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Research Paper

## English Language Learning and Reasoning Ability in Iranian Primary Schools: An Urgent Need for Curriculum Reappraisal

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### Abstract

Advantages of language teaching and learning in foreign contexts are undisputable. This study intended to check if Reasoning Ability (RA), as a promoted cognitive skill which is emphasized not only in the field of education, but also as an important element of most professions, is cognitively enhanced along with English language learning. To this end, a sample of Iranian primary school children, aged 5-8 years, were selected through purposive sampling and divided into three groups; that is, monolingual, bilingual, and limited bilingual children, in order to investigate their RA enhancement during early formal education. Also, a researcher-made psychometric test was used to measure quantitative, visual, nonverbal, matrix, and abstract reasoning of the sample during early primary school education. The results of the analyzed data indicated that the bilingual group outperformed the monolingual and the limited bilingual children in matrix, visual, abstract reasoning and logical thinking. The findings of the study can be used by educational policymakers to reconsider the primary school curriculum, and through holding workshops on strengthening national and religious values help English language instructors to unravel related problems.

**Keywords:** English language learning, cognitive advantages, Reasoning Ability, primary school children

### یادگیری زبان انگلیسی و توانایی استدلال در دبستان های ایران: نیاز مبرم به ارزیابی مجدد برنامه درسی

فواید یاد دهی و یادگیری زبانهای خارجی مسلم و غیرقابل تردید است. هدف این مطالعه بررسی ارتقاء احتمالی مهارت استدلال تحت تاثیر آموزش زبان انگلیسی طی سالهای اولیه آموزش رسمی دبستان بود. لازم بذکر است که این مهارت، بعنوان یکی از توانایی های شناختی، نه تنها در حوزه آموزش بلکه بعنوان یکی از ارکان مهم بسیاری از حرفه ها مورد توجه قرار گرفته است. از اینرو، نمونه ای از کودکان 5-8 ساله دبستانی با روش نمونه گیری هدفمند انتخاب و به سه گروه تک زبانه، دوزبانه محدود و دو زبانه تقسیم شدند تا توانایی استدلال و منطق ایشان تحت تاثیر آموزش زبان انگلیسی مورد ارزیابی قرار گیرد. بنابراین، به کمک آزمون روانسنجی محقق ساخته، توانایی استدلال انتزاعی، کمی، غیرکلامی، ماتریسی و تصویری آنان سنجیده شد. نتایج حاکی از آن بود که مهارت استدلال انتزاعی، ماتریسی و بصری کودکان دوزبانه نسبت به کودکان دو زبانه محدود و تک زبانه بیشتر بود. یافته های این پژوهش می تواند در راستای بازنگری برنامه آموزشی دبستان مورد استفاده سیاستگذاران آموزشی قرار گیرد چرا که برگزاری کارگاههای آموزشی در خصوص حفاظت از ارزشهای ملی-مذهبی برای مدرسین زبان، به حل مشکلات مرتبط کمک خواهد کرد.

**واژگان کلیدی:** یادگیری زبان انگلیسی، مزایای شناختی، استدلال انتزاعی، کودکان دبستانی

## Introduction

Foreign language learning and becoming bilingual promotes cognitive abilities. Studies on the relationship between bilingualism and cognitive development started in 1960s, when scholars uniformly agreed on the negative impact of bilingualism, until Peal and Lambert revised the notion by asserting that under suitable social environment, positive effects of bilingualism on cognitive abilities flourish (Peal & Lambert, 1962). Later on, other scholars explored children and provided more evidence that bilingual children outperform their monolingual peers in attention control, creative thinking and metalinguistic awareness (Baker, 2006; Bialystok, 1999; Bialystok, Martin, & Viswanathan, 2005). However, there are other aspects of foreign language learning/teaching that restricts the paths to full gains of bilingualism. It is asserted, for example, that foreign language learning/teaching affects the morals and values of a community (Johnston, 2003). Socio-cultural identities and values too are unfixed constructs that affect and are affected by language teachers and learners (Kramsch, 1993). This is why, foreign language teaching programs, including English Language Teaching (ELT), have been restricted in Iranian and non-Iranian primary schools in an attempt to protect religious and national values. Unfortunately, the activists of this campaign have recently recommended elimination of ELT from school curricula totally.

However, wiping out the question would not remove the issue. Alternative solutions must be explored to overcome this challenge so that gains of foreign language learning and bilingualism are achieved and at the same time, national and religious values are protected. The present study was, therefore, intended to highlight the cognitive advantages of English language learning, as a means of becoming bilingual, during early school education in an Iranian population of 5-8-year old children. However, due to practical purposes, several cognitive correlates could not be investigated simultaneously. Therefore, only Reasoning Ability, as a significant correlate of bilingualism, was explored with the mentioned population. The participants of the study were non-fluent bilinguals, who were at different levels of bilingualism. So, with the above points in mind, the study sought answers to the following questions:

**RQ1.** Do Iranian children who benefit from English language learning as a means of becoming bilingual during early school education, benefit from higher levels of reasoning ability compared with their monolingual peers?

**RQ2.** Does reasoning ability vary at different levels of bilingualism among the intended group?

## Review of Literature

### Bilingualism and Cognition

Scholars define bilingualism differently and have varied considerations of a bilingual person. Bloomfield as a pioneer in the field, has assumed that a bilingual benefits from native-like control of two languages with no apparent shortcomings (Merrikhi, 2011). Baker goes beyond and emphasizes on the mastery over the writing skill in the foreign language (Baker, 2011). Other scholars, however, have a wider view. For instance, it is claimed that anyone who can communicate in another language other than his/her mother tongue, without being proficient, can be called a bilingual (Landsberry, 2019). Haugen has stated that a bilingual can make meaningful sentences in another language (Askari, Fazeli, Khademali, Aghae, & Piroozan, 2019). It is even assumed by some scholars that anyone who is beginning to acquire a foreign language and knows only a few words of another language is considered bilingual (Sulik, 2020). Accordingly, children who are in the early stages of foreign language learning, could be considered bilingual, since they know at least a few words of the foreign language, can communicate without being proficient or fluent, and can make simple meaningful sentences.

The hypothesis that language is a cognitive activity underlies the argument that bilingualism affects cognition, either positively or negatively. Piaget's Developmental Theory (Piaget & Inhelder, 1969), as a major one in the field of psychology, vividly accepts no role of language in human development, while other scholars such as Vygotsky have an opposite view and see language as a median that helps the thinking process and therefore has profound effects on cognitive abilities (Swain, 2013). Scholars such as Chomsky and Fodor limit the effects of bilingualism to cognitive functions that are under the influence of bilingual environment (Piattelli-Palmarini, 1980); that is, bilingualism as a linguistic treatment, rather than a societal one, merely affects linguistic dimensions of cognitive functioning.

### **Cognitive Reasoning Skill and Children**

The significance of reasoning and problem-solving abilities for everyday achievement is already crystal clear. That is why enhancing learners' capacity to think critically has been highlighted as one of the primary goals of recent educational programs (Mirzoyeva, Shaibakova, & Meiramova, 2015). It is worth mentioning that not only in the field of education, but also as an important element of most professions, reasoning ability is emphasized (Mirzoyeva et al., 2015).

Reasoning is defined as the process of drawing conclusions mentally based on previous premises (Burt, 1922). Development of reasoning is scientifically explored separately among children and adults. There are controversial debates regarding the logical thinking ability of children: The literature is dominated by Piagetian approach that it is concerned with age-related changes. More recent scientific explorations, however, expound the idea that young children do think logically within specific contexts and domains. Yet, they need the knowledge and experience that is gained through "investment, engagement, exploration and discovery" (Berger, 2004; Bruner, 1964; Burt, 1922; Carroll, 2005; Tipper & McLaren, 1990).

From the linguistic point of view, there are three linguistic principles involved in logical thinking: Primacy of Functional Relations which states that the functional relations of a sentence become tangible after a full comprehension of the message (Chomsky, 2014; Clark & Begun, 1968; Mehler, 1963; Miller, 1962), Lexical Marking and Semantic Complexity which affects the first principle, and the Principle of Congruence that emphasizes the implication of presuppositions and memory for retrieving information (Clark & Begun, 1968). Bearing in mind the significance of these principles for reasoning, it is inferred that linguistic incompetency would be a reason why children are unable to reason properly at times (Eva et al., 2012; Heyman, 2008; Kail, 2000; Keeley & Browne, 2007).

Given that the reasoning deficiencies during preschool and early school education are potentially due to linguistic and surrounding variations, it is hypothesized that adding a foreign language teaching program to primary school curricula and helping children become fluent/non-fluent bilinguals, could in turn improve their cognitive skills; namely, logical thinking ability.

Thus, the benefits of bilingualism during early school education have been highlighted quite a lot, and adding foreign language teaching programs to primary school curricula has been recommended to educational policy makers. On this basis the present study aimed to gather related evidence about the impact of Teaching English as a Foreign Language (TEFL), as a means of becoming bilingual, on the cognitive promotion of reasoning ability among non-fluent bilingual children during early formal school education.

## **Method**

### **Research Design**

The requirement for causal-comparative design was met for this study. Thus, Teaching English as a Foreign Language (TEFL) was the main independent variable, and the potential

impact of it on the RA, as the dependent variable, was compared among monolingual and bilingual children.

In this regard, once the proper psychometric test for investigation of Iranian children's reasoning skill was developed and validated (Piroozan, Razmjoo, & Namazi, 2019), this cognitive ability was assessed in different groups: X1 bilingual preschoolers; X2 bilingual first-graders, and X3 bilingual second graders who had benefited from learning English as a foreign language. Then, the mean score of their ability was compared to that of their peers in control groups. Meanwhile, the impact of "Level of Bilingualism" on RA was examined.

### **Participants and Setting**

A sample of bilingual and monolingual Iranian children aged 5- 8 years and 12 months were selected through purposive sampling from two Iranian monolingual and bilingual schools with rich educational background to determine their RA during early formal education. The bilingual school provided English language learning programs to both girls and boys in separate classes. So, from the list of the classes, a preschool, a first grade, and a second grade were randomly selected. From the list, the students whose parents had agreed with their participation in the study, preschoolers were selected randomly to take part in X1, first graders in X2 and second graders in X3. It should be mentioned that the selected population was considered bilingual according to the definition that 'individuals who know a few words of a foreign language are bilinguals, even if they cannot link the words together' (Bialstok 2013; Merrick, 2011).

In the same manner, monolingual participants were selected from a monolingual educational complex with almost the same educational disciplines, save for teaching English as a foreign language, and were assigned to three classes; that is, preschoolers (C1), first graders (C2), and second graders (C3). On the whole, 222 male and female students participated in the study, out of whom 47 were monolingual (21.2%), 79 were limited bilingual (35.6%), and 96 were bilingual (43.2%).

The theoretical foundation for choosing this age group (5- 8 years) was Piaget's theory which states children start logical thinking between the ages 4 and 7. Since formal education starts at age 5 in Iran, the minimum age of the participants was five years of age. In addition, the standard psychometric scales from which our subtests were extracted, consider children up to 8 years and 12 months, which was the maximum age of the participants.

### **Instruments**

As far as the researchers of the current study know, no proper psychometric tests are available to evaluate children's reasoning skills, specifically for the Iranian population. Hence, the researchers had to develop and validate a psychometric test for this purpose.

In order to take care of the linguistic processes involved in problem-solving; namely, "primacy of functional relations", "lexical marking and semantic complexity" and "the principle of congruence" (Chomsky, 2014; Clark & Begun, 1968; Mehler, 1963; Miller, 1962), which might prevent a child from reasoning properly, it was decided to assess the participants' performance through an activity pack without asking them to explain or reason verbally (Piroozan et al., 2019). So, from among the available psychometric scales which were standardized for Iranians, Raven (Kail, 2007; Richardson, 1991) and Wechsler Preschool and Primary Scale of Intelligence (WPPSI) (Wechsler, 2003) were selected under the supervision of three scholars in the field of educational psychology. The indices that fit the purpose of this study were extracted and their design was changed from paper-pencil format to digital format in a software program, called CRST (Children's Reasoning Skill Test) The reliability and validity of this researcher-made instrument were confirmed (Piroozan et al., 2019) and then implemented to

measure reasoning with continuous and discrete visual patterns, quantitative reasoning, nonverbal reasoning, the ability to analyze and synthesize abstract visual stimuli (Wechsler, 2008) and abstract reasoning (Millones, Flores-Mendoza, & Rivalles, 2015). Once the instrument was designed by putting together the above-mentioned subtests, programming the software and confirming the validity, it was time to implement the psychometric test to compare children's RA under the influence of TEFL.

### Procedures

With the developed and validated instrument mentioned above, the main phase of the study; that is, comparing RA among monolingual and bilingual children started, and the raw scores of the three subtests were recorded for each participant. Every participant was given three subtests under the titles, Functional intelligence (from Raven Scale), and Putting the pieces together and arranging the stories/Matrix reasoning (from Wechsler Scale). The standardized scores obtained from these tests predict a child's abstract reasoning, matrix/visual reasoning, and quantitative/nonverbal reasoning respectively. All the data were analyzed by SPSS program version 22, using statistical tests such as One-Way ANOVA and then Post Hoc Multiple Comparison tests; that is Tukey, to clarify the statistically significant similarities and differences between the groups.

In order to make the scores interpretable, the researchers standardized the raw scores based on a child's exact date of birth (day, month, and year). The instructions from Raven and Wechsler Scales were fully followed.

### Results

#### Bilingual vs. Monolingual/Limited Bilingual Children's RA and Level of Bilingualism Hypothesis

The results of the comparison analysis of the three groups of participants are shown in the following tables.

**Table 1**

*Comparing the Reasoning Ability of Monolingual, Limited Bilingual and Bilingual Children*

		<i>N</i>	Mean	<i>Std. Deviation</i>	<i>Std. Error</i>
functional intelligence	monolingual	47	108.91	18.306	2.670
	limited bilingual	79	114.53	14.894	1.676
	bilingual	96	117.52	9.649	.985
	Total	222	114.64	14.094	.946
Put the pieces together	monolingual	47	13.47	2.339	.341
	limited bilingual	79	14.46	3.385	.381
	bilingual	96	14.28	2.853	.291
	Total	222	14.17	2.970	.199
Arrange the stories	monolingual	47	8.19	3.132	.457
	limited bilingual	79	8.90	3.838	.432
	bilingual	96	10.75	2.271	.232
	Total	222	9.55	3.260	.219



As the Table 1 above displays, the scores obtained for the subtests of Functional intelligence are as follows: Monolinguals obtained the mean score of 108.9 ( $SD=18.3$ ), limited bilinguals got 114.3 ( $SD=14.8$ ), and bilingual children received 117.5 ( $SD=9.6$ ). Regarding the subtest of Putting the pieces together, the mean score for the monolingual group was 13.4 ( $SD=2.3$ ); for the limited bilingual group was 14.4 ( $SD=3.3$ ) and for the bilingual children was 14.28 ( $SD=2.8$ ). As for the results of the subtest of Arranging the stories, the mean score for the monolingual group was 8.19 ( $SD=3.1$ ); for the limited bilingual group was 8.9 ( $SD=3.8$ ); and for the bilingual children was 10.75 ( $SD=2.2$ ). To check the potential differences between the reasoning ability of the three participating groups in terms of their language ability and level of bilingualism, the obtained mean scores were compared to see whether they were statistically different from one another or not. In this regard, One-Way ANOVA was used and the results are displayed in table 2.

**Table 2**  
*Between Group Differences Based on Language Ability*

		Sum of Squares	df	Mean Square	F	Sig.
functional intelligence	Between Groups	2338.157	2	1169.079	6.160	.002
	Within Groups	41563.289	219	189.787		
	Total	43901.446	221			
put the pieces together	Between Groups	30.792	2	15.396	1.757	.175
	Within Groups	1918.703	219	8.761		
	Total	1949.495	221			
Arrange the stories	Between Groups	258.488	2	129.244	13.540	.000
	Within Groups	2090.466	219	9.546		
	Total	2348.955	221			

As seen in Table 2, for the subtest of 'Functional intelligence' there is a statistically significant difference between the groups, under the influence of learning English as a foreign language and becoming bilingual ( $P=0.002$ ). The difference is also statistically significant ( $P=0.000$ ) for 'Arranging the stories'. Yet, regarding the subtest of 'Putting the pieces together', the difference between groups is statistically insignificant ( $P=0.175$ ). Since a significant  $F$  test does not tell us which group differs exactly, post-hoc tests were needed. So, the Tukey test was implemented to explain the differences. Table 3 below presents the results.

**Table 3**  
*Multiple Comparisons: Tukey Test for the Differences Between Groups Based on Language Ability*

		N	Mean	Std. Deviation	Std. Error
functional intelligence	Monolingual	47	108.91	18.306	2.670
	limited bilingual	79	114.53	14.894	1.676
	Bilingual	96	117.52	9.649	.985
	Total	222	114.64	14.094	.946
put the pieces together	Monolingual	47	13.47	2.339	.341

	limited bilingual	79	14.46	3.385	.381
	Bilingual	96	14.28	2.853	.291
	Total	222	14.17	2.970	.199
	Monolingual	47	8.19	3.132	.457
	limited bilingual	79	8.90	3.838	.432
Arrange the stories	Bilingual	96	10.75	2.271	.232
	Total	222	9.55	3.260	.219

Table 3 signifies that there is a statistically significant difference between the monolingual group compared with the bilingual group ( $P= 0.002$ ) in the ‘Functional intelligence’ subtest which detects abstract reasoning. Also, in the subtest of ‘Arranging the stories’, the monolingual group differed from the bilingual group with the significance value of 0.000, and the limited bilinguals too differed from the bilinguals with a significant level of 0.000. However, in the subtest of ‘Putting the pieces together’ which indicates quantitative and nonverbal reasoning, there was no statistically significant difference between the groups ( $P= 0.175$ ). Therefore, it could be stated that bilingual children outperformed their monolingual and limited bilingual peers in matrix, visual and abstract reasoning. Concerning the level of bilingualism hypothesis, our bilingual group whose participants were in a higher language ability level was better than the limited bilinguals. This is in contrast with Level of Bilingualism Hypothesis and is, therefore, worth being investigated in future studies.

### Discussion

Since schools, as the forerunners of education, must contribute extensively to the development of young children in order to quicken the process of individual, social, cultural and national cultivation, it is wise to evaluate school educational programs and curricula constantly and revise them if needed.

In Iran, one of the recent changes in primary school educational programs has been banning any foreign language teaching program, including EFL. Actually, Teaching English as a Foreign Language (TEFL) has become prohibited in primary schools to take care of national and religious values. Such values are undeniably precious and must be taken care of. However, imposing educational restrictions through omitting such a useful subject would not be the right solution. Learning a foreign language and becoming bilingual, or multilingual, could be considered an invaluable asset due to the positive outcomes that come along with it, for instance, enhanced social and political interactions, employment benefits, better health as it delays the onset of Dementia and Alzheimer's diseases and last but by no means least, improved cognitive abilities. Therefore, anyone involved in the field of TEFL is responsible to stand against biased activists who wish to eliminate ELT from school curricula.

The current study intended to highlight the cognitive promotion of RA among bilingual children compared with monolinguals under the influence of ELT. It has been widely believed that early foreign language acquisition helps children promote cognitively (Adi-Japha, Berberich-Artzi, & Libnawi, 2010; Akhtar & Menjivar, 2012; Berger, 2004; Bialystok, 2001). It is widely acknowledged that bilingual people outperform their monolingual peers in cognitive abilities such as problem-solving, attention control, metalinguistic awareness, creativity, critical thinking, and reasoning (Adesope et al., 2010). The results of this study confirm the same belief about Iranian children who benefit from primary school ELT programs. The results also support the studies which have claimed that children do have a sense of reasoning which could be benefited from under suitable conditions (Berger, 2004; Bruner, 1964; Burt, 1922; Carroll, 2005; Tipper & McLaren, 1990). Furthermore, the results confirm the studies that report higher

cognitive skills among bilinguals compared with their monolingual peers (Akhtar & Menjivar, 2012; Bhatia & Ritchie, 2008; Bialystok, 2005; Bialystok et al., 2005). As for level of bilingualism hypothesis Diaz (1983), claiming that lower levels of foreign language learning promote cognitive outcomes, the results here show that the higher the level of bilingualism, the more the reasoning ability of children. This is due to the Level of Bilingual Proficiency which regards the higher linguistic proficiency threshold responsible for cognitive correlates of bilingualism (Cummins, 1976, 1978; Skutnabb-Kangas, 1981).

### Conclusion

The main intention of this study was to highlight the correlation of learning a foreign language and improved cognitive skills, specifically among children. Helping children to benefit from better education would be the speculation for individual and national wellbeing. However, foreign language teaching, as a significant element of education, has been excluded from primary schooling once and for all in Iran. The findings of the present study show that it is unfair to deprive children of language learning programs during primary school education. Taking care of religious and national values is absolutely invaluable. Children must be taught of the significance of protecting such values as the predictors of one's identity; meaning, since language and culture are intimately linked, once children are about to start learning a second language, they might be at the threat of being impressed by a foreign culture. However, if language teachers are instructed well on how to focus on cultural differences while signifying the national and religious values for language learners, no hazard would come about. Moreover, by stressing the links between the field of ELT and other fields, such as psychology, novel windows of research would be opened to explorers who could add to the concepts of these fields. For instance, the psychometric test that was designed in this study could be used in psychology clinics to diagnose developmental disorders. It is interesting that research on ELT not only can add to the field of psychology but also gives prominence to the advantages of second language learning and becoming bilingual during childhood.

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