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An Investigation into the Relationship between Pedagogic Inference Quality and Epistemic Cognition of Pre-School Teachers*

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ABSTRACT

Purpose: This study examined the relationship between pedagogic inference and the epistemological cognition of pre-school teachers. This paper provides and interests a relationship network with the pedagogy of field by delineating. In accordance with the model of this study, naïve and sophisticated epistemic cognition were determined and investigated whether these groups were comparable to pedagogic inferences quality, especially concerning validity, was compared. **Research Methods:** This research was designed as a qualitative case study conducted of Epistemic Cognition Scale (ECS) and Pedagogical Inference Interview Form (PIIF) as a tool to measure critical thinking capability. Compliance sampling was used in this study. This study included 68 pre-school teachers who enrolled Inegol district of Bursa province in the 2018-2019 academic years. The data were gathered using interview transcript and vignette questions. **Findings** The findings revealed that there were positive relationships between pedagogical inference quality and epistemic cognition of pre-school teachers. In addition, results showed that the quality of pedagogical inference is an alternative in capturing the individual's epistemology. pre-school teachers. In addition, results showed that the quality of pedagogical inference is an alternative in capturing the individual's epistemology. Implications for Research and Practice: Pedagogic inference quality can be an effective new parameter in teacher training. The relationship between this parameter and pedagogical content knowledge in teachers ' cognition with the other parameter may create a new corpus for teacher training studies.

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Introduction

What is knowledge? How do we acquire knowledge? How do we know what we know? Individual who role notions of knowledge and knowing play in the continuum and how viewpoint change over time? Epistemology, also known as the philosophy of knowledge, is formed by the combination of the Greek episteme (ways of acquiring knowledge or knowledge) and logos (theory, discourse) (Kitchener & Anderson, 2011). Epistemic cognition is a common term used to describe a mental process that employs person's notions of knowledge and knowing (Hofer, 2016). Teachers' epistemic cognition is related to how they conceive of teaching (Brownlee et al., 2017). Epistemological cognition, which is a part of teacher belief system, is a parameter that shows teachers' questioning and inference skills. Cognition and inference, two terms in this paper are used purposively and distinctively.

The vast majority of research what teachers know and how they make use of their knowledge to accomplish the work of teaching has been a subject of interest for researchers, teacher educators and educational policymakers (Guerriero, 2017). Teacher knowledge is paramount evidence that what a teacher knows impacts the quality of classroom instruction and hence students learning (Baumert et al., 2010). 'Justification' is seen to closest area to epistemology (Hofer & Pintrich, 1997). Justification is clearly revealed to search for evidence of an event and to make inferences in light of this evidence. When 'justification' is mentioned, 'inference' comes to mind. As such, pedagogical inference quality is an important province of knowledge within the professional base of teachers when epistemic cognition arises during the enactment phase of learning. Pedagogical inference quality, knowledge and pedagogy needed for teacher to teach lesson topics for enhanced pupils achievements (Gess-Newsome, 2015). The notion of pedagogical inference quality has also been put forward by Akyürek (2018), who assumed that facilitate to examining what teachers do and do not know about the teaching of lesson topics and provide useful feedback about the target epistemic cognition appraisals processes.

Education policies predict that preschool teachers should focus on learning progress significantly in their epistemic cognition and in their pedagogic skills throughout their school life. Additionally, this research in worldwide is rare. This study deals with whether there is a network of relationships between pedagogical inference and epistemic cognition.

The primary aim of this paper is to explore the relationship between pre-school teachers' epistemic cognition and pedagogical inference. In line with this general objective, this study sought to answer the following research questions:

1. How epistemic cognition can guide pre-school teachers' reasoning across teaching life?
2. How do these reasoning align with and account for pre-school teachers' pedagogical inference quality and epistemic cognition?

The literature relies heavily on measure epistemic beliefs both the number of complexities and the number of statements in the scale items and that the analysis

takes a long time, the uncertainties of analyzes reduce the usefulness of these measurement tools (Hofer, 2016; Hofer & Pintrich, 1997). Philosophical theories of epistemic beliefs have considered justifications (Schraw, Brownlee, Olafson, & Brye, 2017). When the current literature is examined from appraisals, it is seen that justification is considered as one of the four dimensions that is only for knowledge. With existing measurement tools, with limited number and non-contextualized items, justification is tried to be measured, given that the validity, reliability and accuracy of the knowledge should be taken into account (Bernecker & Pritchard, 2014; Morton, 2003; Talbot, 2016). This situation could not be reflected in the survey items. In this context, the researcher considers the question of the authority in comparative research conducted by a scientist (the scientist as a professor), the certainty of the knowledge (for example, the study has not yet been published, the measurement tools used and the insufficient knowledge about design) and justification (limitation on validity and reliability of the study, method of the study, the findings, the results and harmony problems between implications) are asked to make inquiries and draw conclusions. In the relevant literature, various measuring instruments are used to measure epistemological beliefs, including qualitative and quantitative.

According to Mason (2010), interview and scenario type measurement approaches should be used besides traditional measurement tools. Even more troubling is the evaluation upheaval caused by Likert-type measurements and classified schemas are not a dynamic process for capturing information on teacher competence, and document type measurements are unsuccessful in critical thinking and questioning information (Sinatra, 2016). Hence, it was proposed to implement models that would lead to critical thinking rather than these scales (Chinn & Buckland, 2012; Lombardi, Sinatra & Nussbaum, 2013). Likert-type scales can be considered inappropriate instruments for homogeneous critical thinking samples because of a threat to the reliability issue. Also, Likert-type scale may be unable to capture more than two perspectives represented at the edges of the Likert continuum (authority is certain or insignificant).

Method

Research Design

In this study, there is a short scenario in which video-assisted education and traditional education are compared whether to increase science achievement of students who have difficulty in learning or not and there is only one question which is that participants question the correctness of the inference made by the scientist at the end of the scenario. Qualitative case study is useful for revealing new ways in which teachers' aspects of epistemic cognition. Thus, a case study was used in this research. This method allows for an in-depth and short-time study of one aspect of the researched problem. Case study research refers to an in-depth, a detailed study of an individual or a small group of individuals. Such studies are typically qualitative in nature, resulting in a narrative description of behavior or experience. Case study research is not used to determine cause and effect, nor is it used to discover

generalizable truths or make predictions. Rather, the emphasis in case study research is placed on exploration and description of a phenomenon (Gorman & Clayton, 2015). The main characteristics of case study research are that it is narrowly focused, provides a high level of detail, and is able to combine both objective and subjective data to achieve an in-depth understanding (Creswell, 2013).The data that were obtained from short scenario in which video-assisted education and traditional education were compared whether to increase science achievement of students who had difficulty in learning or not. Also, semi-structured interviews were analyzed from teachers' pedagogical world by the case study method. Code that qualifies similar situations from the codes was created. Themes of the research have been created from these codes (Yıldırım & Simsek, 2013). In accordance with the model of this study, naïve (7, 6, 5 point) and sophisticated (1, 2, 3 point) epistemic cognition were determined from epistemic cognition scale (ECS). Afterwards, these groups were compared according to pedagogical inferences quality.

Research Sample

This study included 68 pre-school teachers who enrolled Inegöl district of Bursa province in the 2018-2019 academic years. Convenience sampling was used in this study (Büyüköztürk, 2006). Accordingly, the universe of the research composed of 76 pre-school teachers working in Inegöl district of Bursa province, where the author worked as a science teacher. Eight teachers did not agree to participate in this research. The sample of this research consisted of 68 pre-school teachers in this universe. The data were gathered using interview transcript and vignette questions.

In the determination of 10 people from these 68 participants, epistemic cognition scales (ECS) detailed in the next section was used. Total of general scale 12 items, (Pedagogical Inference Interview Form 'PIIF' = 11 items, ECS = 1 item) was used by the researcher at a seminar meeting in Inegöl district of Bursa in September 2018.

In accordance with the model of this study, naïve and sophisticated epistemic cognition was determined and investigated whether these groups were comparable to a dependent variable called pedagogical inferences quality. In this context, individuals who were sophisticated (5 teachers) and naïve (5 teachers) for epistemic cognition (10 teachers in total) were selected. In the epistemological cognition section, the highest (5 teachers) and lowest scores (5 teachers) were determined as individuals were naïve epistemic cognition and sophisticated epistemic cognition. In the next stage, one-to-one semi-structured interviews were conducted with selected individuals (10 teachers in total) using the PIIF.

Research Instruments and Procedures

Interview form and vignettes were used in this research.

Interview Form

Interview form facilitates one's personal beliefs and access to the researcher's process of creating meaning. This form includes basic questions about the nature of knowledge. Semi-structured interview questions in developmental studies were

frequently used models. In addition, these interviews reflect the epistemic assumptions of individuals; it consists of a series of interviews, especially information about the beliefs of the 'Is knowledge certain?', 'What are the sources of knowledge?' (King & Kitchener, 1994). Interview forms also provide a mean of deep understanding how instructional practices are interpreted pedagogically.

For the validity of the ECS prepared by the researcher, two Science Education experts with studies on epistemology and three language experts with studies on grammar and narrative disturbances were consulted. One of the language expert stated that there were expression disorders in a few places in the question and this problem was solved in line with his suggestions. The next phase, ECS was applied to a group of nine people, including four teachers working in middle school where the researcher in employed, and five senior teachers in Bursa Uludag University, Faculty of Education, Department of Pre-School Education and after the applications, the participants' opinions about the comprehensibility and ease of implementation were taken. All participants agreed that the scale was clear, understandable and easy to evaluate. Interview form took approximately 15/20 minutes.

Vignettes

An education psychologist Kuhn (1999), who has studies on cognitive development has benefited from vignettes. In these vignettes, the participants were given a controversial case scenario, and they were asked to make reasoning about the nature of the knowledge in the scenario.

Vignettes were involved in a comparative educational science study (video-supported education or traditional education) which was frequently included in the teachers' own pedagogical lives and they were asked to make a judgment on a situation close to their professional life. It took five minutes in average.

Determination of Naïve and Sophisticated Individuals concerning Epistemic Cognition

In determining the highest and lowest scores in the epistemological cognition scale (ECS) developed by Akyürek (2018), the participants were observed in the single question to point out on a 7 point Likert-scale ranging from 1 (I am not sure at all), 2 (I'm not sure), 3 (I'm little sure) to 4 (I'm neutral), 5 (little sure), 6 (I am sure), 7 (I am very sure). The sophisticate participant represents (1, 2, or 3 score), naïve one represents (5, 6, or 7 score). The 7-point Likert scale is one of the most preferred likert scales. To increase the variation in this study, a 5-point Likert scale was not selected intentionally. Since the participants were thought to answer only one item, the 7-point scale was chosen to keep the response range wide. As in the case of Kuhn (1999),it is dinosaur. Five random individuals were selected from 17 teachers who scored 7 points for the naïve epistemic cognition (NEC) group. For the sophisticated epistemic cognition group (SEC), a group of five people has been formed; all of whom received 1 point, one who received 2 points, and one who was randomly chosen from five teachers who received 3 points. The analysis of the data took place in two stages. Firstly, the encodings of ECS participant teachers were entered into the SPSS program

in figures. Using these total scores, Scatter Plot graph was created for the ECS; five individuals with high-epistemic reasoning (sophisticate) and low-epistemic reasoning (naïve) groups (10 in total) were selected from the individuals who selected the highest and lowest scores.

In the second phase of this study, the voice recordings of the semi-structured interviews made with the selected 10 persons in the scope of PIIF were listened and transcriptions were created. In these transcriptions, teachers are asked to examine the quality of pedagogical inferences in each question in the PIIF.

In Table 1, some characteristics of teachers who form sophisticated and naive groups of epistemological cognition are given.

Table 1

Information on the profile of teachers determined by the Epistemological Cognition Scale (ECS)

Teacher	Gender	Experience	School	ECS Score	Education
NEC-1	Female	3	A	7	Undergraduate
NEC-2	Female	9	B	7	Undergraduate
NEC-3	Male	26	C	7	Undergraduate
NEC-4	Female	4	E	7	Undergraduate
NEC-5	Male	23	B	7	Undergraduate
SEC-1	Female	21	A	1	Undergraduate
SEC-2	Female	14	D	2	Undergraduate
SEC-3	Male	13	F	3	Undergraduate
SEC-4	Male	11	E	1	Master Degree
SEC-5	Male	16	G	3	Undergraduate

NEC: Naïve Epistemological Cognition SEC: Sophisticated Epistemological Cognition ECS: Epistemological Cognition Scale

PIIF was developed by Akyürek (2018). In PIIF, the participants were applied arguments based on pedagogical inferences that teachers might frequently encounter in their daily lives about pedagogical situations. Some of these arguments are inductive; some are deductive, while others focus on inferential errors. In this context, 11 arguments were applied and certain pioneers about pedagogical situations and inferences were made based on these pioneers. These arguments were shown to each participant and after reading each argument, it was questioned how logical or powerful the inference in the relevant argument was. In addition, in a question providing a test of perception of authority, it was tired to determine the logic errors and the quality of the pedagogical inference of the participants. Also, the questions in PIIF were asked to teachers in the schools of the teachers chosen in semi-structured

interview format and in a non-noise environment and sound recordings were recorded during the interviews.

Data Analysis

The data were analyzed in two stages. For the one-item ECS, sophisticated epistemic cognition and naive epistemic cognition groups (10 in total) were formed from individuals who selected the lowest and highest scores.

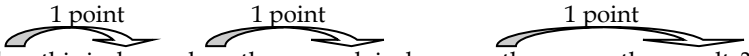
In the second stage of this study, audio recordings of semi-structured interviews with 10 selected teachers were listened and transcribed. In these transcriptions, the teachers were asked to examine the pedagogical inference for an argument given in each question in terms of quality. In this research, the parameters, such as logic and power of inferences, logical errors and authority perception (Bernecker& Pritchard, 2014; Morton, 2003; Talbot, 2016) were questioned. In the responses given by teachers, the themes, such as accuracy, traceability, measurement-internal-external validity and reliability (Bernecker& Pritchard, 2014; Golafshani, 2003; Morton, 2003; Talbot, 2016), which enabled the validity of the conclusions to reveal pedagogical inference quality, were considered and an instruction was prepared for each argument. The participant received one (1) point for each logical or resourceful provider expressed independently in the themes included in the directive. In the following example, a question in the pedagogical inference interview form shows a score for the expression of a teacher with four (4) points concerning pedagogical inference quality.

Argument 2: *A science teacher should share his authority with their students, so that the students in the 11-14 age group are enough to establish their own authority.*

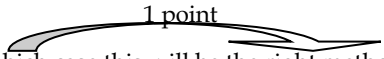
<u>To what extent do you think a reasonable inference</u> is made when you consider the above statement?

Directive: This idea is seen as a situation that differs according to the person's point of view. The credibility of such a situation should be discussed. Because it is not stated who is doing this, whether the benefit is seen or not. In addition, the student's authority to set up his authority does not mean that the teacher shares his authority with his student. If the students establish the authority themselves, no information is given regarding the negative consequences. Errors in the logical sequence should also be examined.

Sample teacher's answer and rating:



Of course, when this is done where the research is done, are there any other results?



In which case this will be the right method, and in which case it will not be important, of course.

Results

In this section, the comparison of epistemic cognition (Naïve/Sophisticated) concerning quality of pedagogical inferences of low and high individuals is made, and then sample statements that justify this comparison is given. In this context, in Figure 2, the pedagogical inference qualities of individuals with naïve and sophisticated epistemic cognition are shown with root models.

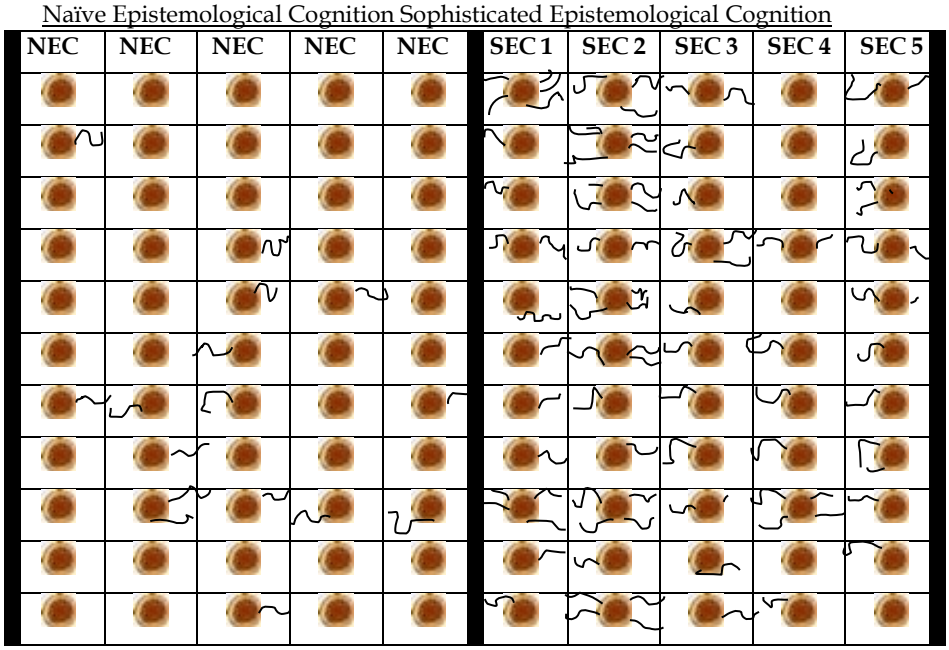


Figure 2. *Comparison of Epistemic Cognition Concerning Pedagogical Inference Qualities of Naïve and Sophisticated Individuals*

*In this paper, it is proposed a model for each root model in which each root model corresponds to a score obtained in terms of pedagogic inference quality, which is queried for 11 questions from the model. For example, in the first question, individuals with naive epistemic cognition received 0, 0, 0, 0, 0, whereas individuals with sophisticated epistemic cognition received 5, 3, 2, 0 and 2 points.

Figure 2 shows the differences in the quality of pedagogical inferences in individuals with naïve and sophisticated epistemic cognition scores as determined by ECS. It was observed that there were prominent differences in the quality of pedagogical inferences among individuals with naïve and sophisticated epistemic cognition scores compared to PIIF. On the other hand, it was observed that epistemic cognition was important determinants in the quality of teachers' pedagogical inference.

Sample Statements

Argument 1 in PIIF: *According to statistics, 90% of the science teacher candidates said that they chose the profession as a guarantee job. This situation means it will more reduce the quality of science education in schools in a short time in Turkey.*

To what extent do you think a strong inference is made when you consider the above statement?

NEC: Person with Naïve Epistemic Cognition **SEC:** Person with Sophisticated Epistemic Cognition

NEC-4 (0 points) did not focus on any factors related to validity and reliability. This situation: *I strongly agree with this statement…* from the statements.

SEC-1 (5 points) exhibited a strong epistemic cognition at all points in the directive. The nature of Statistics, the selection criteria of sampling, the accuracy of the premise, the premise of the result, and the multiple causal approaches showed trials in five main points cognition. These situations: *How statistics are determined, i.e., an assignment to the result we got or a way of being taken by a certain number is not a warranty profession because I disagree with the notion that determining the need. The quality of education does not fall with this and does not rise because we don't know if this is a factor...*could be observed in expressions.

Argument 2 in PIIF: **SEC-2** (5 points) was asked by the person through the self-inquiry process; where it was done, when it was done, the scope validity, the method, in which case it was true that it showed strong epistemic cognition in five basic points. This situation*: It is important that this research is carried out, when it is done, in which case it will be the correct method, in which case it will not be, and in which case it will be important [….]* in his statements that he tried the argument and was looking for evidence.

Argument 3 in PIIF: **SEC-2** (5 points) showed five main points, including multiple causal approach, accuracy of statistics, selection criteria of the sample, accuracy of the premise and follow-up of the result. These situations: *Yes, Selim was successful here because of the correct work, because each student has own work, and the visual work has different questions and visual work has different applications. If he wants to succeed, these conditions may have changed.He has set a target for himself, and it may have influenced the note.Of course, it is also important to increase the number of questions. Hımm […] It affects the transfer of information to long-term memory, but I think it is not correct to do such a generalization over a person, how many participants have done this thing when it was done by those who did it again.* It is understood from his statements.

Argument 4 in PIIF: **SEC-3** (3 points) showed strong epistemic cognition at three points: Internal validity of measurement, precursors of inference, and multiple causal approaches. These statements: *The child may be psychologically motivated, excited, and able to be more successful in children who study less, and who are more successful in the current exams, less information, more interpretation, more intelligence, more perception, and more in this respect, more successful in studying here […]*

Argument 5 in PIIF: **SEC-2** (4 points) has made a strong epistemic judgment at all four points, including the lack of appropriate analogies, the nature of qualitative and quantitative approaches, and the absence of findings and multiple causal situations: *But here, if the subject of research is done again, it is a logical inference to see; how different students affect teachers, how they affect their lifestyle, how they affect the choice of profession, how they choose a role model.But since they are not here, there can only be a qualitative inference.It's not a quantitative one because we didn't choose the research topic and we didn't do a literature review.I can't say it's like clock.Because if we think of the student who has only a mechanical sense of time and who is only working the task, like the hour, we think that his social life or the only duty is to work.But I cannot expect the student to study in all respects, whether it is social aspects or emotional characteristics.Therefore, it is not only effective when the teacher spends time in school, but also when he spends outside the school.Therefore, in this respect, there is of course the truth that there are students who change life with the interest of the teacher.But not just the teacher today.Because his friends are also influential around him…*

Argument 6 in PIIF: **SEC-2** (3 points) answered the question, he made strong three points epistemic cognition, which reflected the different perspectives of the people, the question of research was unclear and tested and recorded. This situation: *Yes I think it is correct when you look at these two views from different angles. I mean, both academics here have looked at it from a different angle.Here is one of the research topics, in a lab environment, children's lecture, or learning technique to what extent is the success?If we look at that aspect, Mr. Usal's opinion may be correct, but when it is done by Mr. Mehmet Sarı on another view, this is another research topic, which is the appropriate sampling, research topics are selected and the experiment is done, monthly average income is low so that the result can be extracted. You know, I think it has two perspectives. And if these methods have been applied and this result has been obtained, I think both are effective.* It is understood from the expression.

Argument 7: **SEC-3** (1 point) stated that it was necessary to continue to ask questions by evaluating the bias in the argument with a correct approach and at one point made strong epistemic cognition. This situation: *Mehmet may not be lazy, but perhaps a different child. His perception may be different. Mehmet's approach may be different. It should not directly qualify him as a lazy. I think laziness may be thought of as a limit to the time allocated to class. But if the child is doing his best, he can make different efforts; if he endeavors to the extent that he has the power, the idea may be different. The difference of his thought should be to reveal other situations in the mind-structure of the child. Maybe, we can come across other things, or maybe the horizon is a lot further away, so sometimes we get very interesting answers from the questions we ask young children, and sometimes we get interesting answers from different children in different children. It is not right to qualify as lazy, so I do not agree with this idea.*

Argument 8 in PIIF: **NEC-5** (0 points) directly accepted the stated correlation: *If he loves nature, he likes science, first of all, that is, he needs to love nature that he needs to look at it, that he needs to live, that he has to succeed in science. An evaluation on paper may not be true. First of all, science class needs to love nature, so I have a logical inference.*

SEC-5 (2 points) made strong epistemic reasoning at two points related to both the validity of the scale and the accuracy of the premise. This situation: *He could be a lot better than science, but he could throw garbage out there. The love of nature is something else.*

Once the nature is protected for the love of nature to be in humans when it is not polluted, nature begins to be protected when it knows what benefits it and its future will gain. Not with love, in fact, what a beautiful flower insect the Greens say, but the scale of love can be 100 out of 100 and do not fit. What is the content of the scale?

Argument 9:

SEC-1 (4 points) found logic errors for each of the given situations and made strong epistemic reasoning at four points. This can be seen in the following statements:

Teacher 1: The Science course is not only teacher-oriented. Teachers who do not know how to take advantage of the part of the technology that can be applied to the Science course cannot be a teacher of science. It's a little old-fashioned mind, this is logic error. (The natural and the old are good logic to be wrong).

Teacher 2: this teacher is already an unskilled teacher because he has no idea of his own. He didn't specify a training opinion.

Teacher 3: this teacher considers the SMART board as just a game and video, and he gives up his probation instead of trying to show his students how to use the smart board. An easy and conservative personality has been convicted.

Teacher 4: passive teacher type prepreader an easy-to-understand personality teacher who cannot even put forward his own idea of the students already cannot be successful why restrict the two options so that there are a lot of options in the teacher…

Argument 10 in PIIF: **SEC-1** (1 point) stated that a large generalization could not be made and made strong epistemic cognition at a single point. This situation is understood from the following statements: *In village schools, there are successful students. However, there are a lot of deficiencies. Many of them don't have a lab, no science teachers, smart boards are getting late. So yes, there are successful students. However, it is not true to say success in general. So I'm gonna say I don't think it makes sense.*

Argument 11 in PIIF:

SEC-2 (4 points) made a strong epistemic cognition at four points in terms of the use of research data, the existence of sufficient evidence, the precursors of generalization and the magnitude of generalization. This situation: *There was similar research data. Here, in the mathematics lesson, some lessons on science subjects, whether the speed of some issues, of course, of course, this is based on mathematics course. However, some of the subjects of science, based on mathematics as a preliminary step, if we think of this success in mathematics may bring success in science. In some subjects of a science lesson, such generalization happens in some of them. There is no generalization in every subject, and although they require knowledge of mathematics, they may not go to the next stage. Although such a generalization is made, there is a very inadequate inference. You cannot make such a generalization of the subject of Science in every field. Not a very strong deduction. We cannot make such a generalization in all students.*

Discussion, Conclusion and Recommendations

In this study, the relationship between the epistemic cognition of pre-school teachers and the quality of pedagogical inference was examined. In this process, teachers who scored lower and higher from epistemic cognition compared concerning their pedagogic inference quality. The findings obtained in this study revealed that the pedagogical inference quality of individuals with naive epistemic cognition was also low, and the pedagogical inference quality of individuals with sophisticated epistemic cognition was also high. Vignette type measurement is the most powerful compared to traditional measurement instruments (Mason, 2010). Survey is not a dynamic process in capturing data to teacher qualification, and document type measurements in thinking and questioning information are not successful (Sinatra, 2016). Therefore, it cannot be denied that teachers have a relationship with pedagogical inferences, which include situations they encounter or may encounter in their daily lives. This result suggests that the quality of pedagogical inference can be an effective parameter in teacher education.

The results of this study showed that participants with sophisticated epistemic cognition paid more attention to situations, such as numerical data and evidence search in pedagogical texts, they were successful in finding logical errors, and they were able to capture the situations that were wrong in a vignette premise proposition. On the other hand, it has been observed that in pedagogic inferences, they test whether or not the result is related to the premise, they perform all the development tests in the form of truth-truth inference, and they can distinguish all the inferential inferences from each other. In addition, it has been revealed that they have multiple cause perception, questioning the accuracy of their analogy in a given sample, questioning the validity and reliability of the presiding judgment and not being influenced by authority. It was determined that the participants with naive epistemic cognition focused on the premise story and tried to relate it to what they experienced in their lives, influenced by authority, restricted in finding logical errors, limited in their validity and reliability processes, and were not willing to seek evidence and data. Thus, in-service training needs of teachers should be considered for their own professional development (Aktekin, 2019).

Limitation that observed in the epistemological belief literature is measurement compliance problems (Kaiser, 1996). Existing researches still fail to pass these problems. Researchers have taken many variables as a dependent variable from the success to the attitude in the studies they took as epistemic beliefs as independent variables. This choice has led to the creation of limited models that are not directly linked to each other and are probably influenced by many other mediator variables. The inferences in these questions and the process and inferences of ECS are the structures that are considered to be closer than similar relationship models in the literature.

Concerning the results obtained from this study, the following suggestions were developed: It has been observed that teachers with sophisticated epistemic cognition may have more effective pedagogical inferences and judge the veracity of information.

This causal relationship can be traced up to class and epistemic cognition-pedagogical inference-practice triplets can be studied. Pedagogic inference quality can be an effective new parameter in teacher training. The relationship between this parameter and pedagogical content knowledge in teachers' cognition with the other parameter may create a new corpus for teacher training studies. A growing body of research shows that epistemic cognition and pedagogic inference parallel structures in teachers' professional learning measurement and classroom practice reflection. The studies are limited with the Turkey sample. In future studies, the studies in different cultural areas and populations will be effective in seeing the validity of the scale in a cultural context. The ERS can be used in conjunction with the epistemic scale of belief to test the interaction of judgment-faith and how this interaction is interrelated.

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Okul Öncesi Öğretmenlerinin Epistemik Muhakeme ve Pedagojik Çıkarım Kaliteleri Arasındaki İlişkinin İncelenmesi

Atıf:

Akyürek, E. (2021). An investigation into the relationship between pedagogic inference quality and epistemic cognition of pre-school teachers. *Eurasian Journal of Educational Research, 92,* 167-184, DOI: 10.14689/ejer.2021.92.9

Özet

Bu çalışma okul öncesi öğretmenlerinin pedagojik çıkarım kaliteleri ve epistemolojik çıkarım kaliteleri arasındaki ilişkiyi inceleyerek öğretmenlerin verilen bilgiyi sorgulama becerisini araştırmaktadır.

Problem Durumu: Epistemik inançlar literatürünün zayıf kaldığı bir alan olarak gerekçelendirmeler gösterilmektedir (Schraw, Brownlee, Olafson, & Vandervelt, 2017). Mevcut literatür incelendiğinde gerekçelendirmenin sadece bilgiye yönelik dört boyuttan biri olarak ele alındığı görülmektedir. Var olan ölçme araçlarında kullanılan yetersiz sayıda ve bağlamsallaştırılmamış maddelerle (bilginin kanıtlara dayalı olması, insanın kendisinin bilgi üretmesi vb.) gerekçelendirme ölçülmeye çalışılmaktadır. Oysa epistemik muhakemede çıkarım yapma ve gerekçelendirme temel bir yere sahiptir. Özellikle çıkarım yapma dikkate alındığında bilginin geçerliliği, güvenilirliği ve doğruluğu gibi boyutlarının dikkate alınması gerekmektedir. Bu durum ise anket maddelerine yansıtılamamıştır. Bu kapsamda ölçekte katılımcıların bir bilim insanının yapmış olduğu kıyaslamalı çalışmada otoritenin sorgulanması (bilim insanının profesör olması), bilginin kesinliği (çalışmanın henüz yayınlanmamış olması, kullanılan ölçme araçları ve dizayn ile ilgili yetersiz bilgiler verilmesi, vb.) ve gerekçelendirme (çalışmanın geçerliliği ve güvenilirliği ile ilgili sınırlılıklar, çalışmada yöntem, bulgular, sonuçlar ve çıkarımlar arasındaki uyumda problemler) ile ilgili sorgulamalar yapmaları ve bir sonuç çıkarmaları talep edilmektedir.

Öte yandan son zamanlardaki araştırmalara bakıldığında epistemolojik inançların bağımsız değişken olduğu ve alan bilgisi gibi bazı eğitim parametrelerinin bağımlı değişken olduğu yordama modelleri ön plana çıkmaktadır. Mevcut çalışmalarda

'genel bilgi'yle ilgili inançların yerine fizik bilgisi ya da tarih bilgisi ile ilgili inançların kullanıldığı gözlenmektedir. Ancak tarih bilgisiyle ilgili inançlar ile tarih başarısının yordanması sınırlılık yaratan bir durumdur. Bir tarafta "fizik sorusunun çözülmesi" ile diğer tarafta "fizik bilgisi kesindir" ifadesine katılıp katılmama durumunun sınanması uyum sıkıntısının olduğunu göstermektedir. Öte yandan epistemik inançlar mı soruların çözümünün nedeni, yoksa soruların çözülmesi mi inançların nedeni hâlen cevabı verilmemiş bir soru olarak bulunmaktadır. Başka bir deyişle epistemik inançlardan bilgi üretme ve kullanmaya giden süreçte başka ara değişkenlerin düşünülmesi gerekmektedir. Bu kapsamda bu çalışmanın bir diğer önemli noktası epistemolojiden bilgiye gidebilecek süreçte bir ara parametre olarak 'çıkarımlar'ın ilişkisi araştırılmıştır. Çünkü insanların günlük hayatta karşılaştıkları olaylarla ilgili çıkarım yapma gereksinimleri bulunmaktadır. Bir olayla ilgili kanıt aramak ve bu kanıtlar ışığında çıkarım yapmak epistemolojik bilişi açık bir şekilde gün yüzüne çıkarmaktadır. Öğretmenler birçok kararında var olan kanıtlar ve muhakemeler üzerine çıkarımlar yapmakta ve bu çıkarımları ya arkadaşlarıyla ve öğrencilerle paylaşmakta ya da bu çıkarımlara uygun kararlar almaktadır. Bu kapsamda bu çalışmada epistemik inançların yordayabileceği bir değişken olarak pedagojik çıkarımlar üzerine bir ölçme yapılmıştır.

Araştırmanın Amacı: Bu çalışmanın amacı epistemolojik inançlarla ilgili var olan ölçme araçlarıyla aynı işi yapabilen ancak uygulanması daha kolay ve tek soruyla epistemolojik muhakemeler ile ilgili bilgi sahibi olunabile Apistemik Muhakeme Ölçeği (EMÖ) ile okul öncesi öğretmenlerinin belirlenen örneklemde epistemik muhakemelerini belirlemektir. Bunun yanı sıra öğretmenlerin tespit edilen muhakeme durumlarının "pedagojik çıkarım kalitesi" ile uyumunun olup olmadığının incelenmesi amaçlanmaktadır.

Araştırmanın Yöntemi: Araştırma durum çalışmasıdır. Epistemik Muhakeme açısından düşük ve yüksek bireylerin belirlenmesi: Araştırmacı tarafından geliştirilmiş olan Epistemolojik Muhakeme Ölçeği (EMÖ)'nde en yüksek ve en düşük puan alan bireylerin belirlenmesinde katılımcıların tek soruda 1 (Hiç emin değilim) ile 7 (Çok eminim) arasında hangi rakamı işaretlediklerine dikkat edilmiştir. Epistemik muhakeme-düşük grubu için 7 puan alan 12 kişiden rastgele beş kişi seçilmiştir. Epistemik muhakeme-yüksek grubu için ise 1 puan alan iki kişinin tamamı, 2 puan alan tek kişi ile 3 puan alan dört kişiden rastgele seçilen ikisi olmak üzere beş kişilik bir grup oluşturulmuştur. Buna göre Epistemik muhakemesi yüksek olan öğretmenlerden birinin yüksek lisans yaptığı diğer dört öğretmenin lisans mezunu olduğu görülmektedir. Ayrıca bu öğretmenlerin meslekte on ila yirmi yıl arasında deneyime sahip olduğu ve dört kadın bir erkekten oluştuğu görülmektedir. Epistemik muhakemesi düşük olan öğretmenlere bakıldığında tamamının lisans mezunu olduğu ve beş kadın öğretmenden oluştuğu görülmektedir. Mesleki deneyimlerine bakıldığında iki öğretmenin henüz mesleklerinin ilk yıllarını (iki yıl) yaşadıkları diğer öğretmenlerden birinin yirmi beş yıl üzeri deneyime sahip olduğu diğer iki öğretmenin ise on ila yirmi yıl arası kıdeme sahip olduğu görülmektedir. Aynı zamanda katılımcıların EMÖ toplam puanı en yüksek yani Epistemik Muhakemesi Düşük beş kişi ve EMÖ toplam puanı düşük yani Epistemik Muhakemesi Yüksek beş

kişi belirlenmiştir. Belirlenen on kişilik gruba Pedagojik Çıkarım Görüşme Formu uygulanmıştır. Çalışmanın ikinci aşamasında ise seçilen 10 kişi ile PÇGF kapsamında yapılan yarı yapılandırılmış görüşmelerin ses kayıtları dinlenmiş ve transkriptler oluşturulmuştur. Bu transkriptlerde öğretmenlerin PÇGF'de yer alan her bir sorudaki pedagojik çıkarımları kalite açısından incelemeleri istenmiştir. Son olarak Epistemik muhakemesi düşük ve yüksek bireyler Pedagojik çıkarım kalitesi açısından kendi aralarında kıyaslanmıştır.

Araştırma Bulguları: Araştırma sonucunda pedagojik çıkarımları yüksek olan okul öncesi öğretmenlerinin epistemik muhakemelerinin de yüksek olduğu, pedagojik çıkarımı düşük olan okul öncesi öğretmenlerinin epistemik muhakemelerinin de düşük olduğu ortaya çıkmıştır. Araştırmadaki bir diğer önemli nokta EMÖ'nün epistemik muhakemenin en yakın olduğu kavram ve epistemolojinin de ana parametresi olan gerekçelendirme üzerine kurgulanmış olmasıdır. Çünkü gerekçelendirme boyutu epistemik inançlar literatürünün zayıf kaldığı bir alan olarak görülmektedir (Hofer, 2016; Schraw, Brownlee, Olafson, & Brye, 2017).

Araştırma Sonuçları ve Önerileri: EMÖ'de sofistike bireylerin bir bilim insanının yapmış olduğu çalışmada farklı gerekçelendirmeler ile önermeler ürettiği ve bu önermeler üzerinden bir çıkarım yaptığı gözlenmektedir. Bu gerekçelendirme süreçlerinde kanıtlar ve çıkarım yapma süreçleri ile ilgili sınırlılıkların katılımcılar tarafından sofistike bireylerde sorgulanırken naif epistemik bireylerde bu sorgulamalar gözlenmemiştir. Bu noktada özellikle çalışmanın yayınlanmamış olması, örneklem büyüklüğü, çalışmanın tasarımı, çalışmada kullanılan yöntem, elde edilen bulgular ile ilgili geçerlilik ve güvenilirlik süreçlerinin düşünülmesi ve elde edilen bulgular üzerinden soruda yer alan çıkarımın yapılıp yapılamayacağının muhakeme edilmesi katılımcıların epistemik muhakemelerini ortaya çıkarmak için kriterler olarak ortaya çıkmıştır. Bundan sonraki araştırmalarda epistemik muhakeme- pedagojik çıkarım-sınıf içi uygulama üçlüsü çalışılabilir.

Anahtar Kelimeler: Öğretmen eğitimi, çıkarım, öğretmen epistemolojisi, pedagoji, görüşme formu.