Exploring Pre-Service Teachers' Pedagogical Beliefs in Primary Education*

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Abstract

Considerable research emphasized that pre-service teachers enter teacher education programs with beliefs about teaching and learning and relate their beliefs to the experiences they gained through their previous studies. Then, their pre-existed beliefs have been shaped through the teacher education. Therefore, understanding pre-service teachers' pedagogical beliefs plays an important role in their professional development. The purpose of this research is to understand pre-service teachers' pedagogical beliefs in primary education in Turkey. Pedagogical Beliefs Scale developed by the author is used in order to understand their pedagogical beliefs. Scale development included data from 553 pre-service teachers. To understand primary pre-service teachers' pedagogical beliefs, data gathered from 310 primary pre-service teachers. Findings revealed that majority of the pre-service teachers hold constructivist beliefs. Although there is no statistically significant difference among the primary pre-service teachers regarding the year they enrolled, statistically significant difference found in favour of female pre-service teachers. Findings of this research revealed that pre-service teachers hold compatible pedagogical beliefs with the demands of the primary curriculum in Turkey.

Keywords: Pedagogical beliefs, pre-service teachers, scale development, teacher education

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INTRODUCTION

Understanding teachers' and pre-service teachers' beliefs has been the subject of educational research for many years (Pajares, 1992; Calderhead, 1996). Beliefs are defined as disposition to action and measure determinants of behaviour (Brown & Cooney, 1982). More specifically, Nespor (1987) indicated that beliefs involve moods, feelings, emotions and subjective evaluations and therefore they are of great importance in defining teaching tasks and organizing the knowledge and information relevant to those tasks. Nespor (1987) further explained that beliefs help to make sense of the context and environment within teachers work and problems they encounter. Therefore, beliefs play an important role in teaching. A substantial body of research pointed out that teachers' beliefs influence their teaching practices (Fang, 1996; Kagan 1992; Pajares, 1992). For example, Pajares (1992) stated that teachers' perceptions and judgments are affected by their beliefs, which in turn influence their teaching practices. In order to understand teaching comprehensively, research has also focused on pre-service teachers' beliefs and indicated that beliefs play a significant role in pre-service teachers' future practices (Lee, 2015). Kagan (1992) expressed that pre-service teachers hold already well-established beliefs about teaching and learning when they enter teacher education programs and these beliefs have also been shaped through their education. Besides, Richardson (2003) considered pre-service teachers' beliefs as important in two ways. Firstly, she claimed that beliefs are considered as the focus of change in teacher education program. Secondly, since pre-service teachers already hold beliefs when they enter teacher education programs, beliefs are important in the way that pre-service teachers make sense of what they are studying through their existing beliefs within a constructivist conception of learning.

Since 1980s, there is a shift in our understanding of learning from traditional to constructivist learning. In constructivism, the learner is required to make sense the information actively as well as use her/his experiences and make meaning from it (Maccallum, Hargreaves, & Gipps, 2000). However, in traditional approach direct instruction is important. Accordingly, many researchers expressed the differences in traditional and constructivist teaching and learning process (Kim, 2005; Lord, 1999). Thus, constructivism became an underlying theme of educational reform movements in Turkey as well as throughout the world.

In the 2005-2006 academic year a constructivist curriculum was introduced in primary education in Turkey. Then, secondary and high school curriculums were gradually developed. Through these alterations, some changes have also been made in teacher education programs in 2006. These changes included the following issues: Programs were arranged as % 50-60 subject knowledge courses, % 25-30 pedagogy courses and % 15-20 cultural courses. Higher education Council [HEC] is responsible for the structure of teacher education system as well as the university system in Turkey. Until 2006, the length of the programs, the number of credits, titles of courses, and a summary of the content of the courses were the same in all teacher education faculties in Turkey. However, after 2006, the faculties are given opportunities to change and modify the courses up to % 30. Researchers conducted research to understand the reflections of constructivist approach in teacher education courses regarding pre-service teachers' views pointed out that although traditional lecture methods were generally employed in the courses, cooperative group studies are performed on occasion and their previous knowledge about the subjects are examined, teaching methods supports pre-service teachers development of thinking skills are used (Cengizhan & Tanrıseven, 2011). Furthermore, they claimed that books reflecting different perspectives are used occasionally in pedagogy and subject knowledge classes; and course contents are modified regarding the interest, expectations and needs of the pre-service teachers.

As pedagogical beliefs involve beliefs about teaching and learning, exploring them is of great importance not only to understand to what extent teachers implement the changes suggested by these reform movements but also to understand the way they make sense of the context and environment in which they work. Besides, regarding pre-service teachers, understanding pedagogical beliefs will also help us to define how they make sense of their studies through their existing beliefs.

Pedagogical Beliefs

Pedagogical beliefs refer to beliefs about teaching and learning (Lim, 2008; Ertmer, 2005). Atweh and Abadi (2012) described pedagogical beliefs as 'what teachers deem to be important in planning and implementing teaching for effective learning experiences in the classroom' (p.325). Similar to this explanation, Chai (2010) identified pedagogical beliefs as preferred ways of teaching by teachers. Reviewing the literature revealed that pedagogical beliefs are classified by researchers under the two headings as traditional and constructivist (Calderhead, 1996; Entwistle Entwistle, Skinner, Entwistle & Orr, 2000; Snider & Roehl, 2007, Chai, 2010). Many researchers agree that teachers hold traditional beliefs about teaching and learning are more likely to consider their students as passive recipients, give them little responsibility for their own learning (Duffy & Jonassen, 1992) and have the control of the flow of the lesson (Sing & Khine, 2008). In contrast to this, teachers hold constructivist beliefs tend to conduct lessons in which students construct knowledge through their own experiences (Chai, 2010). Besides, Chai and Khine (2008) also indicated that although we examine pedagogical beliefs under these two headings, in reality, teachers often hold mixed beliefs. Since teachers' decisions based on their pedagogical beliefs influence the effectiveness of teaching and learning (Lim & Chai, 2008); understanding pre-service and in-service teachers' beliefs about pedagogical knowledge is of great importance.

Research Aims

The aim of this research is to understand the pedagogical beliefs of primary pre-service teachers. Regarding this aim the research questions are stated as follows:

- What are the primary pre-service teachers' pedagogical beliefs?
- Are there any differences between primary pre-service teachers' pedagogical beliefs regarding gender?
- Are there any differences between primary pre-service teachers' self-efficacy beliefs regarding their grades?

Data Analysis

A quantitative research approach was used in this study. Data are collected through the Pedagogical Beliefs Scale developed by the author. Statistical Package for Social Sciences (SPSS) 21.0 was used in order to analyse the data collected through the Pedagogical Beliefs Scale. To understand pre-service teachers' pedagogical beliefs descriptive statistics are employed. independent sample t test was used to compare pre-service teachers' pedagogical beliefs regarding gender. Anova test was performed to understand if there are any differences pre-service teachers' pedagogical beliefs regarding the year they enrolled.The aims and procedures of this research were approved by the university's Ethical Committee for Social and Educational Sciences.

Participants

For the scale development, participants involved 553 primary pre-service teachers from one of the state universities in Turkey. Data collection process were held during the 2012–2013 academic year. First of all, aims and procedures of the research were fully explained to the pre-service teachers including the information that non-participants would not be disadvantaged. To understand pre-service teachers' pedagogical beliefs the scale administered primary 313 pre-service teachers during the 2014-2015 academic year.

Development of the Pedagogical Beliefs Scale

Construction of the Scale

An extensive literature review was undertaken for generating an item pool. First of all, the scale was conceptualized through considering the definition of pedagogical beliefs. During this conceptualization, teaching-learning process including assessment and the issue of being a good teacher are taken into consideration.

As indicated above, pedagogical beliefs show teachers' preferred ways of teaching and they are most of the time associated with traditional and constructivist models of learning. In constructivist model, learning is described as a 'learner's active continuous process of constructing and reconstructing his or her conceptions of phenomena' (Tynjala, 1999: 364). Kim (1993 cited in Kim, 2005) indicated that many constructivist researchers accept that learners' experiences are of great importance in constructing knowledge and learning is internalized through the learner's constructive process in nature. Thus, knowledge is defined as the personal understanding of the outside world and learning is an active process of meaning making. Therefore, learners' perspectives become important in constructivism. Most of the constructivists also emphasized the importance of cooperative learning, problem solving, learning situation have to resemble real life situations (Loyens & Gijbels, 2008). In contrast to constructivism, traditional model requires direct teaching in which students are seen as passive recipients and mostly engaged in a seat work, drill and practice (Gipps, McCallum, & Hargreaves, 2000). However, constructivism is considered as an effective learning theory as opposed to traditional learning by many countries all over the world. As a result of this, collaboration and active participation of students are some of the essential characteristics of constructivist learning. Constructivism also proposes that meaning is constructed by individuals' experience. This reveals that context in which learning occurs should also be considered when creating a constructivist learning environment. In parallel to these developments, traditional assessment is also criticised for considering rote learning and turning students into passive learners (Hart, 1994). Thus, alternative assessment becomes important. Alternative assessment suggested not only using the alternative forms of assessment but also an alternative use of an assessment as a part of the learning process (Gipps & Stobart, 2003). Therefore, since pedagogical beliefs involve beliefs about teaching and learning, assessment is also considered as a part of teaching-learning process. For this reason, the issue of assessment is taken into account for this scale.

Harden and Crosby (2000) defines that a good teacher is a teacher who helps students to learn. Nevertheless Korthagen (2004) stated that although there is a difficulty of putting the essential qualities of a good teacher into words, many attempts are being made to describe these qualities and they are strongly supported by policy makers. Since constructivist model of learning is widely accepted by policymakers throughout the world, our understanding of being a good teacher has also been changed. For example, regarding constructivism, a good teacher should facilitate learning in which students actively make meaning of the information through interacting with it rather than teaching them directly (Gipps, McCallum, & Hargreaves, 2000). This entails a change in teachers' role in which a good teacher should elicit students' ideas and experiences and then elaborate on or restructure their current knowledge (Windtschitl, 2002) rather than should know everything and being a dispenser of knowledge (Holt-Reynolds, 2000). Besides, researchers as well as policy makers and parents identified characteristics of good teachers and they emphasized that a good teacher loves children, and should have lots of experience for caring children (Howes, Whitebook, & Phillips, 1992). These features are also considered as important issues influence teaching-learning process. Therefore, they are also covered in the scale.

Regarding the analysis above, it could be stated that pedagogical beliefs cannot be understood in depth only through considering the conceptions of teaching and learning on its own. In order to have an adequate understanding of teachers' pedagogical beliefs, the relevant aspects of pedagogical beliefs such as features of teachers and assessment should also be taken into account.

Item Development

The initial item pool was created through a comprehensive review of the literature. At this phase, including all content relevant to the construct was considered as important. Thus, 32 items that reflected teachers' pedagogical beliefs were generated. The preliminary item list was sent to 4 professional educators. They were asked to rate the preliminary 32 items according to the importance of each statement in assessing teachers' pedagogical beliefs and the clarity of the items. Most of the items were rated as high. Nevertheless, 3 items were deleted due to the redundancy from the list and 5 items were reorganized regarding the expression. Then, these items were given to 12 pre-service teachers who are in their final year. They were also asked to reflect on the items regarding the expression. This enabled the researcher to avoid academic wording and increased the items' clarity. Then, some of the items were also modified according to the student teachers' reflection. Thus, 29 items were chosen for a final item pool. 5-point likert-type scale ranging from 1 (strongly disagree) through 5 (strongly agree) are used to rate the responses to the items. The means were organized as follows: (5–1=4, 4/5=0.80) as 1.00–1.80, strongly disagree; 1.81–2.59, disagree; 2.60–3.39, neither agree nor disagree-undecided; 3.40–4.19, agree and 4.20–5.00, strongly agree.

Procedure

Exploratory Factor Analysis (EFA) was conducted in order to explore the dimensionality of the measure. First of all, in order to understand whether the data is suitable for factor analysis, Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy and Barlett's chi-square test of sphericity were used. KMO value varies between 0 and 1. When values approach 1, the data is considered as relatively reliable (Kaiser, 1974). Hutcheson and Sofroniou (1999) interpret KMO statistics as below: values between .7 and .8 are considered as middling, values between .8 and .9 are considered as meritorious and values over .9 are accepted as marvelous. Then, EFA was employed in order to establish the construct validity of the instrument. Thus, the numbers of factors underlying the items were determined. Principal component method and varimax rotation was used in the factor analysis. Confirmatory Factor Analysis (CFA) was also employed in order to verify the factor structure extracted through the EFA. A combination of fit indices were used in determining the how well the model fits the sample data. Goodness of fit indicators used in this research to assess the model involves Comparative Fit Index (CFI), Goodness-of-Fit statistic (GFI), Adjusted Goodness-of-Fit statistic (AGFI), Root Mean Square Residual (RMR), Standardized Root Mean Square Residual (SRMR), Root Mean Square Error of Approximation (RMSEA) and relative Chi-square ($\chi 2/df$). Recommended values for CFI, GFI and AGFI > 0.95 (Hu and Bentler, 1999); RMR smaller the better, SRMR <.08 (Hu and Bentler, 1999), RMSEA < 0.07 (Steiger, 2007) and $\chi 2/df$ >2.00 (Tabachnick and Fidell, 2007).

Exploratory Factor Analysis

The EFA was performed with an initial item pool of 29 items to identify the most valid items and factors in the scale. Before employing EFA, a Barlett's sphericity test and KMO measure of sampling adequacy were performed. The Barlett's test of sphericity was significant ($\chi 2$=5,506E3, df=406, p<0.001) and KMO was 0.95. These results indicated that the data is suitable for factor analysis. Then, EFA using principal component analysis with varimax rotation was employed to clarify the structure of the scale (n=553). During the analysis eigenvalue greater than 1 and factor loadings greater than 0.4 were considered as criterions to delete items. The analysis yielded a three factor solution and they accounted for 39.59 % of the total variance. Through the EFA the initial 29 items were reduced to 22 items. During the item development, the issue of assessment is considered under the learning− teaching process. Therefore, the scale is constructed under the two headings: 'Learning− Teaching Process' and 'Being a Good Teacher'. However, the analysis suggested to consider the items related the assessment as a separate dimension rather than considering under the 'Learning-Teaching Process' subscale. Thus, three factors were retained and they were named as 'Learning−Teaching Process', 'Being a Good Teacher' and 'Assessment' (Table1).

Table 1. Factor Loadings of Pedagogical Beliefs Scale

Item	Learning−Teaching Process	Being a Good Teacher	Assessment
ITEM17	,783		
ITEM12	,775		
ITEM16	,771		
ITEM23	,768		
ITEM22	,746		
ITEM 13	,717		
ITEM 19	,715		
ITEM 24	,703		
ITEM 15	,686		
ITEM 11	,670		
ITEM 4	,658		
ITEM 18	,596		
ITEM 28	,594		
ITEM 8	,569		
ITEM 21	,565		
ITEM 5	,531		
ITEM 1		,687	
ITEM 3		,582	
ITEM 2		,534	
ITEM 29			,616
ITEM 20			,583
ITEM 6			,522

Reliability of the Pedagogical Beliefs Scale

Cronbach's α coefficient for the total score of the scale is calculated as .90. Cronbach's α calculated for the Teaching-Learning Process subscale as .93; the Teacher Quality subscale as .77 and Assessment subscale as .70. These results indicated the high degree of internal consistency of the scale. Furthermore, in order to examine test–retest reliability, a subsample (n=120) of the total respondents was randomly selected and asked to complete the same scale 8 weeks later. The analysis revealed that the test–retest reliability of the scale was r=0,708 p=0,001.

Confirmatory Factor Analysis

CFA was conducted using Lisrel 9.1. All model fit indices were evaluated through using multiple criteria as stated earlier. The results of the initial measurement model indicated an acceptable model fit (CFI=0.92, GFI=0.91, AGFI=0.88, RMR=0.038, SRMR=0.049, RMSEA=0.065, x^2/df= 3.36). However, a close examination of the initial measurement revealed that Item 6 had the low factor loading (0.37). Therefore, Item 6 has removed from the analysis. Besides, Item 4 has a relation with the Being a Good Teacher factor and Item 28 has a relation with the Assessment factor. For this

reason, another CFA in which Item 4 and Item 28 were considered under the stated factors was performed to see if it would result in a better model. According to the analysis goodness of fit indicators are determined as CFI=0.96 GFI=0.95 AGFI=0.92 RMR=0.29 SRMR=0.039 RMSEA= 0.061 x^2/df= 2.61. In sum, the CFA analyses suggested that the final version of the model more accurately represents the data than previous model. Thus, the final version of the model comprises 21 items and consists of three subscales (Table 2).

Table 2. Pedagogical Beliefs Scale

Factor 1. Teaching-Learning Process	
Item 1	In the learning and teaching process, the teacher needs to establish students a connection with real life in order to improve the level of long term retention.
Item 2	To enhance learning teachers should provide activities in which students use their five senses.
Item 3	Students' individual differences must be considered by teachers in the learning and teaching process.
Item 4	When students cooperate with their teachers and other students learning is more effective.
Item 5	Teachers' effective communication with students is the most significant factor in providing an effective learning and teaching environment.
Item 6	Teachers should be able to look at their subject materials from different angles and could explain the subject in different ways.
Item 7	When teachers enable their students to engage with real life problems and help them to solve these problems, learning is enhanced.
Item 8	Students' strengths and limitations should be taken into consideration by teachers for assessment to be effective.
Item 9	When teachers encourage students to interpret information through using their background knowledge, learning is more effective.
Item 10	Teachers should create a relaxing and fun classroom environment.
Item 11	The natural and social environment where student live should be considered in the selection of subject matter.
Item 12	Using teaching methods and techniques effectively is the most important feature of a good teaching.
Item 13	One of the most important duties of a teacher is to set up the classroom environment so that it facilitates learning.
Item 14	Students learn best when they actively participate in lessons.
Factor 2. Being A Good Teacher	
Item 15	Teachers should know everything.
Item 16	Being a good teacher requires a lot of experience.
Item 17	Good teachers mostly rely on their intuitions.
Item 18	Good teachers should love their profession.
Factor 3. Assessment	
Item 19	Assessment should focus on an acquired behaviour at the end of the learning process rather than students' individual development.
Item 20	When a student chooses the assessment method, this improves its effectiveness.
Item 21	Students' own interest should be taken into consideration in the assessment process.

Findings of the Pedagogical Beliefs Scale

The pre-service teachers' scores of the Pedagogical Beliefs Scale were analyzed by utilizing descriptive statistics (Table 3).

Table 3. Descriptive Statistics of Pedagogical Beliefs Scale

Scale/Factors	N	Min.	Max	x̄	SD
Pedagogical Beliefs Scale	313	1,95	5,00	4,24	0,39
Teaching-Learning Process	313	1,95	5,00	4,25	0,39
Being a Good Teacher	313	1,50	5,00	3,67	0,68
Assessment	313	1,33	5,00	3,87	0,71

The analysis indicated that pre-service teachers have high pedagogical beliefs towards constructivism. Examining the results showed that Teaching Learning Process subscale received the highest ($\overline{X}$=4.28 SD=0.39) and Being a Good Teacher subscale received the lowest ($\overline{X}$=3.67 SD=0.68) means. This revealed that although pre-service teachers have relatively low pedagogical beliefs in understanding of being a good teacher, their pedagogical beliefs were the highest for the teaching learning process such as they believe that students learn best when they actively participate in lessons and establishing students a connection with real life in order to improve the level of long term retention.

Independent sample t test was performed in order to compare male and female pre-service teachers' pedagogical beliefs the (Table 4).

Table 4. Comparison of Pre-service Teachers' Pedagogical Beliefs by Gender

Gender	N	M	SD	p	t
Female	254	4,27	0,37	0,01	2,51
Male	59	4,13	0,46		

The analysis above showed that there is statistically significant difference between female ($\overline{X}$ =4.27 SD=0.36) and male ($\overline{X}$=4.12 SD=0.46) pre-service teachers regarding pedagogical beliefs, conditions; t(308)=2.60, p=0.01. This result revealed that female pre-service teachers' pedagogical beliefs are more constructivist than male pre-service teachers.

To understand if there are any differences pre-service teachers' pedagogical beliefs regarding their grades anova test was utilised (Table 5).

Table 5. Anova of Pre-service Teachers' Pedagogical Beliefs by Grades

Source	Sum of Squares	df	Mean Square	F-ratio	p
Between Groups	1,379	5	0,275	1,808	0,109
Within Groups	46,572	307	0,152		
Total	47,950	312			

Anova results revealed that there is no statistically significant difference found among the primary pre-service teachers regarding their grades ($F(5,307)=1.808$, $p=0.109$).

DISCUSSION AND CONCLUSION

Through this research the Pedagogical Beliefs Scale was developed. The scale considers the relevant aspects of pedagogical beliefs that will help us to understand pedagogical beliefs in depth and to ensure valid results. In conclusion, developing the measure of pedagogical beliefs consists of the dimensions above provides a useful scale to explore pre-service teachers' beliefs comprehensively that can also be considered as indicators of teachers' classroom practices.

This research indicated that primary pre-service teachers have high pedagogical beliefs towards constructivism. In Turkey, since 2005-2006 academic year, teachers have been required to use constructivism in primary education during their teaching. Accordingly, teacher training programs also emphasize the importance of constructivism. Therefore, pre-service teachers' emphasis on constructivism regarding pedagogical beliefs is not surprising. Pre-service teachers Teaching Learning Process subscale received the highest and Being a Good Teacher subscale received the lowest means. Teaching Learning Process subscale involves items that express the use of cooperative learning, problem solving, creating a relaxing environment etc. In order to provide an effective teaching-learning process when they become teachers, pre-service teachers have courses such as Teaching Principles and Methods, Classroom Management during their training in Turkey (HEC, 2007). Findings indicated that pre-service teachers' training enables them to develop pedagogical beliefs regarding teaching-learning process that also meet the requirements of the primary curriculum in Turkey (Ministry of National education [MoNE], 2005). However, as stated above, pre-service teachers in this research achieved lowest means regarding the Being a Good Teacher subscale. Examining closely, findings of this research revealed that pre-service teachers' beliefs about Being a Good Teacher scale are at agree level ($\overline{X}$=3.67 SD=0.68). This showed that although pre-service teachers hold relatively low beliefs regarding the qualities of a good teacher compare to other subscales; their beliefs about it are still strong. Korthagen (2004) indicates that when teachers have a clear understanding of these qualities, they can promote reflection in teaching that is also an important issue in teacher education. Since, pre-service teachers' beliefs were deeply rooted in their individual experiences (Bird, Anderson, Sullivan & Swidler, 1992); further research focusing on their individual experiences will help us to understand how can we help them to develop stronger beliefs about being a good teacher. Besides, although many researcher states that beliefs can be considered as indicators of teachers' classroom practices (Johnson, 1999; Pajares, 1992); some researchers also pointed out that there is a mismatch between beliefs and practices (Jorgensen (Zevenbergen), Grootenboer, Niesche & Lerman, 2010; Lopes & Santos, 2013). Therefore, further exploration of pre-service teachers that considers to what extent their beliefs mismatch with their practices should also be taken into considered in future.

The findings also showed that statistically significant difference found in favour of female pre-service teachers regarding pedagogical beliefs. Teaching profession is being considered as a woman's job by researchers (Cruickshank, Pedersen, Hill & Callingham, 2015; De Course & Vogtle; 1997). Furthermore, Sarı & Basarır (2016:220) draw a conclusion from their study that 'male teachers are not sufficiently aware of the multiple roles and responsibilities that their female counterparts have'. Considering this statement, we can say that because of female pre-service teachers are more aware of their responsibilities, they internalize constructivism better than male pre-service teachers. Thus, there is a possibility that this may influence their pedagogical beliefs. Accordingly, this result indicates the importance of gender roles in shaping primary pre-service teachers' beliefs.

The research revealed that there is no statistically significant difference found among the primary pre-service teachers regarding their grades. This indicate the fact that pre-service teachers pedagogical beliefs do not change duration of their degree. Although pre-service teachers showed beliefs in favour of constructivism, the finding reveals that their pedagogical beliefs are not different

regarding their grades is unexpected. However, teacher training programs aims to change pre-service teachers' beliefs (Richardson, 2003). This leads us to two possibilities: either the teacher training program does not influence pre-service teachers' beliefs or since the findings of this study based on the self-report measurements of pre-service teachers' pedagogical beliefs, there is a possibility that pre-service teachers did not give honest responses. In self-report instruments it is important that participants give truthful responses (Korb, 2011). Although the importance of this research was explained to the participants and voluntary participation was taken into consideration, supporting findings of this research through different methods will assure the validity of the research.

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