

## Resolving Early English Education Issue Using Data Analytics

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### Abstract

*As the starting age of English education becomes younger around the world where they teach English as a foreign language, the debate on early English education is an unsettling issue as not only academic research, but also educational policy. To resolve the unsettled issues, a new approach is used: the big data and its analytics. To explore the pros and cons of the early English education, the study uses the analysis of research abstracts collected from scholars.google.com and www.kci.go.kr. It also analyzes the data posted on the discussion sites such as agora, daum café and naver café, plus daily interactions of the early English education using SNS. The study uses opinion mining technique using tools such as Sisense and WEKA to lay out the data and analyze them as basic data analytics. The results show that pro early English education is commonly co-occur with critical period, lateralization, ultimate attainment, universal grammar, fossilization, inhibition, acquisition process, bilingualism and exposition. Essays against early English education are related to no critical period, no authentic input, not effective, no universal grammar, national identity loss, self-identity loss and L2 interference. Other extraneous factors are based on practical problems such as social pressure, outcome pressure, political pressure, test reform and statistics.*

**Keywords:** *big data, early education, English education, big data analysis, language development, bilingual education*

### 1. Introduction

As the starting age of English as a foreign language (EFL) is globally lowered, the debate is heated up from different points of view citing the positive effects, the negative effects and other external factors. Big data and the analytics have provided new ways of illuminating arguments on the old issue. The old debate, pros and cons of early English education has recently resurfaced as the Ministry of Education (MOE) banned English education from practiced in kindergartens. The debate is a continuation of the debate when the MOE designated 32 experimental schools nation-wide, two experimental schools for each province to try out English education for lower graders in Korea in 2010. The old debate originated from the time when elementary English education was introduced back in 1996. The debate resurfaced with the introduction of early English education to lower graders as the MOE designated experimental schools. It continued to the recent prohibition policy of the MOE on the kindergarten English education. The term “Early” English Education contains a relative concept which requires a clear definition of how early the presentation of “early” English education is going to cover. It will touch upon the current elementary school English education already in practice which starts

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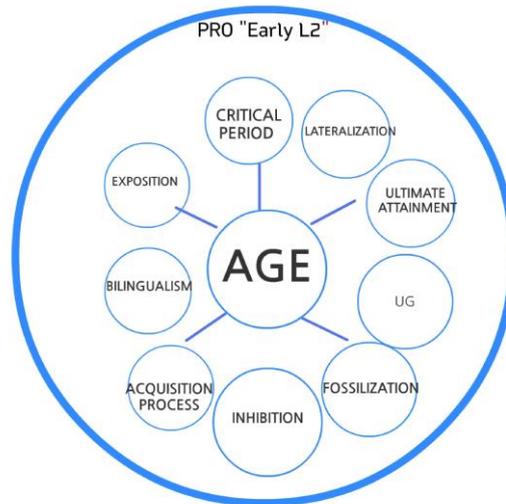
from the 3rd graders to 6th graders. Also, an experimental study is under way to determine whether or not to lower the early English education down to the 1<sup>st</sup> graders. To go even further, private kindergartens are not hesitant to include English education as a part of their integrated curriculum despite the fact that the ministry of education prohibits the practice of teaching English in public kindergartens. The paper will deal with elementary school English education of not only middle and upper elementary education already having been implemented but also lower elementary one which is being planned for experimentation. In addition, it will discuss the language development of infants pertained to the topic of early first and second language development [1].

The method of the study will be based on the analyses of abstracts of research papers, debating sites and open correspondences using SNS on the relevant topics. The analysis of data will be similar to opinion mining [2-3] wherein whether or not the opinion is subjective (Subjectivity analysis), whether or not the opinion is positive or negative (Polarity analysis) and what degree of polarity is shown (Degree of polarity). The tools being used are Sisense and WEKA wherein Sisense crunches the big data into phrasal, sentential and passage combinatorial visuals in cloud environments, and WEKA is data mining tool programmed in open source software of GNU environments. The tools are used for natural language processing and text analysis to identify the patterns of co-occurrence between age and pro/cons early English education as a foreign language.

The area of studies will be covered as follows: theoretical issues on early foreign language education including linguistics, brain studies, socio-linguistics, psycho-linguistics; arguments against early English education in Korea and their resolution; practical discussions such as social, political pressure upon the government and statistics regarding the early English education in Korea. The paper will draw on the early English education in Korea based on the big data collected using text mining tools. It will address to the following questions: First, what are the arguments for the early English education? Second, what are the arguments against the early English education? Third, what are the other arguments affecting the early English education?

## **2. Arguments for Early English Education**

The strength of big data analysis is the embedded, unobtrusive nature of collecting data, which is different from the traditional model of evidence-gathering and interpretation where the researchers are independent observers. Scientific researches seem to converge on the earlier the better hypothesis on language learning whether it is 1<sup>st</sup> language or 2<sup>nd</sup> language. Children's learning ability on languages is so plastic that they can handle as many languages as the environments require. Children's learning of languages are different from adults' in three critically different ways: the development of linguistic components such as pronunciation, grammar and vocabulary to the near-native like fluency, the socio-linguistic influence from others and their inhibition in making errors, and the brain plasticity. The text mining result shows that pro "early English education (early L2)" is commonly co-occur with critical period, brain lateralization, universal grammar (UG) and fossilization where it sets limitation of age for the ultimate attainment of the L2. It is also based on the arguments such as length of natural English exposition, bilingualism by single part of brain which is more effective than two separate parts, the acquisitional process rather than the conscious learning process and less social inhibition for making errors in speaking L2 when children are younger as shown in Figure 1.



**Figure 1. Pro Early English Education**

The categories of pro L2 arguments can be classified into linguistic, socio-linguistic and biological arguments. Each category of arguments can be elaborated in the following sections.

### **2.1. Linguistic Argument**

Facing the theoretical difficulties of explaining creative aspect of human language, [4] proposed Linguistic Acquisition Device (LAD) in which children are born with the innate Universal Grammar (UG). LAD is a black box of language learning taking an input language and transforming UG into an individual language grammar. LAD gradually loses its function as a child reaches a comfortable level of linguistic competence which is about the age of 13 to 14. Besides Chomsky, linguists such as [5] globally accept and put forward the hypothesis of LAD.

An interesting study based on the big data of children's pronunciation development was done by [6] where they compared the perceptual differences of monolingual and bilingual infants. Monolingual infants of Spanish and Catalan (a Romance language different from Spanish) respectively were tested how well they perceive the infants perceive the vowel contrast that involved two distinct contrast in Catalan but show no contrast in Spanish. Both Catalan and Spanish children were able to distinguish the vowel contrast at 4 months, and Catalan children retained the distinction between vowels, but Spanish children gradually deteriorated the contrast between 8 months and 12 months. The bilingual children of Spanish and Catalan were able to distinguish the vowel contrast at 4 months like other groups of children, but ensued the U shape development of temporary deterioration at 8 months followed by the recovery of the contrast at 12 months.

### **2.2 Socio-linguistic Argument**

Early linguistic growth of children are greatly influenced from and by the parents. [7] investigated 42 families of high-income, middle and low socio-economic status collecting monthly hour-long observational records on children's language growth. The analysis of the records showed that 86-98 percent of the words used by each child reaching the age of three were derived from their parents' vocabularies. Words were not the only language component that are identical to their parent but also the average number of words utilized, the duration of their conversations and the speech patterns were very similar to those of their parents. Children from families on welfare heard about 616 words per hour while

those from working class families heard around 1,251 words per hour, and those from professional families heard roughly 2,153 words per hour. This indicates that children's exposure to language is positively correlated to the socio-economic status of their families

In addition to the early linguistic influence by their caregivers of children, they tend to have lower self-defense mechanism than adults, which allows children to be less inhibited to learning new things and accepting other ideas, thoughts, feelings and experiences. This care-free tendency sometimes leave them vulnerable to dangers of accidents and crimes, but on the other hand provides them many great learning opportunities: one of such opportunity is learning a new language resulted from less inhibited interactions with other children in the form of play and games. [8] argued that the rate of social inhibition is proportional negatively to the rate of speed learning a 2nd language. [9] also suggested that children have stronger curiosity and eagerness to try out new things, which thus lead easily to engage in authentic communication with others.

### **2.3. Biological Argument**

The development of language for communication is a natural and instinctive process like feeding ourselves and breeding the children. The reason language is instinctive is because it is hard-wired in the brain. Just as we evolve neural circuits for eating and seeing, so has our brain, together with a sophisticated vocal apparatus, evolved a complex neural circuit for rapidly perceiving, analyzing, composing and producing language.[10] Children growing up in bilingual environments result in the ability to hear the sounds of both languages. The child may mix the languages in their own speech initially, but will typically sort it out by approximately two and one-half years of age. They will differently classify the words to two separate languages and know which language to use upon they interact with their caregivers. By the age seven, children are able to cope with two different language systems using different linguistic components such as pronunciation, grammar and vocabulary appropriate to their age level.

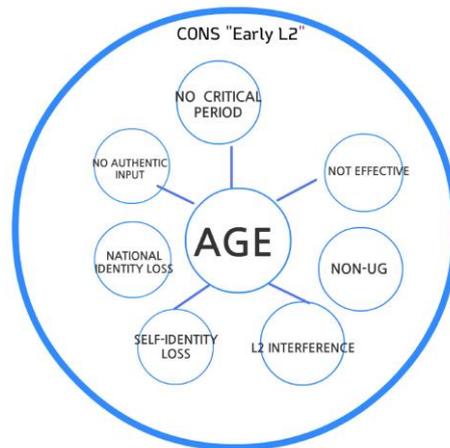
Brain tends to lateralize a variety of its function as a child grows. The process of lateralization is complete around age of 12 to 13 for female and 13 to 14 for male children, which is supported by the evidence from patients with brain damage. [11] The study looked into cases of children and adults lost their language ability caused by brain tumor or accident, and concluded that there's a biological clock, the above mentioned critical period before which one can regain the language ability but after which one cannot recover it to the same degree. [12] states that the biological clock ticks in such a way that the plasticity of children's brain allows that brain functions are redistributed to other parts of brain as the needs arise, but as the lateralization is complete and the plasticity decreases, the redistribution of brain functions are increasingly more difficult especially the function which requires meticulous muscle movements such as pronunciation.

### **3. Arguments against Early English Education**

The arguments against the introduction of early L2 are founded on two categories of theoretical disagreements: no recognition of critical period and UG. This is a long standing argument between nativists and naturalists. In other words, language development is based on the input and exposure rather than biological factors which set the age limit for the ultimate attainment of L2. The other arguments are based on the environmental factors wherein average people in foreign language setting cannot experience the authentic input, and it is not effective even if one encounters English as shown in Figure 2.

There are three arguments against the introduction of early English education: L2 reverse interference to L1 acquisition, loss of national identity and loss of self-identity as

shown in Figure 2. When children are exposed to the 2<sup>nd</sup> language before they master the 1<sup>st</sup> language, the result is claimed that their 1<sup>st</sup> language development will suffer because of the mixed information between two different languages. This claim can be repudiated by the fact that learning more than one language is more normal than not in many countries. Monolingual communities such as Korea and Japan belong to the minority camp than the majority in this regard. This explains that the reverse interference does not hinder the 1<sup>st</sup> language development as evidenced by many bilingual or trilingual communities around the world.

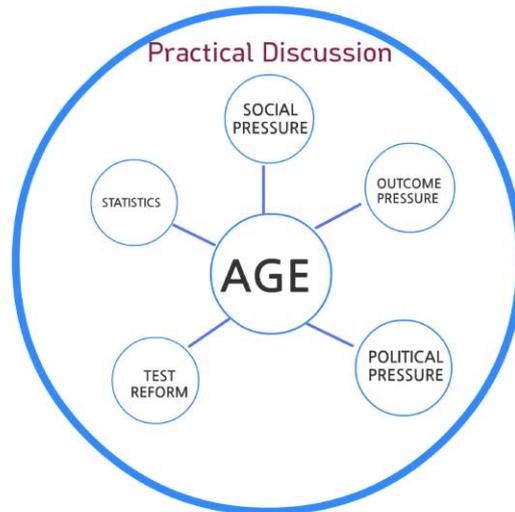


**Figure 2. Cons Early English Education**

Since English becomes increasingly more important in international interaction, children will weigh more heavily on learning English than learning their mother tongue, which will result in the gradual loss of their mother tongue, and one step further the loss of their national identity. As English is introduced earlier on before they gain their self-identity, this will lead children to imitate the English speakers and their culture to identify themselves as a part of the target language group. The national and self identity issue is likely to occur where a small group of people migrated into the target language community, and desperately need to acculturate to the target culture. However, early English education in Korea and Japan is not likely to lose the national and self identity because the majority of time and people they interact with will be their own no matter how early the target language learning might start and how intensive it may be.

#### **4. Practical Discussions**

In this section, the paper will deal with more practical issues. No matter which direction the theoretical arguments sway, there are social and political pressures for early English education. Also, statistics back up that these pressures are real than fictional. It should be remembered, though, that social context influences the second language development indirectly mediated by different variables such as social attitudes towards the language and the learning opportunities determined by their social-economic status. Another type of arguments is not based on pro and cons “early L2” inherent to children’s development but rather the parents’ peer pressure and other social factors on the early L2. This will be called as practical discussion wherein five categories of arguments can be found in the discussion groups and open SNS correspondences as in Figure 3. Out of these five arguments, the outcome pressure and test performance are related to the parents’ perception that more and longer study of English will result in better outcome and test result.



**Figure 3. Practical Discussion**

Political pressure for the excellence in foreign language education is emphatically strong in a developing and trade-oriented country like Korea since good jobs require certain levels of foreign language proficiency. This created foreign language middle and high schools departed from the uniform, inefficient and equalized educational system. Nobody denies the needs of improving the foreign language education, but the roads to get there are different wherein flexible curriculum including content and language integrated learning (CLIL) and in opposition more equalized system is necessary to improve the holistic improvements of all public schools.

#### **4.1 Social Pressure**

In any society an extreme polarization for opportunities for better life causes proportionally extreme reactions. English plays a significant role dividing up the society into two between urban and rural, between haves and have-nots. Some may argue that the different success rate of learning English is the result rather than cause for such polarization. It is true; however, the problem is that English excels the process. For example, people in rural areas feel that they and their children are deprived of English learning opportunities and it will deepen the gap between two areas. This consideration seriously affects their decision in moving to big city area in search of better educational opportunities for their children. English also creates a big social gap resulted from the financial affordability to educate their children in English speaking schools and kindergartens. It left permanent mark on people's mind that using English proficiently is important for their careers in life. This impression is largely inherited by their children.

In the same vein Korean parents are increasingly sending their children to English speaking countries to study. According to Bank of Korea statistics (Jan. 2016) 3,020,000,000 dollars were wired to cover the tuition and living expenses for students studying abroad. The number of elementary and secondary school students studying abroad has dramatically increased from 3,274 (2004) to 16,446 (2016) in the past decade. Number of elementary school students alone accounts for 6,276 in 2004 increased from 241 in 2016 according to MOE statistics.

#### **4.2. Political Pressure**

The outcome-based curriculum is gradually gaining momentum even to the education for younger children due to the newly available testing instruments such as NAPLAN

(national assessment program for language) and CARA (curriculum assessment and reporting authority) test. These tests are designed to measure the outcomes and successes of the predetermined standardized curriculum and practices for the accountability. The standardization and accountability exerts the political pressure to improve the quality of education for the stake holders in the society since the constant comparison and international normative ranks will be bombarded to the political constituency over the internet and news release. It is hard for politicians not to act upon the academic results when the outcome weighs less than expected over the budgetary investment earlier being made.

Another area of concern is that the excellence in education is handed down generation after generation as the private entity in education overgrows and is not regulated. Education traditionally functions as a record breaker correcting the inequality existing in the society. The succession of wealth and social class caused by the educational opportunities leads to social frustration among people who are economically less fortunate cannot be overlooked by politicians. Gyeonggi Province, one of 16 provinces in Korea, established English villages in two locations to offer quality English learning experiences for students from different social background. Central government also released five year innovation plan for English education in which the focus is given in strengthening English education in public schools by controlling the entry level of teachers for stricter requirement in their English proficiency and maintaining stronger maintenance inspection for in-service English teachers. They also have a plan to supply a native speaker per public school so that students have equal access to the cultural and language awareness to the native speakers which is previously available only to those attending private language institutes.

#### 4.3. Statistics

The simple statistics shows that kindergartens teaching English reaches up to 91.8% of 183 kindergarten teachers in Daejeon metropolitan city area surveyed in [13], and the nation-wide survey shows a relatively smaller percentage of 66.2% and one year later 74.9%. The steady increase is noted for the percentage of kindergartens offering English education. The content and method of teaching English in kindergarten is completely up to the teachers and management staff since Ministry of Education claims that kindergarten English education is not necessary and outright ban, though nobody apparently seems to pay much attention to it. 74% of 489 3<sup>rd</sup> graders sampled from metropolitan cities, medium and small cities and rural areas answered that they had learned English when they were lower graders in [14]. If we look at the statistics asking whether or not English education is necessary for lower graders, surveys on the question to students (849), parents (796) and teachers (104) in [15] provides even higher percentage of students and parents for the needs of English while teachers are left behind in the figure. 78.3 % of students and 77% of parents in the survey are for the introduction of English while only 4.5 % of students and 10.4% of parents are against. On the other hand, only 26.5 % of teachers are for the introduction of English and 51.9% is against. No matter what teachers want their students to learn, the statistics clearly show that they want their sons and daughters to learn English, and above all majority of students are for the introduction of English to lower graders.

#### 4.4. Successes and Problems

According to Holliday (1994), there are two basic contexts: instrumentally oriented English language education based in Britain, Australia, and North America (BANA) and state English language education in the rest of the world (TESEP). There are many questions concerning English language education as a form of technological transfer, and “this technological transfer between two branches of the profession is problematic be-

cause the educational environment within which BANA methodologies are designed and implemented is very different from those of TESEP English language education” [16].

English education in middle and high schools has been encroached by the college entrance exam. The Korea Scholastic Ability Test (KSAT) largely measures listening and reading abilities in English due to its nature of being mass testing and high-stake exam, which determines the test format to be multiple choice items. Thus students tend to focus on listening and reading, and test-taking strategies to gain a higher score on the test. The functional syllabus in the national curriculum, despite its emphasis on the productive skills, loses its grip on practical English learning because of the students’ immediate causes. In comparison, elementary school students are relatively free from the pressure preparing for the KSAT. Teachers and students can run the class on their own phases in pursuit of the core spirit of the curriculum. This leads to creative and very interesting English classes in elementary schools introducing games, songs, drama and skits, and different activities. There’re advantages and disadvantages of elementary school English education. Advantages are the innovation of classroom activities and materials including CD-ROM with various pedagogic educational functions embedded. Disadvantages are the further differentiation of English proficiency among students, which caused some left-behind students to lose interests in English much earlier. Another area of disadvantage of early introduction of English is going to have a negative impact on students’ cultural and national identity. In [17], several informants were concerned that introducing English language literacy to students before they had attained literacy in Korean would have a negative impact on their L1 literacy. Teachers’ English competence is often demanded for improvement, and teachers’ ability in English is roughly negatively proportional to their ages, and their ages are positively proportional to their antagonistic position in the introduction and expansion of English to lower graders [18].

## 5. Conclusion

The paper has reviewed different sources of arguments for and against such as linguistic, social and biological argument out of big data and analytics available on-line. The rational aspect of language learning points positive on this matter, but the antipathy and practicality on the matter such as self- and national identity, teachers’ resistance and their English competence hold their strong grips on for the step forward of early English education.

Despite the pros and cons of early English education, it remains a fact that EF (Education First) English proficiency index (EPI) shows a strong positive correlation between English proficiency and income levels shown by statistics of years between 2007 and 2016 over 40 different countries [19]. Korean society where parents tend to dictate the children’s future is not going silent to any attempt to curb early English education or lower the English proficiency of their children by implementing prohibitive measurement on English education. [20]

[17] raised the concern that the early introduction of English literacy negatively affects the first language literacy. However, the early bilingual studies such as [6] and [21] consistently show that the damp on the L1 is transitional and temporary in the phase of development. This implicates that the follow-up study on the subjects in Nunan’s study may well indicate the corrections observed in other bilingual studies. The large portion of studies that oppose to the early English education can be accounted for the transitional nature of the subtracted stage of foreign language development.

Based on the accountability of subtraction of the language ability during the early stage of absorption for the second language, the big data study indicate that early English education excels the fluency in language skills, and it suffices the required exposure times and hours of learning a foreign language in which the Foreign Service Institute

(FSI) has shown approximately 2,200 hours you need to learn Korean as an English speaker to reach S2 being able to communicate on general topics in both oral and written language.[22] The micro area of English education such as materials and methodologies are much under scrutiny for the practice of English education in elementary schools and further down to the kindergartens, though it still has room for the improvement.

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