

I INTRODUCTION

“Will my child not have disadvantages if he enters the bilingual group and have classes in German, his second language, instead of Spanish, his native language?” This question has been asked by many parents who have concerns about bilingual education. As a teacher, I have confronted this situation several times. Now, with this thesis, I do not only have an answer to this question but also evidence to support my beliefs about bilingual education.

Languages are keys that open the doors to the world, therefore speaking two languages is better than speaking only one. Being bilingual has become more and more common since today, people travel, learn languages, live abroad and frequently meet people from other countries speaking other languages. In the twenty-first century, going abroad is not as difficult as it was before. Universities organize exchange programs; firms send their workers to foreign countries; there are many opportunities to be in contact with other languages and cultures, which was not the fact some decades ago. The development of the lifestyle of the twenty-first century not only encourages people to learn a second language, it forces them to do it and most of the time, speaking two languages is not even sufficient. Nowadays, being multilingual is necessary; it already surpasses being “only” bilingual in many countries. In Mexico for example, speaking Spanish and English is required by some private schools, as well as by many firms. But speaking a third language such as German is a privilege and a further chance to find a job later.

Knowing more than one language is a privilege which is an opinion shared not only by linguists but today, according to my experiences, by the majority of people, including parents and teachers. Bilingual schools are increasing in many countries of the world for example, in Mexico, it is possible to find numerous schools in cities that offer English classes. Parents agree on the fact that learning a second language is positive and most of them give their children the opportunity to learn a second language from as early as the kindergarten or sometimes even before.

At this point, it is relevant to distinguish between terms so as not to get them mixed up. First, an important distinction has to be made between a second language and a foreign language. For the purpose of this thesis, the term *second language* will be used to define the fact that students are learning content (such as mathematics, biology, geography etc.) in a language not spoken at home. This means more specifically that the learner has a first language environment (home) and a second language environment, which is in this case, the school. A second language learner belongs to a community which the language is not only spoken but the culture is also shared. When speaking about a foreign language, this means that the language is learned in the first language environment, such as when children learn, for example, English at a school in Mexico. They do not have a direct contact with the English spoken community.

The second important distinction that has to be clearly understood is the difference between learning a second language and learning **in** a second language. Take for example German classes as a foreign language (grammar,

conversation, listening comprehension etc.) which is different from learning content in German (mathematics, biology, arts, etc.), when German is not the native language of the learners. The parents' opinion about learning content in a second language is controversial.

According to my own experiences as a teacher, I can say that parents are still sceptical about the consequences of learning content in a second language. Questions regarding the effectiveness of being able to learn using a language other than the native language are frequently asked. Parents tend to think that a child will learn a lot less if the content is taught in a second language than if it were in the child's first language. They are entitled to be sceptical since it concerns their child's education, yet they need to be informed in order to make the right decision. Is bilingual education a trend of today's life or is it a correct and well-considered choice? Should parents trust bilingual education?

The purpose of the investigation is to provide information that bilingual education is good and parents can make an informed decision. This thesis explains what they should know about bilingual education and answers their questions. Parents should understand why bilingual education is the best option for their children. The claim is to show that taking content classes in another language rather than the native language leads to many advantages and does not cause interference between the languages nor overwhelms the students.

The general area of the study is applied linguistics. The topics that will be investigated are bilingualism, language and cognition, and education. The study is

a quantitative study focused on bilingual education. The two languages involved in this study are Spanish, being the language of the monolingual students and the home language of the bilingual students, and German, which is the educational language of the bilingual students.

In my study, I worked with monolingual and bilingual learners. The bilingual students have German as a second language and not as a foreign language because they are learning the language within a German community and because they are using German in content classes, as well as in their community. If they only had German language classes, I would need to call them foreign language learners. The fact that they are second language learners, use German as the language of instruction for other subjects, and share a culture has contributed to their bilingualism. The participants of this bilingual group all speak Spanish at home and German at school, in the classes as well as in the school community. So, can it be said that taking content in a language other than the native language is the key to bilingualism?

The German native speakers of the school will not be taken into consideration for this study. The reason is that they are not all of them considered to be bilingual. Depending on when they arrived to Mexico, they speak more or less Spanish. Some of them are beginners, some of them advanced and some of them truly bilingual. Not all of them fit into one of the two groups. This has been the reason for not including these pupils, since the variables of language is controlled. The participants of the two groups formed for this study are either bilingual or monolingual.

A crucial aspect that should be taken into consideration is that many schools promote bilingual education without being actually a true bilingual education institution. Having some hours of English language during the week is definitely not bilingual education, but would be foreign language learning. In order to talk about bilingual education, content classes, such as mathematics, biology, arts, music etc. have to be taught in a foreign or second language. In this study, the term bilingual education refers to the fact that the second language is used as the tool to learn content, so the focus is first on the content, then on the language. In Mexican foreign language classes, the central point is the language. The doubts that parents have about bilingual education will hopefully be resolved in this study but a main problem may be that information concerning bilingual education is missing. How should parents know what is good for their children if they are not well informed? How can they know if taking content classes in a second language really leads to positive effects if schools do not explain this to them and why they should trust it? They have the right to be explicitly informed and exposed to the consequences of bilingual education.

The focal point of the study is to analyze the ability of pupils between 10 and 12 years old to deal with cognitive tasks. In order to analyze these abilities, participants will take a series of cognitive tests. For the study, two groups are required – one of monolingual learners (Spanish) and another of bilingual learners (Spanish and German) – which will take the same test, each group in its original language of instruction and the results of the tests should show differences between monolingual and bilingual participants. In order to show that bilingual

learners do not suffer from any disadvantages by learning content using a second language, it is important to have not only the bilingual pupils but also a control group made of Spanish monolingual students. The comparison of both groups will show whether bilinguals or monolinguals perform higher on cognitive tasks. The results will be explained and commented upon.

Monolingual and bilingual students will be tested in mathematic content classes since mathematics will be taken as the example of a content class for bilinguals taught in a language other than the one spoken at home. One of the reasons for choosing mathematics as the example for general content classes is because cognitive skills can be tested for mathematical cognitive tasks. The second reason is that mathematics is a content class that has been taught in the second language since the first grade at the institution where the study was conducted. The final reason for choosing mathematics is because I am a math teacher who teaches this class in German. The participants of the study are not my students; they come from other groups which I do not teach. Finding out which cognitive skill is the more developed by bilinguals can help me for my classes since I could focus the teaching on the pupils' strength. Knowing which one is the less developed will lead to a special training of this skill in mathematics in order to develop it more. In addition, mathematics is an exact science; the mathematics tests that have been used did not lead to complex answers of the questions asked and the participants did not have the possibility to give ambiguous answers which means that the answers could only be either right or wrong. This gave exact numbers for the results.

The choice of doing this study in Mexico has a coherent explanation. Bilingual schools are becoming more and more popular in the country, which causes parents to think about the positive and negative aspects of enrolling their children in one of these schools. The second reason is the fact that many schools that actually call themselves bilingual institutions are not. Parents should know the difference between learning a language and learning in a language, which is the key point in bilingual education. The cognitive aptitudes that will be tested and discussed in this study are related to bilingual education, and not to foreign language learning. The consequences in cognitive aptitudes that will be found cannot be automatically related to foreign language learning since this study only focuses on bilingual education, whereas the mathematic content is taught in a second language, German. The study does not assure that the results found can also be applied for foreign language learning. This is why the study makes the distinction between second language and foreign language, as explained previously. The third reason for having this study done in Mexico is that bilingual education is only accessible in private schools because public schools do not promote content classes in a second language. Starting with bilingual education also in public schools would be a very good initiative in Mexico. If at some point representatives of the public education in Mexico, as well as the parents, were convinced that bilingual education was beneficial, then it might also be made available to children in public schools.

My strongest motivation for doing this study is to encourage bilingual education and immersion instruction at schools in Mexico and demonstrate that

positive cognitive aptitudes are gained by learning content through a second language.

As mentioned previously, speaking two languages is better than only speaking one, but the languages themselves are not the only positive aspect. A bilingual learner has many more advantages than being able to speak in two languages; learners also acquire many cognitive aspects by speaking two languages. Bilingual speakers might forget one of the two languages they have learned or acquired if this language is not being used but they will probably not lose the skills they gain by being bilingual. A research conducted by Fiocco (2009) found out that aging does not necessarily imply a loss of cognitive function. Bilinguals will not only have better skills for language learning but they will also have a large number of further advantages beyond language. They will acquire various cognitive skills that they can apply in their everyday life, such as memory, logical thinking, velocity or abstract reasoning.

My intended contribution will be to help parents, teachers and schools directors to understand the positive attributions of bilingualism and to encourage this kind of education in Mexico.

Three hypotheses have been formulated since the study has been designed to find evidence to support these hypotheses. The evidence will be discussed in chapter 4, according to the results of the tests of each group. Each of the three hypotheses will be supported or rejected.

1. Speaking two languages does not cause any interference nor overwhelm the students in content classes. Bilingual education is not negative.
2. There is a difference in the use of cognitive skills depending on if a child is bilingual or monolingual.
3. Bilingual students have advantages over monolingual students in content classes such as in mathematics. Bilingual education is positive.

To summarize the three hypotheses, the main argument is that bilingual education has no negative effects on the brain; but instead has positive effects on the human brain.

In addition, there is a null hypothesis, which will be rejected or accepted according to the statistical analysis explained in chapter 4. The null hypothesis is the following: H_0 = There is no difference between the monolingual and bilingual group results.

In case the null hypothesis turns out to be supported, the other three hypotheses mentioned previously will be rejected. In the case of at least one of the other three hypotheses turns out to be supported, the null hypothesis will be rejected.

These hypotheses led to five research questions which motivated the investigation and will be answered and discussed in chapter 4.

1. How do monolingual students between 10 and 12 years old score on cognitive and mathematic tests?

2. How do bilingual students between 10 and 12 years old score on cognitive and mathematic tests?
3. What similarities and differences can be found between the monolingual and bilingual students' results of the four cognitive tests? Are these results significant?
4. What similarities and differences can be found between the girls' and boys' results of the four cognitive tests?
5. Based on the results, what recommendations can be made regarding taking content classes in a language other than the one spoken at home?

Besides the five research questions that guided the study, the following assumptions were taken into consideration in this investigation. These assumptions built the basis for the study. They are stated and explained:

1. I assume that bilingual education has not only an impact on language learning but also on cognitive aptitudes. This is important because if this assumption turns to be true, bilingual education will lead to advantages in other areas than only languages. The consequences of choosing a bilingual institution will be vast, since human beings use cognitive skills every day, in most of their thoughts, decisions and learning processes. If this study can show that bilingualism increases the development of cognitive skills, it should not be a challenge for parents to choose between monolingual or bilingual education.

2. I assume that the cognitive aptitudes that bilingual students have come from their bilingualism. The two groups used for the investigation (the monolingual and the bilingual group) have the most important variable – language – as the main difference. Other variables (age, level, socio-cultural background, social class) are controlled. The mathematic programs both groups follow are the same (even if the content might not be taught at the same time, they are all taught during the first six years of primary education). Every student, coming from the monolingual or bilingual group, has to be at the same level of knowledge when starting secondary school; the participants are presently in their last or next to the last year of primary school and the age of the participants is the same in both groups. The participants come from the same socio-cultural background since they all go to the institution chosen for the study which is a private bilingual school. The fact that the mathematic teacher of the groups is not the same will not affect the results because teachers at the institution have to follow the same methodology, syllabus and lesson plans. In addition, the pupils have already had many different mathematic teachers until their present year of study, thus avoiding the implication that one group has had a better teacher than the other; they have all had between four and five different mathematics teachers. The differences in the results should be caused by bilingualism because language is the most important variable for the study and it is different for the two groups. Differences between the groups that would not be caused by bilingualism but by other variables (not controlled, such as time spent on the homework or mathematic aptitude) are not investigated in the study and so it cannot be assured if they influence the

results or not. But the most important variables are controlled, meaning they have no effect on the outcome.

3. I assume that cognitive aptitudes can be tested. It is possible, using a cognitive test, to find out how the participants score on each of the four cognitive skills chosen for this study.
4. I assume that cognitive aptitudes can be applied in any learning processes used in content classes, such as in mathematics. When they are in a learning process, pupils activate their cognitive skills whether they are in a math class or a literature class. For example, if they have acquired a well developed short-term memory skill, they will be able to take advantage of it in every subject.

This thesis is addressed to parents who might be interested in bilingual education program. It is meant as well for directors of any institution in order to support their own bilingual education or to encourage them to start such a program if they still have not. The last audience is the *SEP, the Secretaria de Educación Publica*, the public instruction in Mexico who should also start to think about bilingual education in the country, which would allow Mexico to forge ahead. What is more important than education? It is the seed that makes a person, a society or a whole country grow.