



## The effect of philosophy teaching on metacognitive and irrational beliefs among male students of elementary school

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### Abstract

Philosophy for Children (P4C) is a wonderful way of bringing teachers and children together to discuss things that matter. It has many benefits for both groups. The aim of this study was to evaluate the teaching process-approach of P4C effects on students' meta-cognitive and irrational beliefs by using experimental design with pre-posttest and control group. The statistical population consisted of all male students at sixth grade of elementary schools out of whom 50 students were randomly allocated to experimental and control groups. Measurement tools included meta-cognition questionnaire of MCQ-Cand Jones's irrational beliefs (IBQ-40). At first, pretest was done on both two groups. Then, 12 one-hour sessions of philosophy process-approach teaching was provided to the experimental group, while the control group did not receive any specific teaching during this period. At the end, posttest was done on both two groups. The findings showed that the use of a process approach in teaching philosophy has decreased the mean score of negative meta-cognitive and irrational beliefs among the students in the experimental group, however, there was no significant change in the control group. In other words, it can be concluded that P4C can affect the negative meta-cognitive and irrational beliefs.

**Keywords:** Metacognition, Philosophy, Rational, Student, Teaching

### Introduction

The modern world of today requires thinking. Since people who live in such society receive new and various suggestions, they should choose one of them. Therefore, the educational systems are required to not only depict a broad, rich and precise picture of the future but also to plan to develop the intellectual skills of young generation [1]. Students will face different phenomena in the unexpected world of the future. Thus, they must obtain the skills to enable them to control their lives and learn [2].

The distinctive characteristic of the 21st century education are initiative, autonomy, goal-setting and make goals balanced, activity control and independence, surveillance, problem-solving, conscious decision-making, active data search and the training of the learners who are equipped with self-regulated learning strategies [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 the effective factors on individuals' life quality [5,6]. The fundamental assumption of metacognition is that the thinking is not a reflection. It can be regulated and controlled through tact and contemplation, because people can assess their own responses and those of others and are able to direct their behaviors to meaningful goals [7]. According to meta-cognition theory, disorder in thinking and excitement is emerged 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 result in the continuation of negative excitement owing to the failure in controlling thoughts and events and also negative and threatening perception of mental events [9].

One of major problem that disturbs the process of thinking is the formation of irrational convictions in children. Irrational or illogical beliefs result in ineffective behavior and feeling which prevent people from achieving their desires or avoiding from what they don't want to do [10]. Initial maladaptive schemes or bases 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 which affect mental health negatively and those that affect it positively. 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 questioned the main elements of traditional education system [13]. Lipmann claims that philosophy for children 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 philosophy teaching 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 out of school [15]. Studies have shown P4C's efficiency in growing the 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 the 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 meta-cognitive views as well as rational values among children [21]. Reza Nezahd concluded that community research method affects the anger related to school and also the irrational beliefs of students at sixth grade significantly [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].

Not falling into the trap of impaired and irrational meta-cognitive 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 meta-cognitive and irrational beliefs among students in order to develop a pattern for reviewing and revising the curriculum.

### **Method**

This study was a experimental design with a pretest-posttest and control group in which the effect of independent variable (P4C process approach) on dependent variables

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(metacognitive and irrational beliefs) was measured. The statistical population of this research consisted of all male students of sixth-grade elementary schools in Torbat-e-Heydarieh city in northeast of Iran, 2016-2017. This research with code of 39301014 has been approved by the Research Council of Islamic Azad University, Bojnourd Branch on December 5, 2017.

The sample size was calculated with an error margin of 0.05, effect size of 0.5, and a test power of 80% as 50 participants. Thus, by using random cluster sampling method, six classes of three primary schools from different three geographic regions (north, south, and center of city) were selected. Then the irrational and meta-cognitive 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 group 25 participants). The inclusion criteria included the high average score for irrational and metacognitive beliefs at screening phase, be 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 researcher. The sessions were held out of school hours with the consent of learners and their parents. The first session was an introduction preparatory session for defining goals, motivation creation and pretest. The final session was also for acknowledgement and posttest. However, the other ten sessions were the main sessions in which the intervention was carried out according Table 1. The subject "debate plan" was provided in all sessions in the form of community research. Therefore, in order to measure the validity, a portion of a philosophical tale (after selecting about forty tales from Persian literature by researcher) was presented 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 in Mashhad proposed these stories based on the pre-mentioned criteria [19].

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

Session number	Session topic	Story	Reference	Author	Category
2	Presenting stories and discussions	Dog and cat friendship	Baharestan	Jami	Epistemology
3	Presenting stories and discussions	The secret of human creation	Tarikh-e-Tabari	Rezaei	Epistemology
4	Presenting stories and discussions	Donkey and jackal	Kalila wa Dimna	Monshi	Epistemology
5	Presenting stories and discussions	Ant desert	The stories of the Qur'an	Seyed Mohammad Sahafi	Ontology
6	Presenting stories and discussions	Master and student	Tazkirat al-Awliya	Attar	Ontology
7	Presenting stories and discussions	Back to the world	Kalila wa Dimna	Monshi	Ontology
8	Presenting stories and discussions	Man who has a herd	Qaboos Nameh	Onsor Almaali	Ontology
9	Presenting stories and discussions	Anoushirvan and Shogener	Shah nameh	Ferdowsi	Ethics and aesthetics
10	Presenting stories and discussions	Death or flogging	Baharestan	Jami	Ethics and aesthetics
11	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  
 The 'Ant on Paper' tale was read; a number of questions about this tale were chosen 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 requested to talk about their comments with reasons. Thus, the students were debated based of research community method. During this session the following issues were discussed:

What's the story's meaning and idea? How were the paintings on paper emerged? How did the pen created 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?

Children's Meta-Cognition Questionnaire (MCQ-C ) which is developed by Ghadery, Mohammadkhani and Hassanabadi based on Adolescents Meta-Cognition Questionnaire (MCQ-A) was used. In MCQ-C the subscale of cognitive confidence has been omitted [9]. The final MCQ-C comprises of 24 items and 4 sub-scales: cognitive supervision, positive meta-worry, negative meta-worry, and the sub-scales of superstition beliefs, penalty, and accountability. Each MCQ-C item is scored on a 4-level Likert scale from 1 (not agree) to 4 (totally agree). The MCQ-C scores range from 24 to 96 and the higher score indicates a higher negative meta-cognitive activity. The alpha coefficient was 0.87 for total scale and between 0.44 and 0.86 for sub-scales. At first, this scale was translated into Persian by researchers. Then, it was reviewed by four experts. Next, it was distributed on 100 students to measure face validity and examine the initial psychometric. Finally, after making the necessary corrections, the revised form was prepared to be performed on 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 Meta worry, negative Meta worry, superstition beliefs, penalty, and accountability and cognitive supervision was 0.76, 0.61, 0.58 and 0.68, respectively [22]. In the current study, the internal consistency of the questionnaire was equaled to 0.84 by calculating Cronbach's alpha.

*Jones's irrational beliefs scale:* The original version of this 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 [23]. They removed 60 of 100 questions after analyzing the subjects' responses, and provided four-factor structure. These four factors were: helplessness for change, demand for approval, problem avoidance and emotionality irresponsibility. The questions were on Likert's 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 Cronbach's alpha. Since the coefficients were more than 0.7, the questionnaire has enjoys of an acceptable internal consistency [23]. In the currents study, the questionnaire's internal consistency was calculated as 0.79 using Cronbach's alpha Data was analyzed using SPSS 20. The descriptive statistics (mean score/standard deviation), and inferential statistics (covariance analysis) was used. Therefore, the posttest mean scores were compared with adjusted pretest scores and the 0.05 significance level ( $p < 0.05$ ).

## Results

This study was carried out on the 50 male students of sixth-grade at elementary schools in Torbat-e-Heydarieh city, using experimental and control groups. The participants' age was about twelve years and their social-economic class was almost identical. The descriptive data is provided in Table 2:

**Table 2** Descriptive indexes of metacognitive beliefs and its components

Variables	Statistical groups	Test status (before and after intervention)	Mean	Standard deviation
Metacognitive beliefs	Control	Pretest	48.44	7.52
		Posttest	48.56	7.49
		Total	48.50	7.43
	Experimental	Pretest	46.32	6.86
		Posttest	38.60	5.70
		Total	42.46	7.36
Cognitive supervision	Control	Pretest	14.92	3.90
		Posttest	14.36	4.33
		Total	14.64	4.09
	Experimental	Pretest	13.32	4.48
		Posttest	10.84	3.44
		Total	12.08	4.14
Positive meta worry	Control	Pretest	11.32	2.82
		Posttest	11.40	3.27
		Total	11.36	3.02
	Experimental	Pretest	10.40	3.20
		Posttest	8.72	2.35
		Total	9.56	2.91
Negative meta worry	Control	Pretest	11.04	3.14
		Posttest	11.20	2.86
		Total	11.12	2.97
	Experimental	Pretest	11.96	3.59
		Posttest	9.80	2.80
		Total	10.88	3.37
Superstition beliefs	Control	Pretest	11.16	2.84
		Posttest	11.20	2.90
		Total	11.18	2.84
	Experimental	Pretest	10.72	3.02
		Posttest	9.24	2.40
		Total	9.98	2.80

First, to check data normality, we used 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 pretest and posttest was higher than 0.05. Thus, the distribution of studied variables for pretest/posttest was normal. Besides, the findings showed that the amount of Skewness and Kurtosis coefficient of all studied variables was in the safe interval (-3, +3). Then, to check the homogeneity of variables, Levene's test was used. The value of it 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 significance of independent variables in model. As seen in Table 4, the significance level for status type (pretest/posttest) was less than error level of 0.05 which indicates the effect of status (pretest/posttest) on model. Besides, the significance level of test for statistical groups (control/experiment) was less than the error level of 0.05 which presents the effect of statistical group type on model. Furthermore, the significance level of test for concurrent effect of group type with test status was less

than the error level of 0.05 which indicates the concurrent effect of statistical group and status

type (pretest/posttest) on the irrational beliefs and metacognitive variables.

**Table 3** Descriptive indexes of irrational beliefs and their components

Variables	Groups	Test status (before and after intervention)	Mean	Standard deviation
Irrational beliefs	Control	Pretest	140.16	17.18
		Posttest	139.24	15.47
		Total	139.70	16.19
	Experimental	Pretest	144.72	15.68
		Posttest	94.40	16.39
		Total	119.56	29.97
Helplessness to change	Control	Pretest	51.56	15.54
		Posttest	50.04	14.91
		Total	50.80	15.09
	Experimental	Pretest	56.20	13.22
		Posttest	40.12	15.26
		Total	48.16	16.29
Expectation of confirmation from others	Control	Pretest	36.48	9.54
		Posttest	35.64	8.93
		Total	36.06	9.14
	Experimental	Pretest	37.16	6.71
		Posttest	24.24	8.07
		Total	30.70	9.83
Avoiding the problem	Control	Pretest	16.32	3.22
		Posttest	18.60	3.48
		Total	17.46	3.51
	Experimental	Pretest	15.20	5.97
		Posttest	8.84	4.55
		Total	12.02	6.16
Emotional irresponsibility	Control	Pretest	35.80	9.48
		Posttest	34.96	7.87
		Total	35.38	8.64
	Experimental	Pretest	36.16	9.39
		Posttest	21.20	7.99
		Total	28.68	11.47

The overall mean of subjects' irrational beliefs scores in the experimental group in the posttest (94.40) decreased significantly

compared to the pretest (144.72), whereas in the control group no significant change occurred (Table 3).

**Table 4** Results of the Wilk's Lambda Test

Effects	Statistic amount	F	Significance level
Fixed amount	0.007	4776.452	0.000
Status type (pretest/ posttest)	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

Table 5, shows the main result of covariance analysis which helps in making decision about the effect of P4C process-approach on metacognitive and irrational beliefs.

1) Status type (pretest/posttest) affects

both metacognitive and irrational beliefs significantly ( $p < 0.05$ ). In other words, the mean score of metacognitive and irrational beliefs among students in pretest is different than those in posttest.

**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 (pretest/posttest)	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		

2) The statistical group type (control/experimental) affects both metacognitive and irrational beliefs significantly ( $p < 0.05$ ). In other words, the mean score of metacognitive and irrational beliefs among students in control group differs from those of experimental group. Therefore, the main hypothesis of this research, 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' meta-cognitive and irrational beliefs in experimental group compared with control group. Therefore, according to confirmed hypothesis of the research, community-based class and challenging debates about tale contents at the end of experiment significantly decreased the students' metacognitive belief scores in the components of cognitive supervision, positive meta-worry, negative meta-worry, superstition beliefs, penalty, and responsibility. Besides, the results revealed that P4C process-approach at the end of 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 is in line with those of Morris [21], Burns and Nettelbeak [24], Khadem Sadegh and Faridouni [16], Worley [20], Endopheby and Madbula, Kalantari and colleagues [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, enhances deep thinking and rationality among children and replaces their negative beliefs with positive ones Meta beliefs. Negative meta-beliefs include two broad categories: the beliefs related to 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 in one hand, and resulting in negative and threatening interpretations in another hand, make negative excitements to be continuous. P4C helps children in removing such meta-beliefs from their mind and consequently reducing their worries and stress related to such beliefs. Furthermore, some researchers believe that P4C improves rational thinking skill among children and diminishes their irrational beliefs. This results implies theoretical and practical points in the field of prevention and treatment of anxiety.

When individuals are not able to control their worries and irrational beliefs, they consider themselves the responsible of such thoughts. Then, to get rid of feeling guilt emerged from such thoughts, they blame themselves and regard themselves deserved for punishment. This, causes the defective cycle of chronic anxiety and having no control on worrying thoughts. Regarding the famous quote as “prevention is better than treatment”, it is crucial to detect harmful meta-cognitive and irrational beliefs among adolescent students to provide effective self-regulative techniques to them and prevent from the incidence of anxiety disorders in them. Literatures with philosophical contents provides the arrangement for making a conversion and increases questioning power. Even if there is no answer for children’s questions, it surprises them. Childhood is a momentous and vulnerable period of human life. Considering the fact that many adults suffer from irrational beliefs and its consequences, it seems necessary to teach rational thinking to individual in their sensitive period of childhood and adolescence to hinder from negative meta-belief creation among them. According to the study results, a general change in teachers teaching methods and the expectations of education system from students is suggested in order to train children and correct their thinking process. Besides, it is suggested that a course on philosophy, thinking and rationality be included in elementary school curriculum to make students practice thinking, organize their mind, think critically about their surrounded phenomena and not get captured by negative irrational and meta-cognitive beliefs. It is recommended to train teachers for debating on scientific topics philosophically instead of having a one-way teaching. Revising the teaching method and philosophical deep education enables children and adolescents to control their mind processes, avoid from 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 on internal validity of the research like simultaneous events during 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 be significantly effective on meta-cognitive and irrational beliefs, in other words, P4C helps children in removing such negative beliefs from their mind and consequently reducing their worries and stress related to such beliefs, also P4C improves rational thinking skill among children and diminishes their irrational beliefs.

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### **Authors’ contributions**

Study design: TFM

Data Collection and Analysis: TFM, MY

Manuscript preparation: TFM, MY, HM

All authors have read and approved the final version.

### **Conflict of Interest**

"The authors declare that they have no competing interest".

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### **Availability of data and materials**

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