive and irrational beliefs in the experimental group compared with the control group. According to the confirmed hypothesis of the research, community-based class and challenging debates about tale contents at the end of the experiment significantly decreased the students' metacognitive belief scores in the components of cognitive supervision, positive metaworry, negative metaworry, superstition beliefs, penalty, and responsibility. Besides, the results revealed that the P4C process-approach at the end of the experiment significantly decreased the students' irrational beliefs in the components of helplessness to change, approval demand, problem avoidance, and emotional irresponsibility.

The findings of the current study are in line with those of Murris [23], Burns and Nettelbeak, [24] Khadem Sadegh and Faridouni [16], Worley [21], Endopheby and Madbula, Kalantari et al. [17], Asgari et al. [25] and Safaei Moghadam et al. [26], who showed that process-approached P4C or community-based P4C and debating challengeable questions, enhance deep thinking and rationality among children and replaces their negative beliefs with positive metabeliefs.

Negative metabeliefs include two broad categories: the beliefs related to the uncontrollability of thoughts and beliefs related to the danger, importance, and the meaning of thoughts. Such beliefs, due to inability in controlling thoughts and events on the one hand, and resulting in negative and threatening interpretations, on the other hand, make negative excitements to be continuous. P4C helps children in removing such metabeliefs from their minds and consequently reducing their worries and stress related to such beliefs. Furthermore, some researchers

believe that P4C improves rational thinking skills among children and diminishes their irrational beliefs.

This result implies theoretical and practical points in the field of prevention and treatment of anxiety. When individuals cannot control their worries and irrational beliefs, they consider themselves responsible for such thoughts. Then, to get rid of feeling guilt emerged from such thoughts, they blame and regard themselves deserved for punishment. This condition causes the defective cycle of chronic anxiety and no control over worrying thoughts. Regarding the famous saying of "prevention is better than treatment", it is crucial to detect harmful metacognitive and irrational beliefs among adolescent students to provide them effective self-regulative techniques and prevent anxiety disorders in them.

A review of literature with philosophical contents provides the arrangement for making a conversion and increases questioning power. Even if there is no answer to children's questions, it surprises them. Childhood is a momentous and vulnerable period of human life. Because many adults suffer from irrational beliefs and their consequences, it seems necessary to teach rational thinking to individuals in their sensitive period of childhood and adolescence and to hinder negative metabelief creation. According to the study results, a general change in teachers' teaching methods and the expectations of the education system from students are suggested to train children and correct their thinking process. Besides, it is suggested that a course on philosophy, thinking and rationality be included in the elementary school curriculum to make students practice thinking, organize their minds, think critically about their surrounded phenomena, and not get captured by negative irrational and metacognitive beliefs.

It is recommended to train teachers for debating on scientific topics philosophically instead of having unidirectional teaching. Revising the teaching method and philosophical deep education enables children and adolescents to control their mental processes, avoid negative thoughts and self-punishment, and stay safe mentally and behaviorally through positive cognition supervision. This study had some limitations such as sample selection difficulties due to predefined structure of school classes, insufficient time for holding more intervention sessions, lack of control over the internal validity of the research like simultaneous events during the study, participants' attitude toward stories and intervention method, as well as lack of follow up study for assessing the stability of intervention effects.

Conclusion

P4C can significantly affect metacognitive and irrational beliefs. In other words, P4C helps children in removing such negative beliefs from their minds and consequently reducing their worries and stress related to such beliefs. Also, P4C improves rational thinking skills among children and diminishes their irrational beliefs.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles were considered in this article.

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Authors' contributions

Study design: Turaj Falah Mehneh; Data collection and analysis: Turaj Falah Mehneh, Mohamad Yamini; Manuscript preparation, Reading and approval of the final version: All authors.

Conflict of interest

The authors declared no conflict of interest.

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