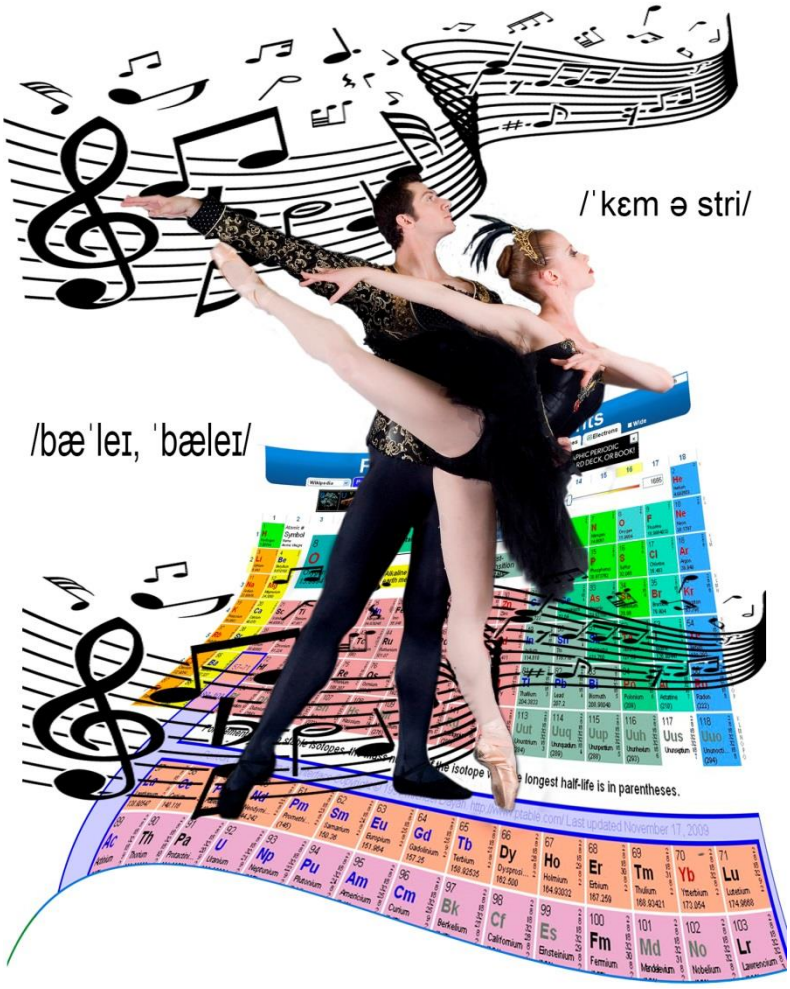

Multiple Intelligences

A framework of the bilingual secondary schools in the Community of Madrid and a perspective of dance to help build up other areas

by **Jean Pierre Daquila**

Supervisor: **Leticia Carrasco Reija**

Universidad de Alcalá

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Abstract

This research aims to explore how Secondary Bilingual Schools in the Community of Madrid develop their work and whether they make use of the Theory of Multiple Intelligences as a tool to facilitate students' learning. These intelligences are bodily-kinesthetic, musical, linguistic, logical-mathematical, spatial, interpersonal, intrapersonal and naturalist. Our work will focus on bodily kinesthetic intelligence.

The first part of the study explores the work which has been carried out by teachers, students and language assistants. To do so, we have administered questionnaires and observed classes.

The second part of the research extends the investigation to find out if ballet dancers and flamenco dancers have a significant improvement in the domains of phonetics and chemistry when trained with the aid of dance. Both groups will be compared with the control group (a group of regular students, who will receive the same training through a traditional method).

Finally, it is shown head teachers are not aware of MI and its benefits to the class. Although teachers sometimes rely on music and dance in their classes, the reason is merely to motivate students rather than knowledge about MI Theory. With regard to assessment, all teachers agreed that assessments are important. Concerning language assistants, we unearthed that the BEDA program and the Franklin Institute have more prepared assistants (compared to the public school) as both institutions train their assistants for one year and are more aware of MI principles than head teachers. 80% of Franklin assistants take into account their students' strengths and weaknesses. With respect to students, 40 % of public schools students and the totality of BEDA students benefit from music and dance in the classroom and all students without exception enjoy learning through these aids. The fact that most students understand their classes in English and all of them were able to understand and answer the questionnaire of this study in English, show us that the bilingual program is efficient to teach a second language and that students are able to express themselves in the L2 as well. However, most students showed a strong Spanish accent.

As evidenced in the results, training is an effective way to improve both pronunciation and chemical elements. A great improvement can be observed after each posttest, mainly in the experimental groups in which dance was used as a potent stimulus to help students to better intake the content.

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I am heartily thankful to my supervisor, Doctor Leticia Carrasco Reija, not only for the valuable advice and guidance she has given me in the writing of this dissertation but also for the encouragement and amiability. I would also like to thank Professor Julio Cañero and Professor Mária Vega for their guidance and suggestions. I would like to show my gratitude to the coordinator of Teach & learn program Iulia Marcela Vescan who helped me administer the questionnaires and she was also a great support in the Alcalá University. My deepest thanks go to my parents, for their love, understanding and support and above all, I thank God.

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I. INTRODUCTION

The increasing interest in Content and Language Integrated Learning (CLIL) in Spain and how schools have been adapting (or not) to new findings - in the light of interdisciplinarity, individual-centered education, individual's profile (Gardner, 2006), self-assessment, peer-assessment - made us carry out this research to verify how Secondary Bilingual Schools in the Community of Madrid deal in practice, not only in theory, with assessments, class planning and adaptation of curriculum according to the student's profile. Because Secondary Bilingual Schools are new in Spain, this research is fundamental to monitor how their implementations are being carried out. In order to analyze these features, we have designed questionnaires for students, head teachers and language assistants of the Secondary School in the Community of Madrid. In 2012, thirty six new Secondary Schools became bilingual in the whole Community of Madrid. In the school year of 2013-14, there are 403 public bilingual schools in the Community of Madrid, 313 primary and 90 secondary schools).

This paper has also aims to analyze if Secondary Bilingual Schools in Madrid make use of the Theory of Multiple Intelligences as a tool to facilitate students' learning. This Theory, proposed by the American psychologist and educator Howard Gardner, was first established in 1983 and advocates that human beings possess eight intelligences and not only one as defended by psychologists prior to his theory. These intelligences are bodily kinesthetic intelligence, musical, linguistic, logical-mathematical, spatial, interpersonal, intrapersonal and naturalist. Our work will focus on bodily kinesthetic intelligence.

Spatial and bodily-kinesthetic intelligences are sensed by athletes, dancers, and others who use their bodies in ways that exceed normal abilities. These are intelligences that are closely related. A quarterback or a ballet dancer need to have both an awareness of body motions and abilities as well as sense of the space involved for the action. Nevertheless, there are many reasons which make the classical ballet dance more integrated with other intelligences. Ballet dancers make it look effortless as they move across the stage, from the lifts to the toe points, therefore there is acting both in the performance of the repertoire and in the hiding the pain or physical stress. The ballet

dancer has to have a great mathematical intelligence to perform a fast allegro, for instance; each movement has to be executed in a specific millisecond. Flamenco dancers need to rely as well on their mathematic abilities, as the footwork requires the ability to make half, two, three, four or even six movement in just one beat. However the precision of the arms movement are freer than in ballet dance, for this reason ballet dancers need to be more holistically aware of their movements, therefore our experiment will test whether this greater attention required by ballet dancers make them acquire better results in the training sessions, when compared to flamenco dancers.

An experiment will be carried out in this study, by training ballet dancers through dance (four years of experience dancing minimum – experimental group 1); a group of flamenco dancers (four years of experience dancing minimum – experimental group 2). Both experimental groups will be trained in two different domains – phonetics and chemistry – to examine whether there is a significant improvement in these areas compared to the control group (a group of regular students, who will receive the same training through a traditional method). The experimental group 1 will be trained with the aid of classical music plus bodily work. The experimental group 2 will be trained with flamenco rhythm and kinesthetic work. The dancers will also build up a portfolio in which they will have to use creativity to explain a topic that they considers difficult (Math, Science, Physics), as proposed by the Arts PROPEL (Gardner, 2006: 156 -166). The analysis of the results may guide us to new approaches to Secondary School students, making use of students' strengths to facilitate their areas of weaknesses.

We would like to highlight that this study takes dance as an example of a possible area of strength; nonetheless, other types of arts can and should be used to support students, such as drama, creative writing, music and others.

The two main aims of this work are: firstly, to help improve the curriculum of bilingual secondary schools in Madrid. Secondly, if ballet proves more effective than other dance styles as a tool to improve other domains (Chemistry, Science, Language), then ballet would be suggested to be added to the extra-curricular activities as one of the options for students with a high bodily intelligence to overcome difficulties in other subjects. One

hypothesis posed in this study is that due to the fact That classical ballet seems to be the most demanding dance technically speaking, it may deal in more intensity with more intelligences tan other dances; therefore, it might be more effective when used to teach other subjects, in contrast to flamenco, in the case of this study.
For instance, a ballet dancer can perform thirty two *battement frappés*[1] in only eight seconds in an eight- beat rhythm; that means four frappés per beat. This is pure mathematics; the choreographer could have opted or demanded 24 frappés in eight beats, for instance. When dancers are in a dance class, the exercises to be performed are usually only spoken, not shown (sometimes the instructor just shows his hands representing the feet and the movements are mimed quickly), dancers need to rely on their logical-mathematical intelligence to perform either 32 or 24 frappés. Spatial intelligence is also germane in ballet. A ballerino must use his spatial intelligence all the time: to monitor his space in order not to invade his colleagues' space as well as monitoring the space of his own movement: in first feet position, for instance, the dancer stands with hips turned out, heels touching together creating as close to a straight line with the feet as possible. In other dances most movements do not have names or a precise position, i.e., any movement close to what the choreographer or instructor asks is accepted; details are not taken into account as they are in ballet. In Classic ballet, even the tips of our fingers have to be in perfect harmony with the movement.

When we start to become aware of our physical capabilities, then we develop the responsibility to protect and hone them. There is a reason the Greeks highly valued "a sound mind in a sound body." We are not fully human and alive unless we are in touch with our body's intelligence.

[1] It is a *battement* where the foot moves from a flexed or 'cou-de-pied' position next to the ankle of the supporting leg, and extends out to a straight position quickly and forcefully, and returning to the initial position hitting the ankle.

The following research questions were raised with regard to the teaching of CLIL in Secondary Schools and the application of Multiple Intelligences in the classroom. In order to answers these questions, two methods were used: we have elaborated questionnaires to teachers, language assistants and students as well as class observation.

1. Owing to the fact that the teachers of Secondary Schools in the Bilingual Program have been working hitherto in a traditional way , have they had enough time to assimilate the "new ideas" proposed by CLIL?

2. Do teachers and language assistants make use of the media available (DVD player, PowerPoint, songs, presentations, computer lab) to facilitate learning or are they still book-centered?

3. Are teachers and language assistants interested in learning about their students? Do they try to find new ways of teaching according to data found in students' self-assessment and in teachers' assessment?

4. Do teachers and language assistants make use of creative materials (drama, dance, music, creative writing) in their classes? Or do they think that secondary school students are too old for the Arts?

5. When assessing, do teachers know exactly the border between language and content? How do they know if a student performed poorly due to lack of knowledge in the language or because he did not master the content?

6. Do teachers exchange ideas / have regular meeting to discuss about assessments, techniques to boost learning processes?

7. Teachers who participate in the program have to take a placement test and then are trained according to their level of English, B2 or C1 (European Framework of reference for languages). Is this level enough for teachers to feel comfortable to teach in a foreign language?

8. Are students effectively learning a second language (L2) or do they have problems to understand their classes in the L2?

On the other hand, to investigate the effectiveness of teaching content through dance the following three research questions were raised:

1. Is there a difference in result among the students who learn through dance (flamenco and ballet in this study) and students who learn through the conventional learning (reading and repeating the content)?

2. Do ballet dancers have a better performance when learning content compared to flamenco dancers due to the greater discipline required in ballet classes?

And finally, in the third part of our study which students have to make choreography telling a school subject theme, we would like to discover whether dancers find it more effective than learning through the traditional method, and if there are advantages for learning in a creative way, what would these advantages be.

This work develops as follows: After this Introduction, section II presents the theoretical framework and is followed by Section III, which presents the methods to be used in this study. Section IV displays the results and discussion and is followed by section V, the conclusion. Section VI presents the bibliography and the penultimate part, the appendix, presents the questionnaires and tables which were used in this study. The final section, *resumen*, shows a summary in the Spanish language with the main findings of this study.

II. THEORETICAL FRAMEWORK

One of the central questions in the implementation of Bilingual Schools in Spain is if it would bear fruit or not. Parents were somehow worried about their children not understanding the content because it would be now taught in a foreign language. This study tries to shed light on this matter. The following literature review shows how CLIL, MI theory and phonetics have been dealt with throughout the years and how they support this and similar studies.

2.1. The History of Content and Language Integrated Learning (CLIL)

Content and Language Integrated Learning (CLIL) is a term created in 1994 by David Marsh and Anne Maljers (Johnson & Swain, 1997) as synonymous of language immersion or content-based instruction. It is an approach for learning content through an additional language (foreign or second), thus teaching both the subject and the language. The idea of its proponents was to create a group of concepts which encompasses different forms of using language as medium of instruction.

CLIL is fundamentally based on methodological principles established by research on "language immersion". Language immersion is a method of teaching a second language in which the target language (or L2) is used as the means of instruction. Unlike more traditional language courses, where the target language is simply the subject material, language immersion uses the target language as a teaching tool, surrounding or "immersing" students in the second language. In-class activities, such as math, science, social studies, and history, and those outside of the class, such as meals or everyday tasks, are conducted in the target language. Today's immersion programs are based on those founded in the 1960s in Canada when middle-income English-speaking parents convinced educators to establish an experimental French immersion program enabling their children 'to appreciate the traditions and culture of French-speaking Canadians as well as English-speaking Canadians. The approach of CLIL has been identified as very important by the European Commission because it can provide effective opportunities for students to

use their new language skills now, rather than learn them now for later use. It opens doors on languages for a broader range of learners, nurturing self-confidence in young learners and those who have not responded well to formal language instruction in general education. It provides exposure to the language without requiring extra time in the curriculum, which can be of particular interest in vocational settings. The European Commission has therefore decided to promote the training of teachers to enhance the language competences in general, in order to promote the teaching of non-linguistic subjects in foreign languages". In Spain the only subjects that are not allowed to be taught in English are Mathematics and Spanish Language and Literature. A school to be considered bilingual needs to have at least one third of its curriculum in English. The first public bilingual schools were implemented in 1996 when by an agreement between British Council and the Ministry of Education and Culture. This project has never had as its main objective to grow in quantity but to maintain and control its quality. A much wider bilingual project was implemented by the Community of Madrid in the school year of 2004-2005 in 26 schools.

2.1.2. Secondary School in Spain

When Spanish students are from 12 to 16 years old, they have to go to Compulsory Secondary School (*Escuela Secundaria Obligatoria, usually abbreviated to ESO*) as homeschooling is not an option in Spain. After the four years of Compulsory Secondary School, students may go to high school (first and second grade of *Bachillerato*). Secondary schools can be:

- Public, free of charge.
- Charter, which receive public money or private donations but are not subject to some of the rules, regulations, and statutes that apply to other public schools in exchange for some type of accountability for producing certain results. Charter schools should be as well free of charge, however parents in Spain usually pay a monthly fee for material, maintenance, extracurricular classes which is around 220 €

according to a survey by the National Institute of Statistics (*Instituto Nacional de Estadística*)[2].

- Private, There's a wide range of private schools (*escuelas privadas*) in Spain including private schools, international and bilingual schools, American and British schools. Together, they educate around one-third of all children in Spain. In order to receive state subsidies and accept Spanish pupils, 25 percent of a school's total number of pupils must be Spanish (at least 20 percent in each class). As a condition of receiving government funding, schools with Spanish pupils are subject to inspection by the Spanish school authorities.

2.1.3. The organization of bilingual secondary schools (E.S.O.)

The bilingual school program was extended to junior high schools (secondary schools) with language section in German, French and English of the Community of Madrid.

The Regional Ministry in Madrid has stipulated the following teaching organization for the secondary schools:

Since the program's inception, each institute will organize their teaching bilingual in two different modalities: Bilingual Section and Bilingual Program.

1. Bilingual Program:

Students enrolled in the bilingual program module will have an increase of two hours per week of English on the general schedule, organized so as to teach a daily class. Furthermore, some other subjects may be taught in English as well as the tutorial sessions of four years of compulsory secondary education. The centers can arrange flexible groups based on the level of English language of students.

[2] Caballer, N *et al*: La escuela concertada oculta el carácter voluntario de sus cuotas: El País, Spain, May 4th, 2009. Available on http://elpais.com/diario/2009/05/04/educacion/1241388001_850215.html

Students have to participate in extracurricular and complementary activities organized by the school to create a bilingual environment and encourage the practice of English.

2. Bilingual Section:

a) Teaching English:

- English is taught five days a week, at the rate of one-hour daily class.

- The contents will be adapted to a curriculum of "Advanced English" to be developed by the Ministry of Education and will focus on English language and literature.

- In the first year of Compulsory Secondary School the "Advanced English" curriculum will be taught, regulated by Order 2154/2010, of 20 April, by the Regional Ministry of Education.

b) Lessons in English:

- Students in the bilingual section may study all subjects in English except Mathematics, Spanish language and literature and second foreign language.

- The same subject cannot be taught in both languages.

- The subjects which are taught in English will follow the curriculum of the Community of Madrid established by Decree 23/2007, of 10 May.

- The hour of tutorial sessions will be taught in English in the four courses of compulsory secondary education.

- In the first, second and third grade of secondary school, Social Studies, Geography and History and Natural Science are taught in English.

- In the third grade of secondary school, at least, Biology and Geology will be offered in English.

- In the fourth grade, besides Social Sciences, Geography, History, Biology and Geology, the school will offer another subject in English. In general, if the availability of teachers allows, the secondary school may propose subjects to be taught in the foreign language, which must be authorized by the Ministry of Education.

The teaching of English, along with the other subjects which are taught in English, have to occupy at least one third of the weekly teaching time.

Agreement MEC / British Council

The bilingual program of the Convention MEC / British Council that has was implemented in 1996 (Dobson, Murillo, Johnstone, 2010) allows students to study the lessons from kindergarten to the end of compulsory secondary education (from 3 to 16 years) pursuing a curriculum that integrates elements of Spanish and British education system.

The program involves an increase in the number of hours of English and the teaching of at least two subjects in English, which means a total of between 9 and 12 hours per week in English. To achieve this, highly skilled and qualified teachers to teach the lessons in English are employed, which also have the support of experienced teachers in the Anglo-Saxon education system. The methodology developed is very active (hands on) and encourages the use of new communication technologies.

The Ministry thus offers a program of high-quality bilingual education in our education system, which fosters mutual interest between the two cultures, without relinquishing its own diversity.

The teaching in bilingual secondary schools began in the academic year of 2007/2008 in three schools belonging to the MEC/British Council Agreement. However, most bilingual secondary schools only became bilingual in 2010 after the Decree 3331/2010, of 11 June, regulating the bilingual schools of the Community of Madrid, ten years after the bilingual program implementation.

Junior high school students participate in international exchange programs with British centers and at the end of the fourth year of secondary school, students achieve a level of knowledge of English as a first foreign language that corresponds to a level between B2 and C2 of the Common European Framework of reference for Languages. This allows, in the public secondary school, students to take, if desired, the external exams of the University of Cambridge in order to obtain the International Certificate for Secondary Education in various subjects. The excellent results obtained since 2010 show the high level attained by students, both in the linguistic and scientific aspect.

2.1.4. The organization of bilingual secondary high schools (*Bachillerato*)

Bachillerato corresponds in English to high school when students are from 15 to 17 years old.

The bilingual project does not extend to Bachillerato due to the fact that students need to be prepared to university entrance examinations, which are all held in the Spanish language.

According to a survey conducted by the British Council / MEC (Dobson, Murillo, Johnstone, 2010: 98 -104), parents show some resistance concerning learning content through English in ESO, let alone in Bachillerato. They believe that their children may learn better the content if it were taught in Spanish.

Nevertheless, there are in Spain the International Baccalaureate Diploma Program (IBDP). A two-year educational program primarily aimed at students aged 16–19 that provides an internationally accepted qualification for entry into higher education, and is recognized by many universities worldwide. It was developed in the early to mid-1960s in Geneva by a group of international educators. Following a six-year pilot program ending in 1975, a bilingual diploma was established. In the community of Madrid there are four of these Secondary Education Institutes (Instituto de Educación Secundaria) from now on abbreviated as IES. IES Maestro Matías Bravo, in Valdemoro, IES Ramiro de Maeztu in Madrid, IES Rosa Chacel, in Colmenar Viejo and IES Retamar, in Poluelo de Alarcón. This

program in Madrid teaches Science, Biology, English, and Technical Drawing in the English Language[3].

2.1.5. The English level of the head teachers

In the Community of Madrid, the first bilingual program was implemented in 1996. A major program was launched in September 2004 when 26 public primary schools were equipped to offer bilingual studies; the teaching staff attended an intensive English course in June and spent the whole month of July in England. In 2012, the community reached a total of 376 bilingual schools.

These teachers were used so far to teaching in Spanish and had two months of training to able to not only learn English but also to teach the content in English. The level required for a teacher to be allowed to teach in primary bilingual schools is B2 according to the Common European Framework of Reference for Languages which is equivalent to the First Certificate of Cambridge. In the first five years of the implementation of the program, the teachers could have a B1 level[4]. From the start, from the 2004/2005 to the 2009/2010 school year, an entry-training plan was offered to teachers that, once completed, allowed the acquisition of appropriate language skills needed to teach in the program.

Initial or entry training (offered until the 2009/2010 school year)

To determine the level of knowledge and training in English language teaching center wishing to participate in training courses, accrediting test was performed (Placement test).

[3] The subjects that are taught in English were obtained through our questionnaires in two of the high schools belonging to the IBDP.

[4] According to the Common European Framework of Reference for Languages, level B1 is an intermediate level, or level 3 of a total of 6 levels.

Based on the results of this initial test, teacher would attend one of the two types of training programs:

a) Aimed at teachers who possessed a B2 level in English according to the Common European Framework of Reference for Languages. These teachers were trained in English-speaking countries for 4 weeks. The course focused on language training, culture and methodology.

b) Aimed at teachers whose skills correspond to the B1 level of the Common European Framework of Reference for Languages. These teachers received the following training in three ways:

1. Language reinforcement training that took place in the Community of Madrid from February to June. This course lasted 100 hours and was taught by the British Council and was apart from teachers' working hours.

2. Training in English-speaking countries. It consists of 4 weeks and is mainly on English Language. Other topics such as culture and institutions of the English-speaking country addressed from the perspectives of language teaching, cultural visits, lectures on topics related to bilingualism and language learning. This course consisted of 5 hours per day. Teachers should spend about 10 hours a week for work and exercises from the development of the course.

3. Thirty-hour training which took place in Madrid on methodology CLIL (Content and Language Integrated Learning Language). It was conducted apart from teachers' working hours and it took place in the schools.

Teachers who participated in these training courses should undergo assessment processes and submit a report of the training. The General Directorate for Improvement of Teaching Quality (Dirección General de Mejora de la Calidad de la Enseñanza) regulated teachers' training.

The selected teachers undertook the obligation to attend training courses to develop the activities in them and participate in complementary cultural and educational visits.

Both non-specialist and accredited English Language teachers, receive CLIL language course in a prestigious British university (University of East Anglia (Norwich), NILE, University of Sussex, University of Chichester, English in York Institution, Stevenson College Edinburgh, Canterbury Christ Church University, York St John University and Chichester University). To this purpose, the Ministry of Education subscribes annually the relevant agreements.

Language Certificate (habilitación lingüística)

After receiving training, educators teach for a year and receive the corresponding authorization. The Language Certificate expires. Therefore, those who do not obtain a position in a bilingual school during the course following the initial training received, have a period of three years to make use of it. All teachers trained and certified by this process made a commitment to teach in English in the program.

Currently, this Certificate is only available through the annual call by the Ministry of Education Human Resources Department. This pathway is for those teachers who have a linguistic level B2 or higher. To do this, it requires overcoming some tests, which will lead to the immediate issue of the aforementioned certificate. This certificate is valid for a period of three years. If, in the course of this period teachers do not work in the bilingual program, they must revalidate their empowerment in subsequent calls. Since the academic year 2010/2011, this is the only possible way to obtain this certificate, for both primary and secondary school teachers.

More than 1,800 teachers were qualified in the 2009/2010 school year. This number guaranteed that there were enough teachers so that all Bilingual Schools could benefit from the required numbered of teachers for the program to work in its best conditions.

Continuing Education

Teachers can receive training courses both in English Language and in CLIL methodology which ensure their linguistic and educational update.

The Training Plan in English Language states that each year the Ministry of Education, allows all teachers to opt for the possibility of training that best fits their profile and personal constraints. Therefore, not only does it offer courses abroad, but also in Madrid and in both cases with different duration, such as, one-month, two-week or one-week courses. This training is offered by the same aforementioned universities in the initial or entry training.

Recycling courses for teachers during the months of July and August are offered by the Official Language Schools, which also offer courses specifically designed for teachers of four weeks during the month of July and the CRIF[5] Las Acacias organized throughout the year and in summer training duration varied. This flexibility allows every teacher to find a response to the type of training and mode they need.

As an example, during the summer of 2010, 5,000 teachers of the Community of Madrid were able to choose from 28 different training options.

An exam for primary teachers was established in 2009, according to the Decree 1672/2009, of April 16, which regulates the procedure for obtaining the foreign language skill to perform bilingual positions in public schools and private schools, and Primary and Secondary Education of the Community of Madrid. This exam consists of two phases:

Phase 1: Exercises for assessing the language skills of candidates in reading comprehension, writing, listening, grammar and vocabulary.

- Phase 2: Exercise for the assessment of the candidates' speaking skills which consists of an interview, in the foreign language, which will aim at assessing the

[5] Centro Regional de Innovación (Innovation Regional Center).

communication skills of the candidates in this language, as it is the vehicle for transmission of the curricular knowledge required, it has to be adequate to express fluency and accuracy.

The candidates who meet one of the following requirements are exempt from taking phase 1 of the exam:

- Possession of any of the language certificates (level B2) that the Education Administration deemed appropriate.

- Have completed, with satisfactory results, the Training Plan Specifically designed by the Ministry of Education for the development of bilingual programs in the Community of Madrid during any of the last three courses preceding the academic year in which the test takes place. Candidates who meet any of these requirements access directly to phase 2 of the exam.

The Spanish Ministry of Education proposed in 2011 that by 2020 all the teacher will have gotten a C1 certificate, which is equivalent to the Advanced Certificate of Cambridge University. For the secondary schools (*E.S.O.*), the Regional Ministry of Education in Madrid since the first of September 2010 has been applying a language exam which is said to be equivalent to the C1 level for the teachers who do not hold a C1 certificate. This language exam provided by the Regional Ministry is structured as follows:

The exam consists of two phases. The first one aims at testing reading comprehension, writing, listening, grammar and vocabulary. Applicants who hold a B2 certificate issued by the Spanish Official School of Languages[6] do not need to participate in this phase. The second phase consists of an oral interview in English that lasts no more than fifteen minutes.

The adequacy of the content and assessment of this test is in line with global knowledge and methodological, of English and knowledge of the curriculum of "Advanced

[6] This certificate is obtained after completing and passing the final exam in the final course.

English" as well as fitness and suitability for its development in the direct classroom practice.

During the oral interview, the evaluation committee may ask the questions they consider appropriate for the proper evaluation of the candidates. The candidates are graded with a "pass" or "fail".

The Regional Ministry of Education applies only the oral interview for those teachers who have completed their studies in the official school of languages (*Escuela Oficial de Idiomas*), even if they finished their studies many years ago. These teachers who get a “pass” in the oral test and were exempt from taking the first part of the exam. Our study will analyze if these teachers are apt to correct their students’ misspelling or even know how to well structure a text. The fact that they can speak English may not mean that they know how to write in English. One of the research questions in this paper is if head teachers have enough level to teach in English. Applicants who hold a B2 certificate issued by Cambridge University have to take both the written and the oral part of the exam. We will try to verify if this fifteen-minute oral test is enough to evaluate teachers’ oral production proficiency.

After teachers join the bilingual program they receive training which last around four hours. Then, once a year they have a meeting.

Teacher Selection for the Agreement MEC / British Council

The teacher selection process takes place in Spain from the month of April to June. Candidates who meet the requirements for this job are interviewed by a Spanish government representative and a representative of the British Council. Following the educational devolution to the regions, they are responsible for the recruitment of teachers participating in the project, although the conditions are similar for all of them.

Requirements:

a. The teachers must be EU Citizens or have a residence permit in Spain in force.

b. They should have English as their mother tongue or English skills, both spoken and written, close to native. It is an advantage to know Spanish, but not a requirement.

c. They must have a recognized teaching qualification in Europe QTS (Qualified Teacher Status).

d. Teaching experience in formal education to students aged 3 to 17.

2.1.6. The language assistant's roles in Bilingual Schools in the Community of Madrid

The Language Assistants who belong to the bilingual program in public and charter schools of the Region of Madrid are pre-selected by the educational authorities of their home countries, mainly Canada and the United States. These assistants may be placed in public Infant, Primary and Secondary education schools. The Madrid Regional Ministry of Education has designed a Training Program for the Teaching Assistants that takes place three times a year, in September, January and April. Attendance to these sessions is compulsory. The training covers the following subjects: music with use of a virtual keyboard; science with interactive human body, sleep, the mind, the muscle, a simulation of a real microscope from either BBC webpage or skool.co.uk; English with dynamic activities (role plays, interviews and interesting articles), history with interactive activities from the National Museum Scotland webpage and also from BBC. Besides this subject training, the contents of the *Language Assistant Guide for the Region of Madrid* include:

- The bilingual school program within the education system of our Region.
- The Language Sections in the Secondary education schools of our Region.
- Basic facts about bilingual education and teaching models: AICOLE-CLIL (Content and Language Integrated Learning).
- Developing resources and teaching strategies for bilingual education.
- The role of the Language Assistant in the schools: socio-cultural, linguistic and methodological aspects.

- Instructions for writing the final report.

Language assistants are paid 700 euros a month (working 12 hours a week) and can work for a maximum period of two years.

The Language Assistants from the *Instituto Franklin - Universidad Alcalá de Henares*

The Instituto Franklin - University of Alcalá has its own program named *Teach & Learn* in which students from a Master's Degree can apply to be a language assistant, or student teacher, as they are called in this program. These students are native English speakers (Americans in this case) as in the program designed by Regional Ministry of Education. The Master's Degree which are related to the program *are Master in International Education, Master in Bilingual and International Education* and *Máster en Aprendizaje y Enseñanza del Español como Lengua Extranjera.* The three Masters deal in theory with some teaching methodologies and the practice the student teacher gets through class observation and talks with the head teacher, in this program called cooperating teachers, at the beginning of the school year. Gradually the student teacher assumes more responsibility, such as lesson planning, developing classroom activities, and eventually student teachers are expected to teach alone although the cooperating teacher has to be in the classroom. Students teacher should request information from cooperating teachers regarding teaching, developing material, lesson planning. Student teachers will be expected to teach English as well as other content courses in English. Student teachers can be requested by school to dedicate a few hours to help cooperating teachers with their English skills. The program was implemented in 2008 and has over 230 student teachers have benefited from it. Student teachers work from 17 to 25 hours and get a stipend according to the hours taught. The stipend ranges from 570€ to 760 €. The student teachers also pursue a Master's Degree for free.

The Language Assistants from the BEDA (Bilingual English Development and Assessment) Program

BEDA program aims to optimize English learning efficiency in Catholic schools. There are 210 Catholic schools in the Community of Madrid which are benefiting from this project. Teaching staff and students are evaluated by a testing body of Cambridge ESOL. The program consists of a step-by-step implementation of bilingual Spanish-English teaching and is an Educational Project which reinforces and extends various aspects of the linguistic community present at the school. This is accomplished by working English into the curriculum as well as the overall educational environment. Teachers and language assistants participate in training courses developed by Macmillan Training Services and Cambridge University Press.

In order to be a language assistant, the English native speaker has to:

- Attend a one-year course at the *Comillas* Pontifical University in Madrid. Each class lasts five hours and takes place every Friday.
- Participate as an assistant during the requested weekly hours
- Encourage oral practice in English
- Act as a role model for correct pronunciation and grammar
- Collaborate with teaching staff in creating teaching materials and planning classes
- Teach students and staff about their country's culture
- Conduct activities and tutorials as the school requires for advancement of the program within the given assistant's schedule
- The assistant will carry out these tasks accompanied by a teacher in the classroom

Language assistants in the BEDA program may work from 16 to 24 hours per week and get a monthly remuneration ranging from 694€ to 1040€ according to the hours he / she has worked.

The head teachers need to pass the language exam established by the Regional Ministry of Education in case they do not have an official certificate which proves that they have the required level.

2.1.7. The Assessment in Bilingual Schools

Assessment is a difficult matter in CLIL due to the fact that it is dual: it has to evaluate both language and content. It is not an easy question to know if a student has performed poorly in a Geography exam, for instance, due to the lack of knowledge of English or because he does not know the content. All forms of assessment are used in European CLIL to evaluate students: formative assessment (project-based, continuous individual or class work), summative assessment (oral and written exams), self-assessment and peer assessment. Ideally, the progress of students is also monitored and considered in the evaluation. In any case, a CLIL assessment should incorporate both language as well as content components.

2.1.8 Students' Linguistic Assessment Program

As recorded by the Order of Bilingual Schools selection, they are committed to participate and collaborate in the development of evaluation processes aimed at students as determined by the education authority.

The Ministry of Education conducts external evaluations of students' linguistic level in the 2nd, 4th and 6th grades of primary education.

During the school year of 2008/2009, the level tests applied by the Trinity College of London, had the participation of 9,280 students from the second and fourth grades of Primary. Ninety one percent of them passed the test.

Since the 2009/2010 school year, external evaluation has been carried out as follows:

The Trinity College of London institution examine the second grader of Primary, corresponding to Grade 3[7]of that institution.

The General Directorate of Evaluation and Analysis, in collaboration with the General Directorate of Innovation Programs, assesses students in the fourth grade of Primary Education in accordance with the requirements of level A2 of the Common European Framework of Reference for Languages.

Finally, and for the first time during 2009/2010, the University of Cambridge began conducting assessment tests to students in the sixth grade of Primary Bilingual Schools (Preliminary English Test - PET for schools, Key English Test - KET for School). The results obtained by the students determine, in case they wish to pursue secondary education in Bilingual Institute, if they will study in the Bilingual Section or in the Bilingual Program.

Evaluation to fourth and sixth grader test the four basic linguistic skills: speaking, listening, reading and writing.

Reference levels in language proficiency of students in the bilingual program, according to the Common European Framework of Reference for Languages, have been established as to achieve the following objectives:

Primary Education second graders - level A1 (beginning level).

Primary Education fourth graders - level A2 (elementary level).

Primary Education sixth graders - level B1 (intermediate level).

2.2. The idea of Intelligence through time and society

The ideal human being may vary through time and society. Physical agility and rational thinking were valued in ancient Greece (Karamanides, 2006). Romans highlighted

[7] Slightly inferior to level A2 (elementary level) according to the Common European Framework for Languages.

courage while Chinese culture values skills in poetry, calligraphy, music and drawing. The Westerner society undoubtedly has been highlighting the ideal of the *intelligent person*. The dimensions of that ideal, however, evolve through time and setting. In traditional schools, the intelligent person could master classical languages and mathematics, particularly geometry. In an IT setting, the intelligent person is the one who fixes computers quickly or can easily develop soft and hardware.

In the late nineteenth century, Francis Galton (Bulmer, 2003: 299 – 328), one of the founders of psychological measurement, believed that intelligence ran in families, and so he analyzed the offspring of those who occupied leading positions in British society. Nevertheless, the honor of having fashioned the first intelligence test is often awarded to Alfred Binet, a French psychologist interested in children and education. In the early 1900s, French families from all over the country were pouring into Paris seeking a solution for their children's difficulties at school. A few years later, the German psychologist Wilhelm Stern developed the measurement of the "Intelligence Quotient", the ratio of one's mental age to one's chronological age. This new measurement test could be easily administered to many individuals. Over the decades, scholars and students of intelligence have argued whether intelligence is singular or there are various independent faculties. Another issue of argument is whether intelligence is inherited or not. Whereas statistics supported heritability of IQs, for instance, the IQs of identical twins are more similar than the IQs of fraternal twins; many scholars still objected to the idea of heritability. They argued that the science of behavioral genetics was developed to work with animals other than humans and since researchers cannot conduct genuine experiments with human beings – they cannot for instance, separate identical twins from their homes - the data is not warranted. Another factor that made many scholars object to heritability is that only people from a certain environment had been studied, chiefly middle-class Americans. Another issue which intrigued some scholars was the fact that intelligence test could be biased. After all, who except the wealthy could answer questions related with polo and fine wines? And if respondents were asked whether they would turn over money found on the street, the expected answers should be different for middle-class and for the destitute ones.

The overuse of the test and its controversy have caused many quarrels and therefore many school officials have become test shy. For the most part, IQ tests are only used in schools when there is a clear case of learning disability. Nevertheless, intelligence testing and mainly the line of thinking that gave rise to it are very much used nowadays.

Half a century ago, there were still neuroscientists who believed that the human brain was an all-purpose machine and that any part of our brain could subserve any cognitive or perceptual functions. All evidences show now that our brain is a highly differentiated organ. Psychologist Robert Sternberg went beyond identifying the components of standard intelligent testing. He looked at how human beings behave in different situations – how they know and use what is needed to behave intelligently at school, at work, on the streets, being in love. Stenberg realized that these practical intelligences are fundamental for success in our society and yet are not tackled in tests or taught explicitly. Sternberg has sought to measure these "new" forms of intelligence and has found that people's ability to deal effectively with them is not necessarily related to their success or failure in IQ-test-style problems.

It is likely that the eagerness to measure intelligence may continue and even become more widespread in the future. Despite this growing tendency of measuring intelligence, Howard Gardner takes into consideration a different premise: Intelligence is too important to be left to intelligence tester. He proposes that we come up with a better way of conceptualizing the intellect since human beings possess a range of capacities and potentials, or multiple intelligences as the author calls them.

2.3. The Theory of Multiple Intelligences: *Frames of Mind*

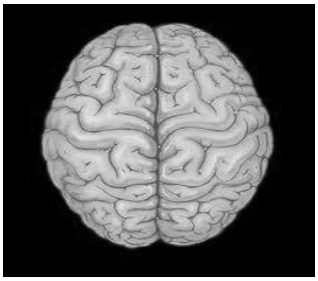
Frames of Mind by Howard Gardner (1983) came out due to a nonprofit institution dedicated to the cause of disabled children and youth, The Bernard van Leer Foundation, in the Netherlands. In 1973, the foundation asked the Harvard Graduate School to investigate the human potential and its realization. Howard Gardner has studied the development of symbolic skills in normal and gifted children, and the impairment of such skills in brain-

damaged adults. *Frames of Mind*, the first book of the project, not only draws on psychological research but also on the biological sciences and on findings about the development and use of knowledge in different cultures (Gardner, 1983). The book starts with the idea that IQ tests are unfair and do not test individual in all the areas; therefore people who are graded with a low number, are stigmatized. However this same human being may have other intelligences which are not tackled by the test. The author goes on to talk about the literature regarding intelligence in chapter two. In the following chapter he explains the biological foundations of intelligence whose findings have two main issues: The first is *flexibility of human development*, which claims that there is malleability or plasticity in development, with appropriate interventions at crucial times yielding an organism with a far different range and depth of capacities. The second issue is the *identity or nature of the intellectual capacities that human beings can develop*. The biologist needs to account for those capacities (like language) which evolve to a high degree in normal individuals, as against other capacities (like ballet dance) where striking differences in individual achievement are far more prevalent. Building upon the findings of neurobiology, studied in molar and molecular terms, helps us to shed light on the possible 'natural kinds' of human intelligence. In subsequent chapters the author dedicates to explain each intelligence in detail.

Dualists' view

Left Hemisphere: language, logic, science and math

Right Hemisphere: creativity, arts and music, spatial code



2.3.1. Linguistic Intelligence

Linguistically intelligent people have a deep understanding of words and sensitivity to the literal and figurative meanings of words, people such as poets, writers, and public speakers have highly developed oral and / or written communication skills. They have sensitivity to the musical qualities and rhythms of words, as well as knowledge of the many different uses for language, such as persuasion, information, or pleasure. One could not hope to proceed with any efficacy in the world without considerable command of the linguistic tetrad of phonology, syntax, semantics and pragmatics. Linguistic intelligence seems the most widely and most democratically shared across the human species.

The Development of Linguistic Skills

Even deaf youngsters begin to babble early in life; during the first months, all infants will issue those sounds found in linguistic stocks remote from their home tongue. By the beginning of the second year, linguistic activity involves, in English, the punctate utterance of single words: “Mommy,” “Doggy,” “cookie”; later, the concatenation of pairs of words into meaningful phrases: “eat cookies”, “bye-bye Mommy”, “baby cry”. Let another year pass and the three-year-old is uttering strings of considerably greater complexity, including questions: “When I get up?”; negations “ I no want to go to sleep”; and sentences with clauses, “Have coke before lunch, please”? By the age of four or five, the child has corrected the minor syntactic infelicities in these sentences and can speak with considerable fluency in ways that closely approximate adult syntax. Average four-year-olds are able to come up with appealing figures of speech; tell short stories about their own adventures and those of characters whom they have invented; alter their speech register depending upon whether they are addressing adults, peers, or toddlers younger than themselves; and even engage in simple metalinguistic banter: “What does *X* mean?,” “should I say *X* or *Y*? The skills of a four- or five-year-old put to shame any computer program for language.

The Brain and Language

Albert Einstein is said to have begun to speak very late; but, if anything, his initial reticence may have allowed him to view and conceptualize the world in a less conventionalized way. Many children, otherwise normal or close to normal, demonstrate selective difficulties in the learning of language. Sometimes the difficulty seems to inhere chiefly in auditory discrimination causing them to articulate improperly.

The ability to process linguistic messages rapidly – a prerequisite for the understanding of normal speech – seems to depend upon an intact left temporal lobe, and so injuries to, or the abnormal development of, this neural zone generally suffice to produce language impairments. Generally, if areas as large as an entire hemisphere of the brain are removed during the first year of life, a child will be able to speak quite well. Early in life the brain is sufficiently plastic and language sufficiently important that language will develop in the right hemisphere, even at the cost of compromising those visual and spatial functions that would normally be localized there. Careful examination of such children reveals that they utilize linguistic strategies that are different from those of individuals who employ the normal language areas in the left hemisphere. Specifically, individuals dependent upon the analytic mechanisms of the right hemisphere proceed almost entirely from semantic information: they decode sentences in the light of meanings of the principal lexical items, while proving unable to utilize cues of syntax. Only those children whose language exploits left hemisphere structures prove able to pay attention to syntactic cues such as word order. Both left and right hemidecorticates[8] are able to understand sentences whose meaning can be inferred simply from knowledge of the meaning of substantives:

The cat was struck by the truck.

But only the individual with an intact left hemisphere can decode sentences where the critical difference in meaning inheres wholly in syntactic cues (Gardner, 1983):

[8] Removal of the cortex from one lateral half of the cerebrum. Available on http://www.merriam-webster.com/medical/hemidecortication

The truck was hit by the bus.

The author takes care not to term this capacity as an auditory-oral form of intelligence, given that deaf individuals can acquire natural language.

Many retarded children display a surprising ability to master language – particularly its core phonological and syntactic aspects – though they may have relatively little of significance to utter. Other rare children, despite retardation or autism, prove able to read at an astonishingly early age. These “hyperlexic” children are often able to decode texts as early as two or three. The reading is so compulsive that it is hard to stop. One hyperlexic child studied by Fritz Dreifuss and Charles Mehegan could immediately tell the day of the week of remote historical dates, while another showed an excellent memory for numbers.

2.3.2. Musical Intelligence

Musical intelligence can be approached through an actual formal musical analysis and representation; as a way of capturing and understanding feelings which the music brings forth, and how to express the physical. Music also ties to other kinds of intelligences, for example logical intelligence, since it is math oriented. Pythagoras, considered to be the first of the philosophers, would not detach music from mathematics and he would also use music to control anxiety, anger, sadness and to fall asleep (Karamanides, 2006).

The origins of music evolutionary process are wrapped in mystery. Many scholars suspect that linguistic and musical expression and communication had common origins which might have split off from even a million years ago. Psychologists have attempted to examine the mechanism by which musical patterns are perceived. The more prevalent school has taken what might be called a ‘bottom-up’ approach, examining the ways in which individuals process the building blocks of music: single tones, elementary rhythmic patterns, and other units that allow ready presentation to experimental subjects and are devoid of the contextual information encountered in performances of works of music. Subjects are asked to indicate which of two tones is higher, whether two rhythmic patterns are the same. Musicians have often questioned the relevance of findings obtained with such

artificial patterns for the larger musical entities typically encountered by human beings (Gardner, 1983: 107). This skepticism arose a 'top-down' approach to musical perception, where one presents to subjects musical pieces or, at least, healthy musical segments. In such studies, one typically examines reactions to more global properties of music (does it get faster or slower, louder or softer?) and then the metaphoric characterizations of the music (is this heavy or light, crowded or sparse?). It is perhaps why a 'middle ground' approach has come to the fore. The goal here is to sample musical entities that are large enough to bear a non-superficial resemblance to genuine musical entities, yet sufficiently susceptible to analysis to permit systematic experimental manipulations. Research in this vein has used short pieces or incomplete fragments of pieces that have a clear key or a clear rhythm. Subjects are asked to compare completions with one another, to group together pieces in the same key or rhythm patterns, or to fashion their own completions. Individuals appear to have 'schemas' or 'frames' for hearing music – expectations about what a well-structured phrase or sections of a piece should be – as well as at least a nascent ability to complete a segment in a way that makes musical sense.

Much has recently been discovered about the development of song in birds. Some species are restricted to a single song learned by all birds, even those that are deaf; other species feature a range of songs and dialects, depending clearly on environmental stimulation of specifiable sorts. A remarkable mix of innate and environmental factors can be found among birds. Within the different trajectories, there is a prescribed path to development of the final song, beginning with *subsong*, passing through *plastic song*, until the species song or songs are finally achieved. Nevertheless, the ultimate output of human singers is much vaster and more varied than even the most impressive bird repertoire; and this discontinuity between the two vocalizing species needs to be kept in mind. Bird songs are lateralized in the left part of the avian nervous system. A lesion there will destroy bird song, whereas comparable lesions in the right half of the brain exert much less debilitating effects. Moreover, it is possible to examine the bird´s brain and to find clear indices to the nature and the richness of songs. The stock of song changes across seasons and this alteration can actually be observed by inspecting the expansion or the shrinkage of the

relevant nuclei during different seasons. The mechanism by which certain core musical components are organized may well prove analogous to those exhibited by human beings.

Investigators working with both normal and brain-damaged humans have demonstrated beyond a reasonable doubt that the processes and mechanisms subserving human music and language are distinctive from one another. Diana Deutsch summarizes this dissociation, whose work falls largely in the 'bottom-up' tradition. Deutsch has shown that the mechanisms by which pitch is apprehended and stored are different from the mechanisms that process other sounds, particularly those of language. Individuals are given a set of tones to remember and then presented with various interfering material. If the interfering material is other tones, recall for the initial set is drastically interfered with (forty percent error in one study). If, however, the interposed material is verbal – lists of numbers, for example – individuals can handle even large amounts of interference without material effect on the memory for pitch (two percent error in the same study).

The specialness of musical perception is confirmed dramatically by studies of individuals whose brains have been damaged as a result of a stroke or other kinds of trauma. There are cases in which aphasic[9] individuals have also exhibited diminished musical ability while others can suffer significant aphasia without any discernible musical impairment, even as one can become disabled musically while still retaining one's fundamental linguistic competences. This is due to the fact that linguistic abilities are lateralized almost exclusively to the left hemisphere in normal right-handed individuals, the majority of musical capacities, including the central capacity of sensitivity to pitch, are localized in most normal individuals in the right hemisphere. Appreciation of music also seems to be compromised by right hemisphere disease. Amusia is the disorder characterized by inability to recognize or reproduce musical sounds.

[9] Person who has had a partial or total loss of the ability to articulate ideas or comprehend spoken or written language, resulting from damage to the brain.

While the syndromes of languages seem to be uniform, even across cultures, a great variety of musical syndromes can be found even within the same population. Musical breakdown suggest no systematic connection with other faculties, such as linguistic, numerical, or spatial processing; music seems, in this regard, *sui generis* just like natural language. Perhaps once the proper analytic tools for studying various forms of musical competence have been refined, we may find that it is even more lateralized and localized than human language.

The literature is filled with accounts of astonishing musical and acoustical feats carried out by autistic youngsters. One such child named Harriet was able to play "Happy Birthday" in the style of various composers, including Mozart, Beethoven, Verdi and Schubert. Harriet exerted her musical passions in other ways – for example, knowing the personal history of every member of the Boston Symphony Orchestra. At the age of three, her mother called her by playing incomplete melodies, which the child would then complete with the appropriate tone in the proper octave.

Many composers have stressed the close ties that exist between music and bodily or gestural language. Stravinsky has insisted that music must be seen to be properly assimilated: thus, he was partial to the ballet as a mode of performance and always insisted that one observe instrumentalists when they were performing a piece. The localization of musical capacities in the right hemisphere has suggested that certain musical abilities may be closely tied to spatial capacities. The psychologist Lauren Harris quotes claims to the effect that composers are dependent upon powerful spatial abilities, which are required to posit, appreciate, and revise the complex architectonic of a composition; he speculates that the dearth of female composers may be due not to any difficulty with musical processing per se but rather to the relatively poorer performances in spatial tasks exhibited by females.

Musical performance and feelings

Music can serve as a way of capturing feelings, knowledge about feelings, or knowledge about the forms of feeling, communicating them from the performer or the creator to the attentive listener.

Individuals with damage to the subcortical areas, or with disconnection between cortical and subcortical areas, are often described as being flat and devoid of affect; such individuals seem rarely to have any interest in or attraction to music. Quite instructively, one individual with extensive right hemisphere damage remained able to teach music and even to write books about it, but lost the ability and the desire to compose. According to his own introspection, he could no longer retain the feeling of the whole piece. Another musician with right hemisphere disease lost all esthetic feelings associated with his performances. Perhaps these feeling aspects of music prove especially brittle in the instance of damage to the right hemisphere structures, whether they are cortical or subcortical[10].

2.3.3. Music and Mathematics

Dating back to the Classical discoveries of Pythagoras, the links between music and mathematics have attracted the imagination of reflective individuals. In medieval times the careful study of music shared many features with the practice of mathematics, such as an interest in proportions, special ratios, recurring patterns, and other detectable series. In the sixteenth century, as harmonic concerns gained in ascendancy, the mathematical aspects of music became less apparent. Once again, however, in the twentieth century music and mathematics have been widely pondered due to firstly the twelve-tone music, and more recently, the widespread of computers. In order to appreciate the operation of rhythms in

[10] Cortical involves or results from the action or condition of the cerebral cortex (the thin mantle of gray matter about the size of a formal dinner napkin covering the surface of each cerebral hemisphere) while subcortical involves the portion of the brain immediately below the cerebral cortex. Available on http://www.merriam-webster.com/dictionary.

musical work, an individual must have some basic numerical competence. Performances require a sensitivity to regularity and ratios that can sometimes be quite complex.

Sensitivity to mathematical patterns and regularities has characterized many composers, ranging from Bach to Schumann, who have given vent to this interest, sometimes overtly, sometimes through a kind of playful exploration of possibilities (Mozart even composed music according to the roll of dice).

2.3.4. Logical – Mathematical Intelligence

In Piaget's view (Piaget, 1965), all knowledge – and in particular, the logical-mathematical understanding which constituted his primary focus – derives in the first instance from one's actions upon the world. Only after the first eighteen months of life does the child come fully to appreciate that objects will continue to exist even when they have been removed from his time-and-space frame. The child of four or five has come to realize that the final number in his counting is also the totality (the cardinal quantity) of objects in an array. Finally, by the age of six or seven, the child has reached the level of Piaget's young mathematician-to-be. Confronted by two arrays, the child can count the number of entities (M&M, dolls, balls) in each, compare the totals and determine which contains the greater amount.

Further cognitive growth is essential before the child reaches the next – and for Piaget – the final stage of mental development. During the early years of adolescence, at least in the Western societies studied by Piagetians, the normal child becomes capable of formal mental operations. Now he can operate not only upon objects themselves, and not only upon mental images or models of these objects, but also upon words, symbols or strings of symbols (like equations) that stand for objects, and for actions upon objects. He is able to state a set of hypotheses and to infer the consequences of each. Where once the child´s physical action transformed objects, now mental operations transform sets of symbols.

Gardner´s major disagreement with Piaget is that the latter has painted a brilliant portrait of development in one single domain, the logical-mathematical, but has erroneously assumed that it pertains to other areas, ranging from musical intelligence to the interpersonal domain (the ability to interact with others, understand them, and interpret their behavior).

The Mathematician

Except from a few initiates, the work of the mathematicians can only be admired from afar. It is notoriously difficult to convey a proper impression of the frontiers of mathematics to non-specialists.

What characterizes those with mathematical gifts? According to Adler, the powers of mathematicians rarely extend beyond the boundary of the discipline. Mathematicians are seldom talented in finance or the law. What characterizes the individual is a love of dealing with abstraction, “the exploration, under the pressure of powerful implosive forces, of difficult problems for whose validity and importance the explorer is eventually held accountable by reality.”

The most central and least replaceable feature of the mathematician’s gift is the ability to handle skillfully long chains of reasoning. Many mathematicians report that they sense a solution, or a direction, long before they have worked out each step of a problem in detail. The world of the mathematician is a world apart, and one must be ascetic to derive sustenance from it. The imperative to concentrate energies for many hours on seemingly intractable problems is the norm. Language is not much help. One is with one’s own with pencil and paper and one’s own mind. One must think very hard; and, thus, one often suffers severe strain, if not a breakdown. Nevertheless, mathematics can also provide protection against anxiety; a mathematician finds his own monastic niche and happiness in pursuits that are disconnected from external affairs.

The Practice of Science

Science and mathematics are certainly closely connected. Even the invention of science has been linked to the status of mathematics during particular historical epochs, and almost every significant mathematical invention has eventually proved useful within the scientific community.

In Classical times, science and philosophy were closed tied. With the passage of time, however, the enterprise of science has become increasingly independent, though it continues to cross-fertilize with philosophy and mathematics. Among the factors important in the rise of science as a separate enterprise have been its dissociation from politics and theology; the increasing reliance on empirical observation, measurement, and crucial experiments designed to test one model of theory against another.

The desire to explain nature, rather than to create a consistent abstract world, engenders an instructive tension between pure scientists and pure mathematicians. The mathematician may peer down his nose at scientists for being practical, applied, insufficiently interested in the pursuit of ideas for their own sake. The scientist, in turn, may feel that the mathematician is out of touch with reality and tends to pursue ideas forever even when they do not lead anywhere and may not be of practical consequence.

Mathematical Talent in Isolation

The ability to calculate fast is at best an accidental advantage for mathematicians. There are selected individuals who have an ability to calculate enormously well, and one can see in them a portion of logical-mathematical ability operating in relatively autonomous form. The best example of this profile are *idiot savants* (Gardner,1983:155), individuals who, with meager or even retarded abilities in most areas, show from early childhood an ability to calculate very rapidly and very accurately. Idiots savants do not seek to use mathematics to help them in other areas; instead, they have mastered a series of steps which enable them to stand out.

In most cases, the *idiot savant* appears to have a genuine calculating ability which starts at an early age. A child named Obadiah, for instance, taught himself at the age of six years old to add, subtract, multiply and divide. Another eleven-year-old child studied by neurologist Kurt Goldstein, was able to remember virtually endless series, such as railroad timetables and newspaper financial columns.

While some individuals are blessed with at least one core component of logical-mathematical aptitude, others show selective weakness in the numerical realm. Some of these may well have a selective numerical difficulty, akin to the difficulties exhibited by many children with written language (dislexics) and a far more reduced number, with spoken language (dysphasics).

The worst disability is found in individuals having the developmental Gerstmann syndrome, an isolated impairment in learning arithmetic, along with difficulties in recognizing and identifying fingers and in distinguishing their left from right. Although there might have problems in writing or spelling, language is normal in these children. These individuals have a deficiency in the association cortexes in the posterior areas of the dominant hemisphere that are involved in recognizing ordered arrays and patterns in the visual sphere.

Little is known about the evolutionary antecedents of numerical ability and a comparatively minimal amount about its organization in the brain of the normal human adult of today. There exist individuals who lose the ability to calculate while remaining linguistically intact, as well as a far larger set of cases of individuals who are aphasic but can still make change, play games requiring calculation, and manage their financial affairs. Moreover, as evidence accumulates, important aspects of numerical ability are normally represented in the right hemisphere. The ability to read and produce the signs of mathematics is more often a left hemisphere function, while the understanding of numerical relations and concepts seems to entail right hemisphere involvement. Elementary difficulties in language can impair the understanding of number terms, even as impairments in spatial orientation can render inoperative the ability to use paper and pencil to carry out sums or geometrical demonstrations. There is a fragile consensus that the left parietal lobes,

and the temporal and occipital association areas contiguous to them may assume a particular importance in matters of logic and math; lesions in this area originate the adult version of the Gerstmann syndrome.

Gardner proposes a different account of the neurological organization underlying logical-mathematical operations. In his view, certain neural centers may well be important for specific logical-mathematical operations. Regions in the parietal area may be important in many individuals, but an equally persuasive case can be made that, in other individuals or with respect to other operations, structures in the frontal lobes or elsewhere in the right hemisphere can compromise key logical-mathematical functions. The solution for Howard lies in the work of Piaget. The ability to carry out logical-mathematical operations commences in the most general actions of infancy, develops gradually over the first decade or two of life, and involves a number of neural centers that work in concert. Despite focal damage, it is usually the case that these operations can nonetheless be carried out, because the operations inhere not in a given center but in a generalized and highly redundant form of neural organization. Logical-mathematical abilities become fragile not principally from focal brain disease but, rather, as a result of more general deteriorating diseases, such as dementias, where large portions of the nervous system decompose more or less rapidly.

Relation to the other intelligences

Logical-mathematical intelligence has been of singular importance in the history of the West; however it has been less important elsewhere. Gardner claims that logical-mathematical intelligence is one among a set of intelligences, a skill powerfully equipped to handle certain kinds of problem, but one in no sense outstanding, or in danger of overwhelming the others. As mentioned before, there is a logic to language and music, but these logics operate according to their own rules.

2.3.5. Spatial Intelligence

This intelligence is related to how well an individual processes visual information. This includes the ability to visualize objects and rotate, transform, and otherwise manipulate them. These capacities typically occur together in the spatial realm. Indeed, they operate as a family, and use of each operation may well reinforce use of the others. Just as linguistic intelligence is not wholly dependent upon the auditory-oral channels and can develop in an individual deprived of these modes of communication, so can spatial intelligence develop even in an individual who is blind and therefore has no direct access to the visual world, therefore Gardner prefers not to call it "visual-spatial intelligence". Engineers and scientists are among those that Gardner sees as having high spatial intelligence. Some commentators deem visual and spatial imagery as a primary source of thought. The psychologist Rudolf Arnheim, for instance, argues that the most important operations of thinking come directly from our perception of the world, with vision serving as a sensory system *par excellence* which supports and constitutes our cognitive processes. Arnheim minimizes the role of language in productive thinking, suggesting that unless we can conjure up an image of some process or concept, we will be unable to think clearly about it. A more comprehensive view would hold that visual or spatial intelligence contributes to scientific and artistic thought.

Development of Spatial Intelligence

Piaget conducted several studies of the development of spatial understanding in children. At the end of sensorimotor stage of early childhood youngsters become capable of mental imagery. They can imagine a situation or a place, without having to be there.

Seeing that both logical-mathematical and spatial intelligence arise from the child's action upon the world, one may ask whether they in fact entail different forms of intelligence. Piaget introduced a distinction between figurative knowledge, in which an individual retains the configuration of an object; and operative knowledge, where the emphasis falls upon transforming the configuration. According to Piaget, the advent of concrete operations at the start of school marks an important turning point in the child's

mental development. The child is now capable of far more active manipulation of images and objects in the spatial realm. Only during the formal operation era, at the time of adolescence, can the youth deal with the idea of abstract spaces or with formal rules governing space. There have been recently new studies of the child's broader spatial understanding. Children of age three or less, for instance, can retrace a route that they knew motorically, but have difficulty anticipating what sorts of things they will encounter in regions that they have not themselves visited, but about which they have accrued some independent knowledge.

Except for language studies, there has probably been more established about spatial abilities in the brain than about any other human faculty. The outcome of this research tradition is persuasive. Just as the left hemisphere of the brain has been selected as the pre-eminent site for linguistic processing, the right hemisphere of the brain, and in particular the posterior portions of the right hemisphere, proves to be the site most crucial for spatial and visual processing. However, sizable deficits in spatial ability can also follow upon damage to the left posterior regions.

Studies in primates show that spatial intelligence was extremely important for a roving band, when individuals needed to traverse wide spaces and return home safely. It was necessary to have keen spatial intellect so that they did not get lost. The premium on spatial skills may also help explain why sex differences appear more in tests of spatial intelligence than on most other forms of intelligence. Hunting and wandering were pre-eminently male preoccupations, there would be more of a selective advantage for males to evolve highly developed spatial abilities, and more likely an early death for those who lacked them.

Unusual Forms of Spatial Ability and Disability

Research with blind subjects has indicated that spatial knowledge is not totally dependent upon the visual system, and that these individuals can even appreciate certain aspects of pictures. Blind subjects as well as normal candidates who have been blind-folded

can recognize geometrical shapes that have been presented via raised line drawings. Insights gleaned by normal individuals from a combination of tactile and visual modalities prove accessible to the blind from the tactile realms alone. Also, drawings of blind children resemble those of sighted subjects. The most striking account comes from studies by Barbara Landau at the University of Pennsylvania. In one investigation, a congenitally blind two-and-one-half-year-old child proved able to determine the appropriate path between two objects after traveling to each of these objects only from a third location. In order to determine the course between objects along a route that she had never herself followed, the child had to be able to detect the distance and the angular relationship of the familiar paths and then derive the angle of the new path from this information. Clearly, metric properties of space can be inferred in the absence of visual information. Moreover, the same child seen again at age four was able to use a tactile map in order to find a prize located in the room. Though the child had never seen a map, she was able immediately to grasp the concept of one and use it to guide her to the desired location. Landau reached a conclusion vital to Gardner's study: There is not a privileged relationship between visual input and spatial intelligence. In Francis Galton's pioneering investigation of the imagery faculty[11], Galton found out that, when asked to recall the scene of that morning's breakfast, scientists typically reported little or no visual imagery, while individuals of apparently modest intellectual powers often reported detailed concrete imagery. Unusual spatial abilities can be found in individuals who are otherwise retarded. There is an English painter Bryan Pearce who despite a subnormal I.Q., can sell his paintings at a high price; an English adolescent who despite a condition of severe autism was able as a very young child to make drawings of the most remarkable finesse and representational accuracy. However, Nadia was unable to draw simpler versions of an object and seemed compelled to include every detail in very drawing.

[11] Francis Galton's observation of poor visual imagery in scientists is discussed in his *Inquiries into Human Faculty and Its Development* (London: Dent, 1907)

The Uses of Spatial Intelligence

Progress in the domain of a sculptor or of a mathematical topologist is difficult to envisage without a developed spatial intelligence. There are many other pursuits where spatial intelligence alone might not suffice to produce competence, but where it provides much of the necessary intellectual impetus. Nevertheless, it must be stressed that spatial reasoning is not uniform across various sciences, arts and branches of mathematics. Topology exploits spatial thinking to a much greater extent than does algebra, for instance. Individuals with exceptional gifts in the spatial area, such as Leonardo Da Vinci and Arthur Loeb, have the option of performing not only in one of these spheres but across a number of them, perhaps excelling in science, engineering and various arts.

Chess would be a strong candidate to illustrate the centrality of spatial intelligence. Chess masters have generally had outstanding visual memory, or visual imagination, as they call it. Yet a close examination of these individuals reveals that they possess a special type of memory. Alfred Binet, the founder of intelligence testing, examined mnemonic virtuosity in blindfolded chess in which the opponent can see the board, but the blindfolded chess player cannot. Successful blindfold chess depends upon physical endurance, great powers of concentration, scholarship, memory, and imagination. Chess players have excellent memories, particularly of important games in their past.

The Visual Arts

The centrality of spatial thinking in the visual arts is self-evident. Painting and sculpture involve an exquisite sensitivity to the visual and spatial world. Artists typically begin by mastering techniques developed by their predecessors. Leonardo da Vinci, for instance, would follow a person with a strange head or beard a whole day and so learn him by heart, that when he reached home he could draw him as if he were present. On the other hand, Michelangelo had a most tenacious memory; he could remember and make use of works of others when he had only once seen them; while he never repeated anything of his own because he remembered all he had done.

The Cultural Perspective

Spatial competence can be observed in all known human cultures. Some remote cultures from our own have developed extremely accurate spatial intelligence. The Gikwe bushmen of the Kalahari (Gardner, 1983: 200 – 204), for instance, can deduce from the spoor of an antelope its size, sex, build and mood. In the several hundred square miles area where they travel, they know very bush and stone, every convolution of the ground. A similar panorama is found in Kenya, where the child Jomo Kenyatta was taught how to recognize every head of livestock in his family's herd from tis color, markings, and size and type of its horns. Eskimos are another good example of developed spatial intelligence; possibly because of the difficulty of finding their way around their environment. They must be able to detect slight cracks in the ice, because a breaking ice pack could set one adrift in the ocean. Also, to find their way back to a few houses in the tundra, the hunter must attend to the angle and shape of small drifts of snow. Eskimos are said to be able to read as well upside down as right side up, and they can carve complexly designed figures without having to orient them correctly. Both males and females Eskimos perform particularly well in spatial tasks, this finding demonstrates that the sex differences in spatial abilities reported regularly in our western culture can be overcome in certain environments.

Highly developed spatial abilities are also found amongst the Puluwat people of the Caroline Islands in the South Seas. The highly developed skill is that of navigation, one found in a minority of individuals who are allowed to sail canoes. Within this well-trained population, there occurs a flowering of skills that has filled Western-trained navigators with awe. The secret of Puluwat navigation is found in the arrangement of stars in the sky. To navigate among the many islands in their vicinity, the Puluwats must recall the points or directions where certain stars rise and set around the horizon. This knowledge is first committed to memory of rote, but then becomes absorbed into the intuition of the sailor as he spends many months traveling back and forth. In order to achieve this knowledge, the chosen Puluwats must learn much secret lore and negotiate a long series of tests. Asked where an island is, he can point to it, immediately and accurately, not because he sees it but

because he has learnt in his mind's eye that the reference island passes under a particular star. These Puluwatan navigators are an excellent instance of high spatial intelligence.

Spatial intelligence in talented individuals often remains intact until the end of their lives. Picasso and Titian painted till their nineties while logical-mathematical thought and bodily-kinesthetic intelligence prove fragile later in life, in all individuals.

2.3.6. Bodily-Kinesthetic Intelligence

The ability to use one's body in highly differentiated and skilled ways, for expressive as well as goal-directed purposes characterizes bodily-kinesthetic intelligence. The cores of bodily intelligence are the control of one's bodily motions and the capacity to handle objects skillfully. Gardner deals with both types of bodily intelligent individuals, such as dancers and swimmers (who develop keen mastery over the motions of their bodies) as well as artisans, ballplayers and instrumentalists, who are able to manipulate objects with finesse. The author also considers other individuals in whom use of the body proves central, such as actors, performers and mimes; in these latter occupations, other intelligences ordinarily play an important role. The actor for instance, uses skills from the personal intelligence as well as from musical and linguistic intelligences.

The Greeks revered the beauty of the human form, a body that was perfectly proportioned and graceful in movement, balance and tone (Gardner,1983: 206). They sought a harmony between mind and body. The divorce between the mental and the physical has frequently been coupled with a notion that what we do with our bodies is somehow less important than those problem-solving routines carried out chiefly through the use of language, logic, or some other relatively abstract system.

Bodily use can itself be differentiated into a variety of forms. One can use the whole body, such as a runner or a swimmer or just his hands and fingers to carry out delicate movements involving precise control. A good pianist is a good example of the latter, he can produce independent patterns of movement in each hand, sustain different rhythms while also using both hands together to "speak to one another" or to produce a fugal effect.

The act of problem-solving in dance is very physical and direct, and it has a way of providing instant feedback. If something works, it clicks in the body, making sense in a manner that is simple and crystal clear. If something does not work, mind and body function together to find an alternate solution. This kind of "body thinking" is inherent in the design of the human physique. It is one of the very first ways we learn about physics. We have a personal experience of gravity, of leverage, force, and motion, and we also have a body that can be finely tuned to its own inner processes.

The Brain's Role in Bodily Movement

Bodily intelligence may have been taken for granted or minimized in importance by many researchers, motor activity has been considered as a less "high" cortical function than functions subserving "pure" thought. However, the famous American neuropsychologist Roger Sperry pointed out that one should see mental activity as a means to the end of executing actions. Rather than a motor activity as a subsidiary form designed to satisfy the demands of the higher centers.

The tendency for left hemisphere dominance in motor activity seems to be a proclivity of human beings, no doubt at least partially under genetic control, and one that in all likelihood is connected with language. Just as most normal individuals will have their language capacities housed in the left hemisphere, so, too, will the left halves of their brains be dominant for motor activity. Supporting Gardner's claim for a separate bodily intelligence, it turns out that injuries to those zone of the left hemisphere that are dominant for motor activity can produce selective impairment or apraxia.

The Evolution of Bodily Skill

The greatest explosion in human evolution occurred probably thirty-five to forty thousand years ago at the time of Cro-Magnon man. It is difficult to dissociate it to the use of productive oral-auditory languages. At that time, there emerged clear signs of human

symbolic capacities, including pictures, notations, ritualistic dances and a correlative revolution in the degree of precision of tools.

The Development of Bodily Intelligence in the Individual

Although Piaget did not himself view his work in relation to bodily intelligence, his description of the unfolding of sensorimotor intelligence illuminates its initial evolution. It can be seen in Piaget's description how individuals progress from the simplest reflexes. There may exist significant continuities between the earliest circular reactions of the infant and the much more elaborated forms of activity that characterize the skilled dancer, chess player and typist, for instance.

The Dancer

Dance goes back to Paleolithic times, for masked dancing sorcerers and hunts are depicted in the ancient caves of Europe and South Africa. Many movements are possible and from their combination, varied in speed, direction, distance, intensity, spatial relations, and force, one can discover or constitute a dance vocabulary. According to the American dancer and choreographer, Paul Taylor, the personality of the dancer will inevitably come across in a performance. Gardner should have been cautious or more specific when writing this statement in his book. Paul Taylor was a modern ballet dancer who studied with Martha Graham. In modern ballet one can express his own feelings, nevertheless, there are many different styles of dances in which the dancer has to play a role and his/her personality should not take part in the performance. Dances such as flamenco, modern ballet, street dance, which are freer in style, allow the dancers to express their personalities, while other styles such as classic ballet or a professional Broadway ballet do not.

Gardner goes on to say that music is the most important partner in dance, but inasmuch as dance can also proceed without music, the latter's presence cannot define dance.

The Actor

Actors must have the ability to observe carefully and then to recreate in detail. Such mimetic ability begins very early, even in the first days or weeks of life; and by the age of two, every normal child is able to observe scenes or performances by other individuals and recreate on a subsequent occasion at least some of the highlights of the display. A strong proclivity to imitate and remember displays well may be a necessary stock-in-trade for a future performer. Gardner, based on Boleslavsky's statements, claims that "The actor must try to recreate feelings with the aid of unconscious memory" (Gardner, 1983: 227). Next the author mentions Stanilaviski, who underscores the crucial role of emotions in the performance of the actor. The actor must feel the emotion not merely at the time when he is studying the part, but at every time that he is performing it. Gardner says that Stanislaviski sees training as a technique for putting the performer into a creative state where the subconscious can function naturally. This is another point in which Gardner generalizes *Stanislavski's* System which prepares actors with a set of exercises to develop their acting techniques. Regarding emotions, Stanislavski's System primarily focused on the development of artistic truth onstage by teaching actors to "experience the part" during performance. Stanislavski hoped that the 'system' could be applied to all forms of drama, including melodrama, vaudeville, and opera. He organized a series of theater studios in which young actors were trained in his 'system.' At the First Studio, actors were instructed to use their own memories in order to express emotion. In his book *An actor Prepares*[12], Stanislaviski draws the actors' attention to conscious feelings, for instance, if the actor has to enact a character whose father has just passed away, the actor should keep in mind and analyze the feelings he actually goes through when a beloved one dies. Therefore, Stanislaviski worked for a long time on a conscious basis, instead of a subconscious one, as Gardner mentions in his book. However, Stanislavski, during his last five years of life, observed that some of the actors using or abusing this technique, the *emotion memory*, were given to hysteria. He began to search for more reliable means to access emotion, eventually he created the *Method of Physical Actions;* a series of physical actions arranged

[12] Stanislaviski, C. (1936) *An actor Prepares.* New York: Theatre Arts, Inc.

in sequential order which trigger the necessary emotions for the performance rather than her/his private and often painful memories. Stanislaviski then was using a conscious physical map of actions to bring out the unconscious emotions of the actor.

Gardner suggests that some acting techniques which deemphasize the need to recreate the felt mood, mobilizes interpersonal intelligence while the ones that are emotion-centered highlight the intrapersonal intelligence.

2.3.7. The Personal Intelligences

In this concluding chapter of the intelligences, Gardner proposes two personal intelligences: the interpersonal, which permits a skilled adult to read the intentions and desires of other individuals and act upon this knowledge; and the intrapersonal intelligence, which permits the human being to examine and to know himself. These two forms could be described separately; however, to avoid unnecessary duplication, Gardner joined them in a single chapter.

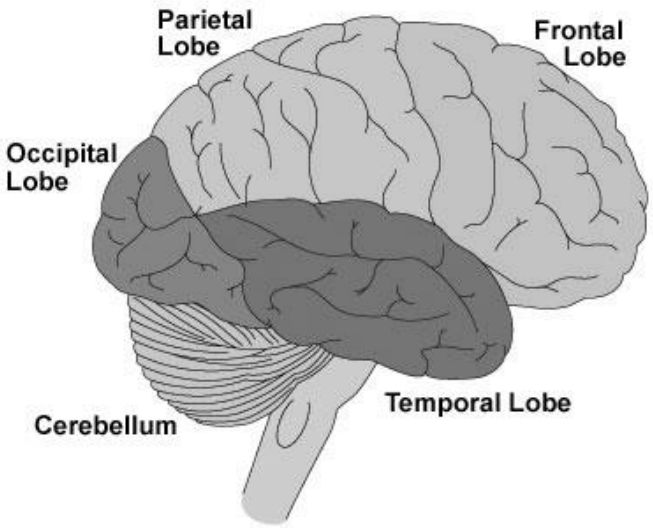
The Development of Personal Intelligences

Various forms of personal intelligence arise firstly from the bond of the child and his caretaker, usually the mother. During the first year of life this tie is strengthened. The origins of personal knowledge can be found in these strong bonds. After the first year this tie becomes looser and more flexible as the child knows he can leave home knowing that when he comes back the mother will be there. The absence of such a bond may result in difficulty for an individual to know other persons, to rear offspring, and to know himself.

During the second year of life, the child starts to react to his own name, to refer to himself by name. Subsequently, the child starts playing roles of mother and child, doctor and patient, teacher and pupil. By doing so the child learns how it feels to occupy their characteristic niches. When the child goes to school, he has a fear of feeling inadequate, of appearing to be an unskilled person. Children invest much effort into maintaining their

friendships and may also come to feel quite alone if he is unable to make friends. Adolescents seek friends who value him for his own insights, knowledge and sensitivity, rather than for his strength or material possessions.

The Pathology of Personhood



All indices point to the frontal lobes as the structures of greatest importance in various forms of personal knowledge. Destruction of the frontal lobes in an adult can damage severely his personality. Frank Benson and Dietrich Blumer suggest that injury to the orbital (lower) area of the frontal lobes is likely to produce hyperactivity, irritability, insouciance and euphoria; while injury to the higher regions of the frontal lobe is more likely to produce indifference, listlessness, slowness and apathy. What must be stressed is that, people who are injured in these aforementioned areas will preserve relatively their cognitive performance; however, a sense of the 'same person' is uniformly felt to be absent. No longer does the individual express his earlier sense of purpose, motivation, goals and desire for contacts with others.

In the case of autistic children, who may well have spared computational capacities, particularly in areas like music or mathematics, but whose pathological condition is in fact

defined by an inability to communicate with others and by so impaired a sense of self that the child has singular difficulties in using the words *I* and *me*. These children have difficulties in knowing others and in using such knowledge to know oneself. On the other hand, children with Down's syndrome preserve the ability to forge effective social relationships with others. Moreover, in the case of psychopathic personality, the individual may be extremely acutely in tune with the intentions and motivations of others without showing comparable sensitivity to his own feelings and motivation.

There are cases in which personal knowledge has been altered - rather than reduced - by a neurological disorder. Patients suffering from temporal lobe epilepsy prove particularly instructive in this regard; they are inclined to become introspective, given to writing extensive tracts, increasingly tending toward the study of philosophy and religion and the constant reflection upon deep questions.

Gardner states that the amount of knowledge available about personal intelligences is less than that available for other forms of intelligence; nevertheless, there are highly suggestive hints, in both the evolutionary and the pathological literature that intrapersonal and interpersonal intelligences can be differentiated from one another. Personal intelligences come to assume their characteristic form through the learning and use of the symbol system of one's culture; the role of the culture and of historical forces proves especially salient and pervasive.

2.3.8. A Critique of the Theory of MI

Gardner dedicates one chapter to criticize his own work. The author recognizes that there are details to be filled in and reminds the reader that the ideal of MI is an old one, since different facets of the mind were recognized even in Greek times (Karamanides, D., 2006), Pythagoras's father, for instance, provided his son with tutors who taught subjects as varied as philosophy, athletics, music, and painting. The objective of the theory is stated straightforward:

I seek to replace the current, largely discredited notion of intelligence as a single inherited trait (or sets of traits) which can be reliably assessed through an hour-long interview or a paper and pencil test. But it should be said here as well that nothing much hangs on the particular use of this term, and I would be satisfied to substitute such phrases as 'intellectual competences', 'thought processes', or other cognate mentalistic[13] terminology. What is crucial is not the label but, rather, the conception: individuals have a number of domains of potential intellectual competence which they are in the position to develop, if they are normal and if the appropriate stimulating factors are available. (Gardner, 1983: 284).

2.3.9. Psychological Constructs Not Addressed

Proper motivation and sufficiently focused attention are not addressed in Gardner's work due to the fact that, although they have applicability across the several intellectual spheres, in an individual only one or two intellectual sphere may entail high degrees of motivation or attention; that is, a ballet dancer displays superb attentional capacities regarding rhythm and body movements while exhibiting neither motivation nor attention in other spheres of life.

Concerning cognitive capacities such as common sense, originality or metaphoric capacity; they were not tackled due to their broad and general nature within terms of individual intelligences. Indeed, it is by no means evident how each of these terms can be explained within multiple intelligence theory. In case that perception and memory were convincingly demonstrated or if metaphor or wisdom could be shown to exist apart from the apparatus of multiple intelligence theory, these components could be added to the theory of MI

[13] Of or relating to any school of psychology or psychiatry that in contrast to behaviorism values subjective data (as those gained by introspection) in the study and explanation of behavior. Available on http://www.merriam-webster.com/dictionary/mentalistic

2.3.10. The Socialization of Human Intelligences through Symbols

During infancy, the child acquires certain basic understandings which later will display capacities for certain mundane symbolic activities. The newborn child has available set of skills and abilities through which he comes to know the world; schemas like sucking and looking, which are at first brought to bear upon every available object and then, the child starts directing certain activities to certain objects (sucking nipples, for instance). The flexibility of early childhood remains one of the most puzzling of all dilemmas in the biological domain as just very few individuals can retain or recapture this plasticity. Nevertheless, investigators have put forth an alternative view, two psychologists Ann Brown and Paul Rozin (Gardner, 1983: 314) claim that the young child is a prisoner of his abilities and gifts, which may exist in exquisite form but also lie in splendid isolation from one another, unable to be productively linked; while the adult is able to gain conscious access to his various modular abilities and to mobilize them for diverse purposes. In Gardner's view, these two positions are not necessarily in conflict. The ability to master a particular program in an effortless way is easier in earlier life whereas the ability to mobilize this ability and put it to fresh uses may be the prerogative of the mature individual. Resent research has shown, virtually unquestionable, that whatever differences may initially appear, early intervention and consistent training can play a decisive role in determining the individual's ultimate level of performance. If a specific trait is considered important by a culture, if considerable resources are devoted to it, if the individual can attain impressive competence in an intellectual or a symbolic domain.

The child from two to five becomes able to appreciate and to create instances of language (sentences and stories), two-dimensional symbolization (pictures), three dimensional symbolization (clay and blocks), gestural symbolization (waving hello or goodbye), music (songs), drama (role plays) as well as certain mathematical and logical understanding. In language there is a huge evolution of syntactic capacities, from the ability to concatenate a pair of words at the age of eighteen months to the ability to speak in complex sentences, to ask 'why' questions, and to use passive constructions. During school age, having learnt the basic symbols, the child goes on to acquire higher levels of them. The

stream in language can be thought of as a separate one in the child's evolving family of competences. In music, the basic streamlike challenge is related to pitch. In number, the stream involves an understanding of the operations of plus 1 and minus 1, and the growing capacity to coordinate these operations with the knowledge of basic numerical sets. The child comes to ignore those symbolic potentials that are neglected within his own culture.

Finally during adolescence and adulthood, the individual can become a fully competent user of symbols.

2.3.11. Interaction among Intellectual Competences

By exemplifying the role of lawyer in our society, Gardner links all the intelligences that would benefit this professional: linguistic skills to write excellent briefs, to recall facts from hundreds of cases; logical skills to analyze a situation, to isolate its underlying factors, to follow a torturous chain of reasoning to its ultimate conclusion; interpersonal skills to speak eloquently in the courtroom, interview witnesses and prospective jurors. An analogous analysis can be carried out for each of the roles within a complex society and we can readily see how various combinations might be exploited by different kinds of practitioner both in our culture and in others.

There are two major views concerning the construct of intelligence: scholars sympathetic to the notion of a general intelligence "g", and those who take a multifactorial approach to intellect. Most tests of intelligence are paper-and-pencil exercises which rely heavily on linguistic and logical-mathematical abilities. Hence, individuals strong in these two areas will perform well on these tests, in contrast to people whose strengths lie elsewhere.

2.3.12. Piaget, Information Processing and Chomsky

Although Piaget believed that he was studying the biology of cognition, he was very insensitive to diverse biological inclinations in the cognitive realm.

Information-processing psychology represents an advance over Piaget in the sense that more attention is given to the processes by which individuals solve problems from moment to moment.

Chomsky[14] denies the role of culture; therefore, his theory is completely skeletal.

Somewhere between the Chomskian stress on individuals, with their separate unfolding mental faculties, The Piagetian view of the developing organism passing through rigid stages, and the anthropological attention to the formative effects of the cultural environment, it should be possible to forge a productive middle ground in which the nature of innate intellectual proclivities, the heterogeneous processes of development in the child, and the values of culture are taken seriously.

2.3.13. The Education of Intelligences

Gardner displays a chart with samples of three possible cultural settings; although other educational settings would yield many other combinations of transmission, intelligences (Gardner, 1983: 339)

The Framework for analyzing Educational Processes Applied to Three Cultural Settings

Component of Education	Specialized Skill in Nonliterate Society	Literacy in Traditional Religious school	Scientific Curriculum in Modern Secular School
examples given in Chapter 13 of the book	Puluwat sailing Yugoslavian oral verse	Koranic school Hindu gurukula Hebrew Medieval cathedral school	Elementary and secondary schools in Europe, North America, Japan; Programming on microcomputer

[14] *In* Chomsky, N. (1975) *Reflections on Language*. New York: Pantheon.

Intelligences	Linguistic, musical(oral verse) Spatial(sailing) Bodily-kinesthetic Interpersonal	Linguistic Interpersonal Logical-mathematical(among advanced students) Oral verse or books	Logical-mathematical Intrapersonal Linguistic (less emphasized)
Media of Transmission	On site	Separate building or inside religious building	Separate building Some learning can be done in a private home or study
Agents Who Transmit Knowledge	Skilled elders, typically relatives	Individuals trained in literacy and argument; high moral component expected; status high except at entry level positions	Individuals with training in education at lower level; with specialized training at higher levels; moral caliber not germane
General Context of Learning	Most individuals share some basic skills, including sailing; a few may be experts	Most males start out in religious school; gradual winnowing process; successful students often enter clergy or community elect	Universal primary and secondary education; many individuals have specialized postsecondary education

Rural Yugoslavians who become singers of oral verse are hardly involved in any formal training; after years of listening and absorbing the individual begins to practice the formulas himself, he is in a strong sense self-taught.

2.3.14. Three Transitional Forms of Education

Initial Rites happen in some American Indian tribes, for instance, when the passage from childhood to adulthood is marked by the individual being left alone in the wilds for long periods of time.

Bush schools in West African, for instance, children learn to perform arts, crafts and other skills important for the community. There are mock battles to test one's war-making abilities.

In the *apprenticeship system*, a youngster leaves home during the pre-adolescence or adolescence period to live for several years with a master of a particular craft. If the youngster succeeds in learning from his master, the now journeyman will be allowed to join the ranks of the masters.

Varieties of School

Koranic education aims at the memorization of the entire Koran. At first, the child listens to the Koran being read and memorizes a few verses; then, he is introduced to the Arabic alphabet. The principal curriculum in the school in the first years is simple: children must learn how to read and write in the language of the sacred texts.

The modern secular school no longer centers on religious texts and began to treat all accumulated knowledge equally. There arose a set of civil servants, who were chosen on the basis of intellectual potentials rather than of moral fiber. Nevertheless, the line between traditional and secular schools must not be overdrawn: not all traditional schools were religious, and many secular schools have maintained some religious ties.

The relative importance of interpersonal intelligence has been reduced in the contemporary education scene: one's capacity to see the other as an individual, one's capacity to form a close tie to a single mentor. In contrast, intrapersonal skills are continually rising, as the individual must monitor his own studies.

2.3.15. The Application of Intelligences

The Suzuki Talent Education Center in Japan, designed by a sensitive violinist Shinichi Suzuki, is a carefully structured technique of music education which begins at birth and as its main goal the training of accomplished musical performance in young children. The mother is crucial in the program, particularly at the beginning. Firstly the child is exposed daily during the first year of life to recordings of great performances. Toward the end of the first year, the child begins to hear the twenty songs that will constitute his curriculum in the program. At the age of two the child starts attending with the mother group lessons. Back at home, the mother begins to perform by herself each day and finally one day the child is allowed to touch the instrument. When mother and teacher decide that the child has reached fever pitch, the child is invited to join the group he has been observing and is given private lessons. The mother and child then go home and work very hard on the lesson. Gradually the mother's involvement as an active student and fiddler stops and the focus is on the child. Even the less remarkable children will perform at a level that astonishes observers. Students by the age of twelve are able to play a Mozart concerto.

2.3.16. A Critique of the Suzuki Approach

Suzuki has focused on music intelligence and has helped individuals of a presumably wide range of native talents advance rapidly within this single domain. Suzuki has taken advantage of the critical period for the acquisition of musical competence, when the brain of the young child is plastic. He has brilliantly exploited the mother-child relationship in which the instrument becomes a privileged means of maintaining intimacy between child and mother.

The method is oriented toward learning by ear and no learning of notation; therefore children fail to master sight reading. Shifting to a notation based strategy by the age of six or seven would be a good solution to this inconvenient. Also, the music played is exclusively Western from the Baroque through the Romantic periods; the children are not in contact with other styles of music.

Children are trained to replicate a sound as it has been heard and not to attempt to change it in any way. That's why few Suzuki-trained children display inclination toward composing. Nonetheless, these deficits are perhaps minor in comparison with the pleasures of listening to these skilled children playing.

Any other type of arts could have been taught in similar ways, from flower arrangement to painting. The same traits of character could be observed if the same rigor, vigor and faith were put into it.

2.3.17. Pointers for Policy Makers

A close analysis of educational processes must take place in order to have a review of pedagogical experiments. These processes might be mobilized to meet new needs in a changing world. It is wise to begin by reviewing the goals of a particular intervention or of a whole educational program. The more specifically these goals are articulated, the better. The next step is the sober assessment of the means currently available for achieving these goals, considering the agents and the loci of transmission as well as the ways in which values, roles and procedures have been transmitted across generations. It is advisable to devise methods for assessing the intellectual profiles of individuals from an early age. A main reason for this early assessment is to allow an individual to proceed rapidly and safe in those intellectual channels where he is talented and to bolster those skills which seem relatively modest.

2.4. Myths and Truths regarding Multiple Intelligences

Sixteen years after the first edition of *Frames of Mind*, Howard Gardner writes *Intelligence Reframed* (1999), a book which draws heavily on essays written by the author in the 1990's. The main objectives of this book are to evaluate how the theory of multiple intelligences has been assimilated into the culture, to deny some of the myths that have proliferated around the theory, to examine its practical applications, as well as to survey the

evidence for additional varieties of intelligence. Overall, the book provides how Gardner's theory is being applied.

2.4.1. Myth 1: Scientists should create a variety of tests for the eight intelligences

Having a battery of tests is not consistent with the major principles of MI theory. Intelligences must be assessed in ways that examine the intelligences directly rather than from the linguistic or mathematic perspectives (as ordinary paper-and -pencil tests do). For instance, if spatial intelligence were to be assessed, subjects should be allowed to explore a terrain and see how well they find or memorize their paths. Or, if one has to test musical intelligence, one should expose people to a new melody, in a reasonable familiar idiom, so that they can sing it, recognize it or transform it. Assessing multiple intelligences should be done exclusively if one has strong reasons for it, such as establishing if a child has a cognitive impairment that inhibits a specific area of learning.

2.4.2. Myth 2: An Intelligence is the same as a Domain or a Discipline

An intelligence is a new kind of concept, one that draws on biological as well as psychological potentials and capacities. Domain and discipline are socially constructed human activities and should not be confused with an intelligence. Constitutional law, physics, cooking, chess, and rap music are all domains in contemporary Western world. Any domain can be realized through the use of several intelligences. Playing chess for example, involves spatial, mathematic and even intrapersonal intelligence (If I know my adversary, I may guess his next move).

2.4.3. Myth 3: An Intelligence is the same as a learning style

A style designates a general approach that can be applied to an indefinite range of content. For instance, if a person is said to have a "reflexive" or an "intuitive" style, we

assume that he will be reflective or intuitive with all manner of content, from language to music.

2.4.4. Myth 4: MI theory is not empirical

MI theory is completely based on empirical evidence and can be revised on the basis of new empirical findings. Hundreds of studies were reviewed in *Frames of Mind,* when the seven initial intelligences were established; each intelligence was identified and delineated on the basis of empirical findings from brain science, psychology, anthropology and others.

2.4.5. Myth 5: There is a single "approved" educational approach based on MI theory

MI theory is not an educational prescription. Educators are in the best position to determine whether and to what extent MI theory should guide their practice. Gardner is suspicious about attempts to teach all concepts of subjects using all of the intelligences. Also, it is inadequate to label people in terms of "their" intelligences. These labels may be risky when used by educators. People so labeled may then be seen as capable of working or learning only in a certain way.

The three key propositions of MI are: Each person is different; therefore, we do not have the same kinds of minds. Taking human differences serious is the principle of MI perspective. An MI school should take differences among human beings seriously and it should construct curricula, pedagogy and assessment in the light of these differences. It should share knowledge about differences with children and parents as well as encourage children to assume responsibility for their own learning and it should also present materials in such a way that each child has the maximum opportunity to master those materials and to show others and themselves what they have learnt and understood.

2.5. MI New Horizons: Completely Revised and Updated: New Intelligence

Naturalist intelligence was a candidate in Gardner's book *Intelligence reframed* to be a new intelligence. In *MI New Horizons* (Gardner, 2008) Naturalist intelligence is considered the eighth intelligence as there is persuasive evidence for its existence. Naturalist intelligent individuals are those who are keenly aware of how to distinguish and classify the diverse plants, animals, mountains, cloud configuration of his or her environment. These are not exclusively visual capacities; the recognition of a bird-song, for instance, requests auditory perception. Nowadays in the developed world, few people are dependent on the naturalist intelligence. We simply go to grocery stores or order groceries by phone or by Internet. Young children are usually better than their parents at natural intelligence, when they recognize dinosaur species, for example.

The study of brain damage shows evidence of individuals who lose the ability to recognize and name inanimate objects but keep the capacity to remember the name of living things; less often, the opposite happens, there are individuals who lose the ability to recognize and name animate objects but fail to do so with artifacts. These capacities probably involve different perceptual mechanisms (Euclidean geometry operates in the world of inanimate objects but not in the world of nature) and different experiential bases (we do not interact the same with objects and with living beings).

2.5.1. The View after Twenty Five Years

Much new knowledge has been accumulated during the last twenty five years after the first edition of *Frames of Mind*; therefore it is quite possible that the picture of multiple intelligences could have been radically altered by these scientific findings. Nevertheless, this is not the case.

Gardner establishes three different connotations of the term "intelligence" have emerged in the recent years and that the issue of enhancing intelligence differs across these three types; therefore, educators should pay attention to these differences:

1. Intelligence as a species characteristic: Owing to the close resemblance between chimpanzee and human genetic material, it is challenging to delineate the defining characteristics of human intelligence. When focusing on this intelligence, we obtain a general characterization of human or nonhuman capacities.

2. Intelligence as individual difference: the most analyzed one; for instance, John is more intelligent than Sara. This has been the most widely invoked by psychologists in the psychometric tradition who assume that intelligence is a trait, like extroversion or eye color.

3. Intelligence as fit execution of an assignment: What distinguishes the great Cuban ballerina Laura Alonso's performance is not her technique per se but the sheer intelligence of her interpretations. This has been the least explored and might as well be the most intriguing. The focus is on the manner which a task is executed. Gardner connects this third type of intelligence with Multiple Intelligences.

Firstly, Gardner states that in order to perform a certain task, we need to count on an intelligence or combinations of intelligences. Concerning education, the judgments about whether an exercise – a paper, a project, an essay – has been done intelligently or stupidly are often difficult for students to understand.

Gardner states: "we will not know the degree of independence of separate intelligences until we have devised much better measures for each intelligence and until we have explored the neural and genetic bases for whichever factors emerge, nor can we look at the results in only one cultural context. The spread or overlap among intelligences may well differ among cultures and even historical eras."

Recently a contrast between "laser" and "searchlight" profile has emerged. Individuals with a laser profile are those who have a sharp spike on the profile, involving one or two intelligences. Laura Alonso had a laser profile emphasizing bodily intelligence. Searchlight profile is characteristic of individuals who have roughly equivalent strengths in three or more intelligences but do not exhibit a spike in just a single intelligence. These individuals have a wider radar screen to make sure that nothing important is completely missed. It is important to notice that any complex society needs both profiles.

2.5.2. The Bridge to Education

Key educational implications:

- Uniform schools are those traditional ones in which all students are treated equally; it privileges those who have strong linguistic and mathematical intelligences but are extremely difficult for those whose strengths lie in other areas. *Individual centered education* is not self-centered; it takes the differences among students very seriously. Educators try to learn as much as they can about their students' learning abilities and proclivities.

- *Educational goals* must be stated as clearly as possible. There are many goals from which we could choose: creative thinking, critical thinking, and interdisciplinary thinking. Other tougher questions must be raised with regard to what is not a priority.

Educational Perspective

Stanford-Binet Intelligence Scale and Project Spectrum are two types of tests of intelligence. Both assessments can reveal similar qualities; however, there are distinct advantages to an assessment conducted over time with rich materials in the child's own world (Spectrum) in contrast to Stanford-Binet test which lasts one hour and a half or two hours maximum. Spectrum addresses fifteen areas of cognitive ability and eighteen stylistic features. At the end of the school year the information gathered about each child in the Project Spectrum is summarized by the research team in a brief essay called Spectrum Report, which describes the child's individual profile of strengths and weaknesses an offers specific recommendations about what might be done at home, in school, or in the wider community to build on strengths and to improve areas of weaknesses.

In the second year of Spectrum program plus interviews with parents and teachers demonstrated that the strengths identified during the first year continued to develop.

Teachers tended to grade their students low in social skills, whereas Spectrum and parents had identified them as strengths.

Spectrum was next extended to several preschool, kindergarten and first grade classes in a suburb of Boston, Massachusetts. In these educational institutions, Spectrum has identified talents and inclinations that are typically missed in the regular school.

2.5.3. Projects during the Elementary Years

The Key School in Indianapolis, now called the Key Learning Community, has proved to be a remarkable success in many ways. Besides being the pioneer and advised by Gardner himself, one of the school's principles is the conviction that each child should have his or her multiple intelligences stimulated daily. Thus, children participate regularly in the activities of computing, music and bodily-kinesthetic in addition to the standard curricula. First, students participate in an apprenticeship-like workshop in which students work with peers of different ages and a competent teacher in the area being addressed. The workshops, at one time, range from architecture to gardening. The focus of the workshops falls on the acquisition of a real-world skill in an apprenticeship environment, thus the chances of securing genuine understandings are enhanced.

The final step is the presentation of students' projects related to a theme. These projects and portfolios are seen in terms of the following five dimensions:

Individual profile: The weaknesses and strengths reveled about the students.

Mastery of facts, skills and concepts: the ability of students' capacity to show their command of factual knowledge is analyzed.

Quality of work: The different genres (a comic play, a mural, a science experiment) harbor within them certain specific criteria of quality that can be invoked in their evaluation.

Communication: students have the opportunity to communicate to a wider audience.

Reflection: The capacity to step back from one's work, to monitor one's goals, to assess what progress has been made, to evaluate how one's course can be corrected.

Students need schools scaffolding to carry out the projects.

2.5.4. Disciplined Inquiry in High School: An Introduction to Arts PROPEL

Gardner starts this chapter by raising questions related to art such as:

> Should we call for specialist teachers or train regular classroom teachers in the arts? Should we focus on one or two art forms or provide the whole menu of genres and forms? Should we have a uniform curriculum across cities or states? Should we employ standardized tests?

Gardner goes on to explain Arts PROPEL, whose feature is shared with other contemporary initiatives, however, Arts PROPEL differ both in terms of its intellectual origins and its particular mix of components. The early findings from the early studies show that:

1. In several artistic spheres, evidence suggests a surprisingly high level of competence in young children followed by a possible decline during the years of middle childhood.

2. Preschool children acquire a great amount of knowledge about and competence in the arts. The evolution of children's drawing is a vivid example of this self-generated learning and development (Gardner, 1980).

3. Comprehension in some domains of arts appears to fall behind performance or production capacities. This finding stresses the importance of giving young children ample opportunity to learn by performing, making, or doing.

4. Little synchrony across areas: it was normal for children to be in one or two areas – for example, sculpture – while being average or below averages in other areas – such as drawing (Gardner, 1993).

5. Specific areas of the cortex have particular cognitive functions, and that, mainly after early childhood, there is little plasticity in the representation of cognitive capacities in the nervous system.

Arts PROPEL was originated at Project ZERO at Harvard Graduate School of Education and has involved hundreds of researchers over the past five decades. The word “zero” in the name, suggests that research on this topic is still in its infancy.

This point is extremely important to our study as we make use of Gardner’s model proposed in the Arts PROPEL, which is an approach to curriculum and assessment in the arts, mainly at the high school level. The Arts PROPEL approach believes that students need to be introduced to ways of thinking shown by people involved in the arts: artists and those who analyze, criticize and investigate the cultural contexts.

Below the age of ten, production activities should be central in any art form. Children learn best when they are actively involved in their subject matter. Arts curricula need to be presented by acknowledged art teachers and artistic learning should be organized around meaningful projects to be carried out during a significant period of time, allowing time for feedback, discussion and reflection. Assessment of learning is essential in the arts.

Ideally, all students would study all art forms, however, this is a utopia which would lead to stressed out and overloaded students. Therefore, students should have extended exposure to some art form, such as music, dance, and drama. Arts PROPEL works in three art forms: music, visual art and imaginative writing. Our study however, is focus on dance as the art form. Three kinds of competences are analyzed: production, perception and reflection. PROPEL captures acronymically this trio of competences with the final *L* emphasizing the learning.

There is no point in assessing competences or potentials if the students haven’t had some experience in working directly with relevant artistic media. Just as soccer scouts look at students who are already playing soccer, it is necessary for teachers to examine students who are already engaged in artistic activities. Students who are creative at writing, making

up sketches or writing poems, his weaknesses can be worked through creative writing, for instance.

For each competence (writing, music and visual arts) in Arts PROPEL a domain project was created, featuring perceptual, productive and reflective elements. In the first session, students are given a set of ten odd, black, geometric shapes. They are asked to put together a set of shapes that they find pleasing. Then they are asked to give reasons why they chose certain shapes. In a second session, the teacher introduces the students to a number of different styles and periods that differ significantly from one another in symmetry or balance they epitomize or violate. Next, students are given an assignment: during the next week, they have to search their daily environment for instances of different compositions – both compositions already existent and those that the students can create by "framing" a scene in nature. In the third session, students report on their compositions and are now asked to make a final work. Before proceeding, they are asked to indicate their plans for this work; the final step is to indicate on a worksheet what they found most surprising about their composition and which further changes they might want to make in a future work. The teacher also has his own assessment sheet in which he evaluates the students' success in discovering interesting compositions in their environments or their abilities to connect their compositions to those of famous artists.

The second domain project, "the biography of a work", is much wider. After the perceptual explorations of the roots of masterworks, such as Guernica of Picasso, they are given a range of media (paper, magazines, charcoal, ink) and are asked to choose any element(s) in their room and to use these in preparing a preliminary sketch. In the second session students examine how famous artists have used objects in their creation and how these elements can carry a multiplicity of meanings. Then, students return to their initial sketches and make provisional decisions about the media and styles they want to use. In a final session, the students complete their works, critique one another's efforts and review their sketches and reflections. Another vehicle, additional to the domain project is the portfolio, which Gardner calls processfolio. In their processfolios, students include not just finished works but also original sketches, critiques by themselves and others, artworks they

admire or dislike. An Arts PROPEL classroom resembles a classical atelier. Processfolios enhances students' awareness of their own strengths and weaknesses, capacity to reflect accurately, ability to work on self-critique and make good use of critiques of others.

Processfolio Assessment System

1. Production: Thinking in the Domain

Evidence: lies in the work itself and are scored by an outsider looking at drafts and final works as well as by the classroom teacher. The considered aspects are: The craft, the pursuit, the invention and the expression of students' ideas or feelings.

2. Reflection: Thinking about the Domain

Evidence: comes from the student's journals and sketchbooks and from observations of the comments the student makes in class; the reflection is scored by the teacher. The aspects are: ability and proclivity to assess own work, ability and proclivity to take on role of critic, ability and proclivity to use criticisms positively, ability to learn from other works of art and ability to articulate artistic goals.

3. Perception: Perceiving the Domain

Evidence: comes from the student's journal entries and from observations of the student's comments made in critique sessions. The perception assessment is made by the teacher. The aspects assessed are: Capacity to make fine discriminations about works in the domain, awareness of sensuous aspects of experience and awareness of physical properties and qualities of materials (i.e., textures of different papers, timbres of instruments, sounds of words)

4. Approach to Work

Evidence: lies in observation of the student in classroom interactions and from the student's journal entries. Students are assessed by the teacher. The aspects assessed are: Engagement, ability to work independently, ability to work collaboratively and ability to use cultural resources.

Arts PROPEL received a tremendous award in the early 1990s when it was selected by *Newsweek* magazine as one of only two "model educational programs" in the United States of America.

2.5.5. Assessment in Context: The Alternative to Standardized Testing

A very common scene both in the United States and in Spain is that of senior high school students taking formal exams. They sit nervously waiting for their exams to be handed out and after brief instructions, the formal testing begins. The results of a morning's testing become crucial in the students' academic future. It is important that instruments used for purposes such as college admission be designed so that students can show their strengths and not to point up weaknesses.

When it comes to sports and arts, besides the formal testing, the "apprenticeship type" is as well applied; that is, a dancer has to perform a choreography, basketball players have to play a match and they are graded according to their performance. Formal testing has been embraced to an excessive degree. Gardner suggests the need for a far wider view of the human mind and of the human learning than that which was aforementioned.

2.5.6. The widespread of formal testing and an alternative approach to assessment

The widespread of intelligence testing can be traced back to the early twentieth century due to Alfred Binet's works. Nevertheless, during the last decades many assumptions on which this testing is based have been undermined by work in developmental, cognitive and educational studies. When intelligence tests were first constructed, little attention was paid to the underlying theory of intelligence. The various "Multiple Intelligences" perspectives propose: Instead of a single intellect, there are vast differences across individuals in their intellectual strengths and weaknesses. It is important to identify strengths and weaknesses at an early point so that they can be incorporated into educational planning.

An enormous body of experimental evidence shows that one test designed for one specific population cannot be transported directly to another cultural setting. Every material reflects its origins.

Another novel conceptualization is that it is erroneous to conclude that the necessary knowledge to execute a task resides completely in the mind of a single individual. In order to obtain a successful task, we may need a team of individuals rather than a single one.

If we were to redesign a fresh approach to assessment nowadays, we should incorporate eight important features:

1. Emphasis on assessment rather than testing: The testing industry has gone too far. An individual should be assessed; that is, information about his / her potentials and skills ought to be obtained with the goal of providing useful feedback to both the person and to the surrounding community.

2. Assessment as simple, natural and occurring on a reliable schedule: Rather than being imposed by external authorities at established times during the year, assessment should become part of the natural learning environment.

Our study has found out that all bilingual schools in the Community of Madrid rely on tests and few use assessments as part of the process.

3. Tests significant correlation with consensually valued criterion

As noted, creativity test are no longer used much because their validity has never been adequately established. When individuals are assessed n situations that more closely resemble actual working conditions, it is likely to make much better predictions about their performance. It is odd that students spend hundreds of hours engaged in a single exercise – the formal test – when few f any of them will ever find similar instrument once they have left school.

4. “Intelligence- fair” instruments

Most testing instruments favor two varieties of intelligence – linguistic and logical-mathematical. People blessed with these strengths are likely to do well on most types of formal tests. Nevertheless, those with problems in either or both linguistic and logical-mathematical intelligences may do not well or fail this formal test only because they cannot master the particular format of most standard instruments. The solution would be to devise instruments that are intelligence fair; for instance, bodily intelligence by seeing how the person learns and remembers a new dance or physical exercise.

5. Uses of multiple measures

Attention should be given to a range of measures designed specifically to tap different facets of the capacity in question. The admission standards of a program for gifted children, for instance, are based solely on IQ tests. If the cutoff is 130 and you have 129, then you do not qualify. Would it not be fairer for these children with an IQ of 129 to have a trial period alongside other "gifted" children and other non-aggressive measures?

6. Sensitivity to individual differences, developmental levels and forms of expertise: Formal testing could be adjusted to consider these documented variations. However, some key assumptions of formal tests such as uniformity of individuals would have to be suspended. Teachers, pedagogical coordinators, and tutors have to be formally introduced to these distinctions. Good teachers have always realized that different approaches prove effective with different kinds of students.

7. Use of intrinsically interesting and motivating materials

The use made of scores is lamentable. Individuals receive the scores, see their percentile ranks and draw conclusions about their merit. Most educators spend far too much time ranking individuals and not nearly enough time helping them. Assessment should be undertaken primarily to aid students. The assessor should provide feedback to the student that will be helpful immediately: identifying areas of strengths as well as of weaknesses, suggesting on what to study or working on, indicating what can be expected in the future assessment.

2.5.7. The need for a social framework in education

The United States overemphasized testing and measurement and neglected the social aspect that had always been an important part of education. The American society has tended to ignore the effects of interpersonal experiences, in part because they are not easily measured. Nevertheless, the creation of cooperative, supportive environments in homes, schools and communities has been shown to have a positive impact on students' social and psychological well-being. An alternative assessment needs to be developed which will lead to assessment environments where the engagement of students in meaningful tasks in society can be looked at more directly. Gardner proposes a model that considers assessment in terms of significant adult end-states which are valued by the community. In other words, these assessments should contain abilities that are relevant to achieving meaningful and rewarding adult roles in the society. The author also advocates apprentice-type learning environments where possible. Every child should have the chance to work closely with an adult who serves as a model of serious study, reflection and application in the real world. Gardner also expresses the importance of education being grounded in the institutions and practices of society – art and science museums, ateliers, scouting.

2.5.8. Bottlenecks, Compensation and catalysts

Due to the fact that intelligences function in combination with each other, Gardner proposes to focus on the way intelligences might to affect performance. Every person has a profile, which provides the individual´s intelligences. Almost everyone's profile is jagged; that is, there are peaks and valleys meaning strengths and weaknesses. Such jaggedness may derive from genetic endowment or the development of preferences as a result of different experiences or differential access to types of information. As we mentioned in **2.5.1.,** Gardner identified two types of profiles – laser and searchlight. Laser profiles include one or two intelligences that stand out among the others and usually determine the individual's career choices. Searchlight profiles balance several intelligences. In addition to these two profiles, Gardner proposes three more ways in which different intelligences can

affect each other: Bottleneck, compensation and catalyst. Bottleneck is a blockage of one intelligence by another. For instance, a weak linguistic intelligence may prevent a person from expressing her interpersonal intelligence due to the fact she cannot speak well. On the other hand, compensation occurs when one intelligence helps the other succeed. That would be the case, for instance, of a strong bodily intelligent person who uses gestures and other nonverbal behaviors to communicate. A catalytic intelligence can start another intelligence or modify the way it functions. For instance, a strong musical intelligence may lead a person engaged in a linguistic task to be more aware of the rhythmic properties of language.

2.6. Multiple Inteligences in the Classroom

Multiple Intelligences in the Classroom was first published in 2009 by Thomas Armstrong. This book is essential in the literature of MI as it is the first compendium of MI focused exclusively on the classroom. After brilliantly summarizing the MI theory in chapter one, the author starts preparing the teacher to work in practice with it in the following chapters. In chapter two, a checklist on each intelligence is provided and the teacher can check the intelligences which he / she has strengths or weaknesses. Besides the ten items suggested in each intelligence of the checklist, the teacher is motivated to think about and write down additional items not specifically referred to in the checklist. Armstrong in this chapter presents a good model not only for teachers to look at teaching strengths but also to examine areas needing improvement. Teachers are encouraged to tap resources in the intelligences they typically shy away from in the classroom by drawing on colleagues' expertise. If a teacher, for instance, does not have ideas for bringing music into the classroom because his musical intelligence is underdeveloped, he should consider getting help from the school's musical teacher or a musically intelligent colleague. Students can also help out the teacher. Students can demonstrate expertise in areas where the teacher's knowledge may lack. For instance, students can draw on the board, provide musical background for a learning activity, share knowledge about animals and flowers. Teachers are also suggested to use the technology available – a tape recording of music if they are

not musical, videotapes if they are not picture-oriented, calculators to supplement their shortcomings in logical-mathematical areas and so on. M. I. theory provides a model through which we can activate our neglected intelligences and balance our use of all the intelligences. Armstrong claims that a person's "weak" intelligence may actually turn out to be her strongest intelligence, once it is given the change to develop.

The checklist proposed by Thomas Armstrong has a more elaborated version: Multiple Intelligences Developmental Assessment Scales (MIDAS). The MIDAS were created by Branton Shearer as a means to enhance a person's intellectual performance, career development and personal satisfaction (Shearer, 1994).

The MIDAS are a self-report survey for the multiple intelligences that have been carefully created to produce a quantitative and qualitative profile of an individual's "intellectual disposition" that may be verified to ensure validity and reliability. The MIDAS are designed to correct several major flaws and problems associated with the common use of brief MI checklists.

Firstly, The MIDAS for adults and teenagers employs 119 questions to inquire about an extensive list of skills, involvements and enthusiasms. The MIDAS-KIDS use 93 items for children (9 – 14 years old) and 70 items for young children (4 – 8 years old). These questions have gone through a rigorous process of refinement and selection (Shearer, 1994) including qualitative review by subject area experts - including Howard Gardner - and many statistical tests involved a wide variety of people around the world. In short, The MIDAS are a "research-based instrument" that have a proven track record for meeting accepted standards of educational and psychological tests.

The MIDAS were designed to be a "thoughtful and systematic" survey of the person's skills and activities. These scales were developed as an interview or dialogue rather than as an impersonal set of general statements. When answering the 119 questions the respondent selects from six descriptive statements rather than merely selecting a yes/no or an ill-defined number response as is common with most MI checklists. Due to the holistic approach of the MIDAS, it is preferred to the checklist proposed by Armstrong. By

identifying only 10 characteristics for each intelligence, Armstrong narrows the scope of the intelligence. In addition to this, the MIDAS design encourages the respondent to think carefully about responding to the content of the question. Each set of responses are uniquely written to match the content of the question. Another positive aspect of the MIDAS is that there is also an "I don't know or Does not apply" choice for every question so the respondent is not forced to answer inappropriately beyond his/her level of knowledge.

2.6.1. Recognizing Intelligences in Students

In the following chapter, after having made teachers aware of their own weaknesses and strengths, the author Thomas Armstrong starts examining how teachers can recognize students' most developed intelligences so that more of their learning in school can take place through their preferred intelligences. This chapter is undoubtedly fundamental for the understanding of our study as we are training dancers, bodily-kinesthetic intelligent students, in chemistry and phonetics through the use of dance. The author constantly reminds educators that most students have strengths in several areas, so they should not be pigeonholed in one intelligence. Then, he provides brief descriptions of the capacities of students who display proclivities in specific intelligences:

Eight ways of learning			
Students who are highly…	**Think…**	**Love…**	**Need…**
Linguistic	in words	Reading, writing, telling stories, playing word games	books, tapes, writing tools, paper, diaries, dialogue, discussion, debate, stories
Logical-mathematical	by reasoning	experimenting, questioning, figuring out logical puzzles, calculating	materials to experiment with , science materials, manipulatives, trips to planetariums and science museums
Spatial	in images and pictures	designing, drawing, visualizing, doodling	art, Legos, videos, movies, slides, imagination games, mazes, puzzles, illustrated books, trips to

			art museums
Bodily-kinesthetic	through somatic sensations	dancing, running, jumping, building, touching, gesturing	role-play, drama, movement, building things, sports and physical games, tactile experiences, hands-on learning
Musical	via rhythms and melodies	singing, whistling, humming, tapping feet and hands, listening	sing-along time, trips to concerts, playing music at home and school, musical instruments
Interpersonal	by bouncing ideas off other people	leading, organizing, relating, manipulating, mediating, partying	friends, group games, social gatherings, community, events, clubs, mentors / apprenticeship
Intrapersonal	in relation to their needs, feelings and goals	setting goals, meditating, dreaming, planning, reflecting	secret places, time alone, self-paced projects, choices
Naturalist	through nature and natural forms	playing with pets, gardening, investigating nature, raising animals, caring for Planet Earth	access to nature, opportunities for interacting with animals, tools for investigating nature (e.g. magnifying classes, binoculars)

Armstrong states that there is no test on the market which can provide a comprehensive survey of students' multiple intelligences. Nonetheless, the best tool for assessing students' intelligences is observation. One good way to identify students' most highly developed intelligences is to observe how they misbehave in class. The strong linguistic student will be talking out of turn, the highly spatial student will be doodling and daydreaming, the interpersonal student will be socializing, and so on. Another good observational indicator of students' proclivities is how they spend their free time in school. Highly linguistic students might gravitate towards books, social students toward group games and gossip, spatial students toward drawing, bodily-kinesthetic students toward hands-on building activities or dancing, and naturally inclined students toward the gerbil

cage, aquarium or just observing the trees and insects. Every teacher should consider keeping a notebook, diary, or journal handy in a desk for recording observations of this kind. In case the teacher has too many students, a couple of lines a week on each student for 40 weeks yields 80 lines, or three or four pages of solid observational data for each student. To help organize student's multiple intelligences, Armstrong created a checklist with ten items for each intelligence and extra space for additional information. In addition to observation and checklists, the author suggests collecting documents. Anecdotal records, photos, recordings with students singing or telling stories, drawings or painting abilities. A fourth way to get assessment information is by looking at school records. By looking at student's grades over the years, teachers may get an evidence of an inclination toward one intelligence rather than another. High grades in art and graphic design, for instance, may indicate well-developed spatial intelligence, while *As* and *Bs* in physical education and shop class may point toward bodily-kinesthetic abilities. You may find that a child who appears quite low functioning in one class will be one of the starts in a class that requires a different set of intelligence. Kindergarten teacher's report is one of the most valuable sources. Often, the kindergarten teacher is the one who sees the child using the eight intelligences. Consequently, comments such as "loves finger painting", "moves gracefully during dance and music time" may indicate the student's musical or bodily-kinesthetic proclivities. Parents are another excellent source; talking to parents, who are experts on a child's multiple intelligences, is critical in discovering ways to transplant information from the home to the school. Students themselves are another option. After they have been introduced to the idea of Multiple Intelligences, teachers can sit down and interview them to discover what they consider to be their most highly developed intelligences.

In chapter four, the author proposes to teach MI theory to students. Research in cognitive psychology applied to education has supported the notion that students benefit from instructional approaches that help them reflect their own learning processes (Marzano *et al*., 1988). The easiest way to explain MI theory to students is to explain it to them. The author has a great capacity to MI theory easier to understand and proposes many activities to teach MI theory for students. The strong points of this book are that Armstrong has a simpler language than Howard and he connects MI theory exclusively with the classroom

environment; not only does the author present the theory, but also he provides hundreds of practical activities and besides that he makes teachers reflect on their teaching techniques and encourage them to create other activities related to MI theory.

2.6.2. How to prepare MI Lesson Plans

The following chapter is dedicated to how to prepare a MI class and Armstrong gives, again, hundreds of examples using different subjects on how a MI class may be planned. The author always has in mind the eight intelligences so that there is always at least one example for each intelligent, enabling all the readers to have a full understanding of how a MI class is planned regardless of his learning proclivity. Reflection is fundamental when preparing a MI class and Armstrong provides a list with questions so that the teacher does not fail to include all or most of the intelligences while preparing his classes, as shown in the table below. After asking oneself the MI questions, the teacher should consider which of the methods and materials seem most appropriate for the activity the teacher has in mind, the teacher should also think about other possibilities not listed.

MI Planning Questions	
Logical- Mathematical: How can I bring in numbers, calculations, logic, classification, or critical thinking skills?	**Naturalist:** How can I incorporate living things, natural phenomena or ecological awareness?
Linguistic How can I use the spoken or written word?	**Musical** How can I bring in music, or environmental sounds or set key point in a rhythmic or melodic framework?
OBJECTIVE	
Intrapersonal: How can I evoke personal feelings or memories or give students choices?	**Interpersonal:** How can I engage students in peer sharing, cooperative learning or large group simulation?
Spatial: How can I use visual aids, visualization, color, art or metaphor?	**Bodily-kinesthetic:** How can I involve the whole body or use hands-on experience?

After teaching the lesson, teachers are encouraged to reflect upon it, considering the most and the least successful parts. In the following chapter, Armstrong presents five strategies for each intelligence, in other words, he gives more tools for the teachers to plan their classes. For linguistic intelligence he suggests story-telling, brainstorming, tape recording, journal writing and publishing. The strategies proposed for logical-mathematical are calculations and quantifications, classifications and categorizations, Socratic questioning, heuristics and science thinking. For spatial intelligence, it is proposed visualization, color cues, picture metaphors, idea sketching and graphic symbols. The strategies for bodily-kinesthetic intelligence are body answers, classroom theater, kinesthetic concepts (students translate information from linguistic or logical symbol systems into purely bodily-kinesthetic expression) and hands-on thinking. In the 20th century, advertisers have discovered that musical jingles help people remember their client's product. Educators, however, have been slower to recognize the importance of music in learning. Armstrong's five strategies for musical intelligence are rhythms, songs raps and chants; discographies, super-memory music (students listen to the teacher's instruction against a musical background), musical concepts (for instance, in a lesson on Romeo and Juliet, play simultaneously two pieces of music with tension for the Montagues and the Capulets and then two quieter musical patterns coming into harmony with each other for Romeo and Juliet) and mood music (music that creates an appropriate atmosphere for a particular lesson or unit).

Armstrong suggests for the following strategies for interpersonal intelligence:

- Peer sharing

- People sculptures, for instance, students can build people sculptures to represent spelling words with each student holding a letter or to represent spelling sentences with each student representing a word.

- Cooperative groups (use of small groups)

- Board games

- Simulations, a group of students to create an "as-if" environment (this activities also deals with bodily-kinesthetic intelligence).

The five strategies for intrapersonal intelligence are one-minute reflection period, personal connections (teachers connects what is being taught with the personal lives of their students), choice time, feeling-toned moments (educators need to teach with feeling), goal-setting sessions. And finally, for the naturalist intelligence the strategies are nature walks, windows onto learning (looking out the window, to teach the weather, bird watching, seasons' effect on trees, plants), plants in the classroom, pets in the classroom and eco-study (whatever subject is being taught, we should keep in mind its relevance to the ecology of the earth; teaching percentage, for instance, the teacher can ask students to investigate the percentage of rain forest left in Brazil compared to what it was in 1900).

2.6.3. How to assess MI students

Another important chapter in the book *Multiple Intelligences in the classroom* is the one devoted to assessment. As we know the most important prerequisite to authentic assessment is observation. Armstrong elicits 64 contexts for MI assessment:

Activity/ assessment	**Linguistic Activity**	**Logical-Mathemati-cal Activity**	**Spatial Activity**	**Musical Activity**	**Bodily-Kinesthetic Activity**	**Inter-personal Activity**	**Intra-personal Activity**	**Natural-ist Activity**
Linguistic Assessment	read a book then write a response	examine a statistical chart, then write a response	watch a movie, then write a response	listen to a piece of music, then write a response	go on a field trip, then write a response	play a cooperative game, then write a response	think about a personal experience	observe nature, then write a response
Logical-Mathematical Assessment	read a book, then develop a hypothesis	examine a statistical chart, then develop a hypothesis	watch a movie, then develop a hypoth-esis	listen to a piece of music, then develop a hypoth-esis	go on a field trip, then develop a hypothesis	play a co-operative game, then develop a hypothesis	think about a personal experience, then develop a hypothesis	observe nature, then develop a hypoth-esis
Spatial Assessment	read a book, then draw a picture	examine a statistical chart, then draw a picture	watch a movie, then draw a picture	listen to a piece of music, then draw a picture	go on a field trip, then draw a picture	play a co-operative game, then draw a picture	think about a personal experience, then draw a picture	observe nature, then draw a picture

Bodily-kinesthetic Assessment	read a book, then build a model	examine a statistical chart, then build a model	watch a movie, then build a model	listen to a piece of music, then build a model	go on a field trip, then build a model	play a co-operative game, then build a model	think about a personal experience, then build a model	observe nature, then build a model
Musical Assessment	read a book, then create a song	examine a statistical chart, then create a song	watch a movie, then create a song	listen to a piece of music, then create a song	go on a field trip, then create a song	play a co-operative game, then create a song	think about a personal experience, then create a song	observe nature, then create a song
Interpersonal Assessment	read a book, then share with a friend	examine a statistical chart, then share with a friend	watch a movie, then share with a friend	listen to a piece of music, then share with a friend	go on a field trip, then share with a friend	play a co-operative game, then share with a friend	think about a personal experience, then share with a friend	observe nature, then share with a friend
Intrapersonal Assessment	read a book, then design your own response	examine a statistical chart, then design your own response	watch a movie, then design your own response	listen to a piece of music, then design your own response	go on a field, trip, then design your own response	play a co-operative game, then design your won response	think about a personal experience, then design your own response	observe nature, then design your own response
Naturalist Assessment	read a book, then do an ecology project	examine a statistical chart, then do an ecology project	watch a movie, then do an ecology project	listen to a piece of music, then do an ecology project	go on a field trip, then do an ecology project	play a co-operative game, then do an ecology project	think about a personal experience, then do an ecology project	observe nature, then do an ecology project

2.6.4. MI theory and cognitive skills

Educators have become increasingly interested in helping students develop thinking strategies since the advent of cognitive psychology as the predominant paradigm in education. The eight intelligences in the model are themselves cognitive capacities. Hence, when developing any or all of them we are facilitating the cultivation of students' ability to think. Let us look at how MI theory applies to the areas related to cognitive approach to learning: memory, problem solving, and other forms of higher-order thinking, such as Bloom's levels of cognitive complexity.

Teachers have always seemed troubled by the problem of students' memories. MI provides a helpful perspective on this educational problem. The poor memories of students may be in one or both of the intelligences areas most emphasized in school: linguistic and logical-mathematical intelligences. The solution may lie in helping these students gain access to their good memories. Spelling problems, for instance, may be tackled using other intelligences. Musical intelligence can be used by singing while spelling a word. Students can spell any seven-letter word to the tune of "twin-kle twin-kle lit-tle star" (each syllable represents one letter). Bodily-kinesthetic intelligence can be used to spell words by using the body to represent the letters, as in the choreography of the famous song Y.M.C.A. by Village People; students can also use hands-on activities to mold spelling words in clay. Interpersonal intelligence can be applied by assigning one letter to each student in a group and as a word is called, the students make a line in the correct order to form the spelled the word.

U.S. students' problem-solving abilities have been regarded as in need of significant improvement (Lemke *et al*., 2004); therefore, more and more educators look for ways to help students think more effectively when confronted with academic problems. Unfortunately, critical-thinking movement has banked on logical-mathematical reasoning abilities and in the use of self-talk or other linguistic strategies. MI theory suggests that thinking can and frequently does go far beyond these two areas. For instance, many thinkers have used imagery and picture language (spatial intelligence) to help them in their work. Others, have used problem solving strategies that combine visual-spatial images with certain kinetic or bodily-kinesthetic features of the mind. Musicians make use of a very different kind of problem solving strategy, which involves musical imagery. Mozart described his composing process this way: "Nor do I hear in my imagination the parts [of the composition] successively, but I hear them, as it were, all at once. What a delight this is I cannot tell. All this inventing, this producing, takes place in a pleasing lively dream" (Ghiselin, 1955: 45). Some MI problem-solving strategies that could be used by students in academic setting are the following:

- Linguistic– self-talk or thinking out loud

- Logical-mathematical – logical heuristics
- Spatial – visualization, ideas sketching, mind-mapping
- Bodily-kinesthetic – Kinesthetic imagery, accessing gut feelings or using one's hands, fingers, or whole body to solve problems
- Musical – sensing the rhythm or melody of a problem, using music to unlock problem-solving capacities
- Interpersonal – bouncing ideas off other people
- Intrapersonal – identifying with the problem; accessing dream imagery, personal feelings that relate to the problem; deep introspection
- Naturalist – using analogies from nature to envision problems and solutions

Bloom's levels of cognitive complexity, unveiled almost 40 years ago, include six levels of complexity by which educators can ensure that instruction stimulates and develops students' higher-order thinking capacities. The six levels are:

1. Knowledge – Rote memory skills (knowing facts, terms, procedures, classification systems)
2. Comprehension – The ability to translate, paraphrase, interpret or extrapolate material
3. Application – The capacity to transfer knowledge from one setting to another
4. Analysis – Discovering and differentiating the component parts of a larger whole
5. Synthesis – Weaving together component parts into a coherent whole
6. Evaluation – Judging the value or utility of information using a set of standards

MI curricula can be designed to incorporate all of Bloom's levels of cognitive complexity. Armstrong presents a table showing how a teacher can articulate competencies that address all eight intelligences as well as Bloom's six levels of cognitive complexity.

MI Theory and Bloom's Taxonomy **Ecology Unit: Local Environment – trees in your neighborhood**						
Intelligence	**Knowledge**	**Comprehension**	**Application**	**Analysis**	**Synthesis**	**Evaluation**
Linguistic	memorize names of trees	explain how trees receive nutrients	given description of trees diseases, suggest cause of each disease	describe how each part of a tree functions in relation to the whole	write a paper describing the life cycle of a tree from pre-seed to post-seed	rate different methods of controlling tree growth
Logical Mathematical	remember number of points on specific trees' leaves	convert English to metric in calculating height of tree	given height of smaller tree, estimate height of larger tree	analyze materials found in sap residue	given weather, soil, and other information, chart projected growth of a tree	rate different methods of controlling tree nutrients based on data
Spatial	remember basic configurations of specific trees	look at diagrams of trees and tell what stage of growth they are in	use geometric principles to determine height of tree	draw cellular structure of tree root	create a landscaping plan using trees as central feature	evaluate practicality of different landscaping plans
Bodily-Kinesthetic	identify tree by the feel of the bark	given array of tree fruits, identify seeds	given type of local tree, find an ideal location for planting it	create different parts of tree from clay	gather all materials needed for planting a tree	evaluate the quality of different kinds of fruit
Musical	remember songs that deal with trees	explain how old tree songs came into being	change the lyrics of an old tree song to reflect current issues	classify songs by issue and historical period	create your own tree song based on information in this unit	rate the song from best to worst and give reasons for your choices

Interpersonal	record responses to the question "What's your favorite tree?"	determine the most popular tree in class by interviewing others	use survey results to pick location for field trip to orchard	classify kids into groups according to favorite tree	arrange field trip to orchard by contacting necessary people	rank three methods to ask others about tree preference
Intrapersonal	remember a time you climbed tree	share the primary feeling you had while up in the tree	develop "tree-climbing rules" based on your experience	divide up your experience into "beginning, middle and end"	plan a tree-climbing expedition based on your past experience	explain what you liked best and least about your experience
Naturalist	learn to discriminate different tree leaves by sight	describe how other living beings benefit from trees	create a system for classifying different tree leaves	analyze the function of a given tree in terms of the larger ecosystem in which it finds itself	develop an approach for protecting specific types of trees in your neighborhood from damage or disease	evaluate which trees in your neighborhood are most eco-valuable to the surrounding environment

Armstrong reminds educators that they do not need to feel a compulsion to include all of these activities in one unit, but use the instructional model displayed as a road map to help them stay on course in their efforts to address a number of intelligences and cognitive levels. MI theory represents a model that can move educators into a broad range of complex cognitive tasks that prepare students for life.

2.6.5. Applications of MI theory to computer technology, cultural diversity and career counseling

MI theory provides a context through which existing understandings and resources can be extended to include a broader perspective to computer technology, cultural diversity and career counseling.

Stereotypical images of computer users working on spreadsheets or using computer programming languages make us associate computers with logical-mathematical intelligence. However, computers themselves are intelligence-neutral mechanisms. What activates a computer is the software used in it, which can be designed to interface with any or all of the eight intelligences. Educators can use MI theory as a basis for selecting and making available software for use in the classroom or in computer labs in the school. Using multimedia software, a project incorporating text (linguistic), illustrations (spatial), sound (musical or linguistic), and video (bodily-kinesthetic and other intelligences) can be designed. The process of putting together such a project requires a great deal of intrapersonal intelligence. If such a project is cooperative in nature, then interpersonal intelligence is called in play as well. The completed CDs or DVDs themselves become valuable documents of a student's learning progress. They can serve as electronic portfolios and be passed from one teacher to the next as part of an authentic assessment of the student's accomplishments during the year.

Over the past two decades, the United States as well as Spain have seen tremendous demographic changes that have created a student population more racially, ethnically, and culturally diverse than ever before. Such diversity presents a great challenge for teachers in designing curricula that are not only content-sensitive to cultural differences but also process-sensitive. According to MI theory, an intelligence must be valued by a culture in order to be considered a true intelligence. This criterion automatically disqualifies many of the tasks that have traditionally been associated with intelligence testing in the schools. For instance, the ability to memorize random digits is a task found on some intelligence test. Nevertheless, no cultures in the world pass on random digits to the next generation. What cultures do pass on to their younger members are stories, myths, values, scientific discoveries, political institutions among others. Spatial and naturalist intelligences are highly prized among inhabitants of the Puluwat culture in the South Sea Islands.

2.7. Factors concerning pronunciation in second language acquisition

As our experimental groups are trained in pronunciation in the second part of study, we present below some important literature regarding pronunciation.

2.7.1. Psycholinguistics

A relevant area when studying pronunciation is Psycholinguistics, the branch of linguistics which studies the mental processes involved in the acquisition and use of language (Ellis, 1997). Arguably, the most extensively studied area of psycholinguistics is first language (from now on referred to as L1) transfer. The transfers regarding the second language (from now on referred to as L2) learners are the *Zero* transfer, which describes the case where a structure or sounds found in the L2 is *not* a feature of the L1; the *negative* transfer which occurs when an L1 feature is found in the L2 but not in the same environment or distribution and the *positive* transfer, which describes the case where the L1 and L2 share a feature in terms of both its structure or features and its distribution (Nunan, 2000).

The Contrastive Analysis Hypothesis (CAH) is an early model to approach transfer effects. CAH argues that the difficulties in L2 speech lie at the differences between L1 and L2. It was thought that the elements of L2 familiar to the learner from L1 would be easy to learn while the elements different from the L1 would be difficult. The CAH fell out of favor, in part because it was not difficult to find cases where learners did not have difficulty with new and different phonemes in the L2. The CAH bred Flege's Speech Learning Model (SLM) (1995), which claims that different sounds would be easier to learn because the learner would be forced to create new categories for them. SLM is not in keeping with this study, due to the fact that the participants in this study assimilated most of the L2 sounds to their L1; for instance, all the /j/ sounds, as in *yellow*, were assimilated to the Spanish letter *y*, as in 'yo' whose sound is closer to the English /ʤ/, as in **j**ar; the same happened to the sound /æ/, which was associated to the Spanish phoneme /a/.

The Perceptual Assimilation Model (PAM) slightly echoes the doctrines of Flege's SLM, but focused on the behavior of *nonnative* listeners (Best, 1995). It proposes that the difficulty of nonnative contrast discrimination can be predicted based on the perceived similarity of L2 categories to L1 categories. In other words, PAM accounts for learner perception of nonnative sounds in terms of the phonological system of L1. Specifically, PAM proposes that the articulatory characteristics of nonnative sounds will determine the extent to which they will be assimilated into L1 phonemic categories. In turn, the degree of

assimilation of the nonnative sound will determine the learner's ability to detect any contrast.

Another feature addressed by Psycholinguistics is the role of consciousness. Discussions on the role of consciousness can be dated back to early work by Stephen Krashen's Theory of Second Language Acquisition which proposes the need to distinguish "acquired" L2 knowledge from "learned" L2 knowledge. The claim that these were knowledge systems independent of one another eventually gave rise to controversy and led Schmidt to address the then overgeneralized use in SLA of the word 'consciousness'. Eventually Schmidt (1990, 1993) argued that consciousness takes many forms, such as 'intentionality' and 'attention', and that *noticing* is an essential component of learning. Schmidt's proposals on the role of consciousness in learning have had far-reaching effects in SLA, spawning over a decade of research on the interplay of attention, awareness, noticing and many other factors. The role of consciousness in L2 speech perception and acquisition is less clear. From what has already been reviewed thus far, it seems that acquiring the sounds of the L1 takes place with little *conscious* attention. Rather, the *attention* that is given to differing acoustic cues takes place at the unconscious level. However, it may still be true that the adolescent or adult learner of a second language does draw upon conscious processes in some way. The majority of research addressing L2 phonological acquisition does not question the issue of consciousness in the same manner as studies of production (i.e. grammatical or conversational structures).

2.7.2. A review of the Critical Period Hypothesis

New researchers are shedding light on the Critical Period Hypothesis (CPH) (Lenneberg, 1967; Penfield & Roberts, 1959; Scovel, 1988) which suggests that an L2 must be learned early, perhaps as early as six years of age, for the learner to acquire native pronunciation. Some writers have suggested a "sensitive" or "optimal" period rather than a critical one; others dispute the causes, arguing that adults possess physical maturation, and more cognitive factors which may optimize their learning. The duration of the period also

varies greatly in different accounts. The strict version of this hypothesis states that there is a cut-off age at about 12, after which learners lose the ability to fully learn a language.

Wode (1994) based upon a review of studies on speech perception, cautions that there is more than one way in which age may affect language acquisition and that at present, no single theory can account for all the facts.

There is a body of research by Flege and colleagues addressing the effect of time of exposure on L2 perception and production. Research by Flege *et al*. (2003) with native Italian-speaking learners of English focused on production of the /e/ vowel of English. Participants were classified by age of arrival (AOA) and amount of continued L1 (Italian) use. The subjects' productions were rated by native English-speaking adults and ratings indicated that early bilinguals (i.e. earlier AOA) tended to produce the English vowels more accurately than late bilinguals did and low-L1-use bilinguals tended to produce English vowels more accurately than high-L1-use bilinguals. An earlier study by MacKay *et al*. (2001) also examined bilinguals in Canada who differed according to AOA and amount of continued L1 use. The findings of this study differed from those of Flege *et al.* (2003). MacKay *et al*. (2001) examined the production of English /b/ and the perception of short-lag /b d g/ tokens. The observed differences between early and late bilinguals were attributed to differences in amount and quality of English input rather than to any likelihood that early learners have an advantage over late learners for establishing new phonetic categories. Indeed, the effect of time of exposure to the L2 is in no respect clear. In a study of Spanish-Catalan bilinguals, all subjects had at least 12 years of exposure to Catalan (Pallier et al., 1997). In spite of both high use and over a decade of exposure, results of this study indicated that the bilinguals had not mastered the perceptual contrast between Catalan /e/ and /ɛ/ phonemes. The authors claim that these results constitute strong evidence that the sound system learned by the bilinguals is very biased by the first language learned, and that these speakers do not have two systems between which they might have switched.

Students' aptitude, or a laser profile according to Gardner's terminology, which is an internal individual variable might also be relevant. A student who has strong linguistic intelligence, may learn pronunciation faster than another student with weaker linguistic intelligence.

Motivation is another relevant variable which can be of at least three types: instrumental, integrative or intrinsic (Norris, 2001). Instrumentally motivated learners make efforts to learn a language due to requirements of school or career or perhaps for the possibility of advancement in said environments. Integrative motivation describes the case of the learner who is interested in the culture of the people who speak the language in question. Lastly, the intrinsically motivated learner is much like the learner with integrative motivation, but this learner finds the activity of the learning exercise to be motivating in and of itself.

The aforementioned methodologies and their aids, for instance, minimal pairs, phonetic drills, IPA chart, and also Perception, Psycholinguistics and age factor were used to structure and support this paper. The IPA chart was fundamental in the organization of this paper, for instance, to show that students pronounced /e/ in lieu of /æ/. The age factor played an important role in this study because one of the oldest participant was the one who got the greatest mark in pronunciation, this shows that motivation and determination may be important factors to acquire a better pronunciation.

III. METHOD

This paper focuses on two main aspects. On the one hand, we wanted to investigate teachers, students and language assistants in order to know how Secondary Bilingual Schools in the region of Madrid develop their work as well as if they make use of MI theory in the classroom. We obtained such information by creating and administering three different questionnaires in over 30 public and charter secondary schools in the Community of Madrid.

On the other hand, we wanted to investigate if there are any differences in performances between flamenco dancers, ballet dancers and secondary school students when trained in two different areas: Phonetics and Chemistry. In order to demonstrate that learning through a student's strength is more efficient than learning in the conventional way, students and dancers were trained in three separate groups. The data for this part were obtained from six different training sessions. Ten dancers haphazardly chosen had three subsequent session to make up the dancer student's Portfolio.

3.1. Participants

Part 1- The Questionnaires

- 150 teachers, 150 language assistants and 150 students were chosen at random to complete questionnaires designed specifically for this study. All of these participants belonged to bilingual secondary schools from Alcalá de Henares, Alcobendas, Guadarrama, Las Rozas, San Sebastián de los Reyes, Villalba, Madrid and Móstoles, all of which belong to the Community of Madrid.

Part 2- Phonetics and Chemistry Training

- 20 students from secondary schools were randomly chosen to be the control group. All these students aged from 12 to 17. Five of these students were intentionally

chosen at the age of 12 in order to review the Critical Period Hypothesis, being 12 the limit age to better acquire a second language.

- 20 dancers of classical ballet with a minimum of four years of experience were chosen at random to be the experimental group 1. All the dancers belonged to Galileo 98 Dance Academy and Escuela Amor de Dios, both in the city of Madrid. The dancers were all Spanish and aged from 15 to 30.

- 20 flamenco dancers with a minimum of four years of experience were haphazardly chosen to be the experimental group 2, from Galileo 98 Dance Academy and Escuela Amor de Dios, both in the city of Madrid. The dancers were mostly Spanish; there were also two students from Venezuela and one from Mexico and they aged from 19 to 28.

Part 3 – The Processfolio

- Three dancers from experimental group 1, other Three from experimental group 2 and two other ballet and modern ballet dancers were randomly selected to participate in the processfolio, proposed by Gardner (see, Theoretical Framework 2.5.5. Disciplined Inquiry in High School: An Introduction to Arts PROPEL).

3.2. Materials

In order to assess the bilingual schools in the Community of Madrid, following the classification established by Sierra Bravo (1996) in relation to empirical work, this research fits on the one hand, within what he calls "direct type empirical". It studies the reality through a survey and for its descriptive style, since one of the focuses of this research is to determine the status of how the curriculum is taught in secondary bilingual schools in Madrid. The instrument used for data collection was the questionnaire, along with the interview and the attitude scale, which form the three possible types of observation through survey (Bisquerra Alzina, 2004). The survey, one of the social research techniques most

widely used, is based on oral or written statements from a sample of the population in order to gather information (De Vaus, 1996). The aim of the questionnaire is to obtain in systematic and orderly manner, information from the research population (teachers, language assistants and students) on the variables under investigation (see appendix A, page 188; B, page 191 and C, page 195). The questionnaires were sent to different schools after having gotten the principals' approval.

On the other hand, some class observations took place, based on the very positive or negative attitudes found in the questionnaires; that is, if teachers answered that they were still book-centered, and hadn´t adapted themselves to the new systems, we considered these answers as negative attitudes. On the contrary, when they said they used all the possible media available, we also found fundamental to analyze these positive aspects. These two extremes were of interest to class observation.

In the second part of our study, in order to appraise the experiment, a standard pretest was administered in all three groups (see appendixes D and E, page 199). The dancers also filled up a form before taking the pretest (see appendix H, page 202). Subsequently, the three groups had five training sessions, which was followed by an immediate posttest (see appendixes D, page 199; F, page 200; and G, page 201). A questionnaire was administered after the dancers' posttest (see appendix I, page 203). Participants received one more training session after the first posttest, this training session lasted fifteen minutes as the previous ones; however, before this final session, participants had ten minutes to check their mistakes in posttest 1. Posttest 2 was given just after this sixth training session by following the same procedure as in posttest 1; that is, appendixes D, F and G were completed.

In the third part, the phase of creative process, the dancers needed to make up choreography with the use of the chosen media (spoken text by colleagues or by themselves, writing, objects in connection with their choreography), and a questionnaire was administered (see Appendix J, page 204) as a form of assessment. The choreography was also critiqued by their colleagues. In a final phase, each dancer had the opportunity to

make use of their friends' pieces of advice and of his own reflections to produce a final version of their choreography which deals with an area of weakness of the dancer, for instance, the dancer can explain a math formula through his choreography. A final assessment took place (see Appendix K, page 205)

The trainings were specifically designed for this study. For the ballet dancers, the phonetic training made use of leg movements analogical to the mouth movements; that is, a phoneme such as [/i:/, as in b***ee***], has tension and little mouth opening, whereas [/æ/, as in *b**a**d*] needs a wide open mouth. Then, jetés (forty five degrees) were chosen to practice /i:/ and grand battements one hundred and eight degrees were selected to represent /æ/. Jetés have lots of tension, just like the /i:/ sound whereas grand battement is the movement with greatest amplitude in ballet and can be compared to /æ/, which is the vowel with the greatest amplitude in English. By the same token, frappés were elected to represent [/ð/, as in ***th***ey, /v/, as in ***v***ery and /z/, as in ***z***oo] because they are nonstop movements with a lot of air flow, as if it produced a wheezing sound resembling the/ð/, /v/ and /z/ sounds.

The Chemistry training was associated to the developés, the dancers start practicing the periodic table columns from top to bottom, as they usually learn at school; they say out loud a whole column as the legs move from a hundred-and-eight-degree position to zero degrees, when the leg hits the floor. The movement is performed *en-crois; that is,* four developés with each leg. Flipcharts were used so that students could practice pronunciation without having to hold any paper, which would make dancing more difficult. A big periodic table was made, each element was printed on A4 paper size. These A4 papers were laminated and put together in the same order as in the periodic table and finally attached to the wall on the days of the trainings.

When it came to the flamenco dancers, the phonetic training was associated to movements specific to this dance style. Fast and ample circular arm movements were performed to train the /ð/, /v/ and /z/ sounds, as if the air flow produced by the movement were these sounds themselves.

3.3. Procedure

Part 1 – The Questionnaires

The first step to get questionnaires completed was to go to bilingual schools and ask for the principals' approval to let us administer the questionnaires. However, no schools allowed us to administer our questionnaire to students, so we had to approach students when they were leaving school. We also banked on some friends who are currently working as language assistants and not only did they answer their questionnaire but they also handed out some questionnaire to their students. The University of Alcala de Henares allowed us to come to the university and administer in person the questionnaires to their language assistants who attend the Master's Course. After analyzing the questionnaires, we wanted to observe one BEDA class which had a better general performance compared to the other charter and public schools in this study as well as to observe one class from the public school system. Because only one principal from the BEDA program authorized the tape-recording of one of their classes, we asked one language assistant to record one of the classes from the public school system. In neither case the students knew about the tape-recording.

Part 2 – The trainings

All participants individually took the pretest (see Appendixes D and E, page199) on chemistry and phonetics. The dancers also filled out a form (see Appendix H, page 202); regarding chemistry, all participants were supposed to fill in the periodic table using all the elements they know. Nevertheless only the elements from group 1, 2, 13, 14, 15, 16, 17 and 18 were taken into consideration, totaling 44 elements, as they are the most important ones in the periodic table. The trainings focused on these 44 elements. Then, ballet dancers took a ballet class jointly with the chemistry training (see Appendix L, page 206). Because the dancers needed to dance as they repeated the chemical elements, a big periodic table was attached to the wall. By the same token, the flamenco dancers took a flamenco class combined with the chemistry training. The control group received a traditional training or

drill, just by repeating the columns out loud. The amount of time for the trainings was of 15 minutes. The dance groups had an extra two minute but for the dance instructions. No input on chemistry was given during these extra two minutes; that is, the factual time for chemistry input was 15 minutes for the three groups.

In the first Chemistry training session the focus was on columns 1, 2 and 13. Because the drills were cumulative, in the second session columns 1, 2 and 13 were quickly reviewed and attention was given to columns 14, 15 and 16. In the third session students were presented to the two last columns (columns 17 and 18), and once again reviewed the columns studied in the two first drills. Right after the third training sessions, the participants filled in the periodic table once more for the posttest 1.

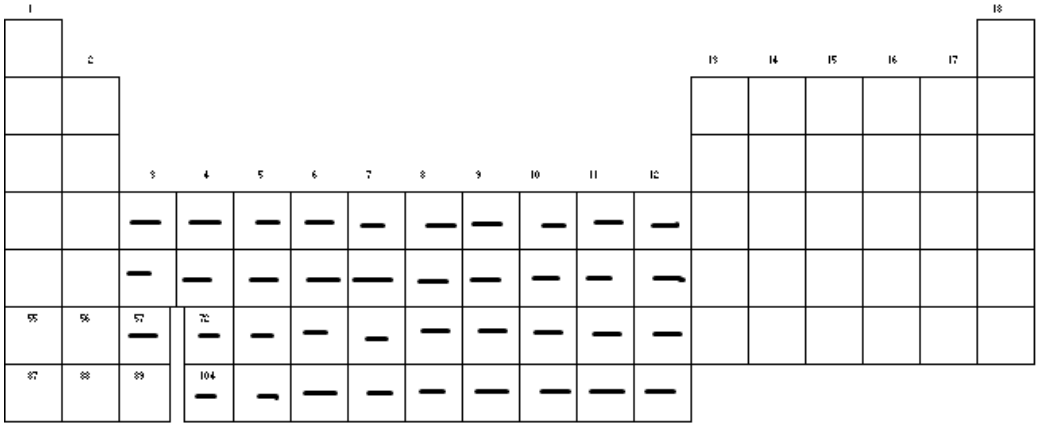
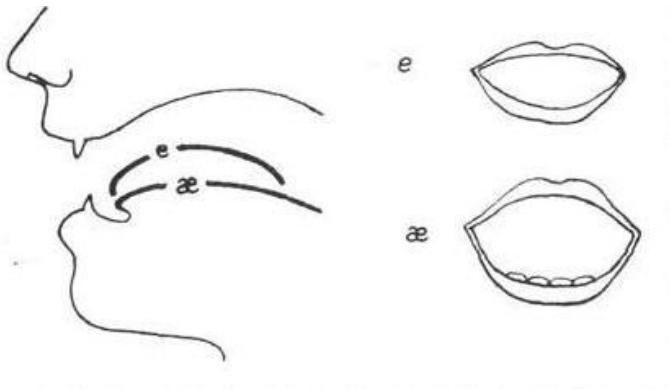


Table used for students to fill in for posttest 1 and 2.

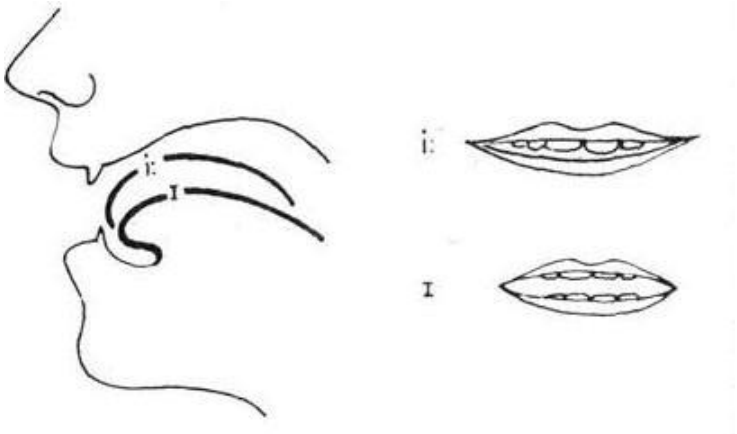
Due to the fact that the participants were volunteers and were not getting credits or payments for their participation in the study, the pronunciation training (see Appendix J) took place on the same day, just after the chemistry sessions. That is, once week participants had one training session combining the two analyzed aspects (Chemistry and phonetics), fifteen minutes was spent on Chemistry and another fifteen minutes on Phonetics, totalizing one single thirty-minute session per week. For the pronunciation training, the same procedure was repeated: students read out the same words they had read for the pronunciation pretest (see Appendix E, page 199); however, now they were corrected and were taught the right articulation. The pronunciation training was divided

into two parts, drill A, which dealt with consonants sound, and drill B, which focused on the consonants sounds Spaniards have difficulties with. In the first pronunciation training session, the focus was on the difference between /æ/ and /e/.



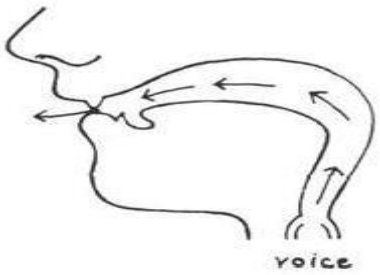
The participants were asked to look at the mouth diagram above and tell the differences they could notice from both sounds. The immediate answer was that to produce /æ/ one has to open the mouth wide.

In the second phonetics session, the /i:/ sound was practiced. Participants were asked to analyze the mouth diagram below and were instructed on how to pronounce the sound. To produce /i:/ one has to have a wide mouth and place the front of tongue high; the lips and the tongue are not relaxed as in /ɪ/.



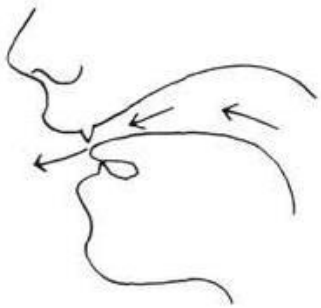
These drills were cumulative, therefore, in the second training session, participants from the three groups reviewed sound /æ/ and /e/.

Owing to the fact that European Spanish speakers do not distinguish between the phonemes /v/ and /b/, drill B (see Appendix M, page 207) was performed in the third session in order to clarify the difference between these two sounds. Students first received articulatory instructions, for instance, to produce /v/ the lips have to be separate, the top teeth on top of the bottom lip and the air has to pass through the natural gap that is obtained.



The instructor read the words, students repeated them and, in case of mispronunciation the students were immediately corrected.

In the fourth training session, participants were explained that the only thing that differentiates /θ/ and /ð/ is the use of voice. To produce /θ/ voice is not used (voiceless), while to produce /ð/ it is used (voiced). Students were asked to touch their throats and feel both sounds. They could notice the vibration of the vocal folds when they pronounced /ð/, by following this procedure they became aware of the voiced “th” sound, which the Spanish language lacks. The voiceless “th” sound / θ/ was compared to “C”,as in *ha**c**er /a*θér/, of the L1. They also had the pictures below as a visual aid. Once again the three groups reviewed the sound previously learnt in sessions one, two and three.



/θ/

In order to ascertain that students are not associating the pronunciation with the written words, some pictures were shown to the participants with the written words shown underneath each picture, these pictures were the same used during the posttest without the written word (see appendix G, page 201). Pronunciation was corrected in both sessions (Chemistry and Phonetics) to ascertain that students were transferring what they had learnt in the Phonetics sessions to the Chemistry pronunciation of the elements.

In order to check if bodily-kinesthetic intelligence helped the dancers memorize better the trained phonemes and the chemical elements, all participants took posttest 1 after the fifth training session by using Appendix D, F and G once more. The trainings took place once a week after the dancers' classes at their dance academy. Due to the fact that the participants of the control group were volunteers from different schools, they were divided in four smaller groups, two groups with 6 students and two groups with four students.

There were in total six training sessions, which lasted fifteen minutes each. Five sessions before posttest 1 in the case of phonetics, there was a review prior to the sixth session in which the participants had ten minutes to check their mistakes in the first posttest. Participants had session six previous to posttest 2. The sixth training session and posttest 2 took place on the same day, one week after posttest 1.

Part 3 – The Processfolio

In the first meeting, either individually or in small groups, according to dancers availability, dancers were introduced to the processfolio process, they were explained that they had to choose any secondary school subject and present the topic they would choose to other dancers. In case the dancers could not come up with an idea, some topics were proposed (see Appendix N, page 209). Three of the dancers went to flamenco classes together, so it was decided to join them and make one group. Another two groups were made, one group with two ballet dancers and one ballet and modern ballet dancer who attended dance classes together and a third group with one ballet dancer and a ballet and

modern ballet dancer in which the instructor participated actively in order to compensate for the lack of participants.

In the second meeting, approximately one week after the first one, dancers got together and talked about the topics they had chosen. This meeting was short and students were given instruction on how to present their topic for the following meeting. They were instructed to make choreography to explain the chosen topic. They could use (but not overuse) verbal, any visual aid as well as music to accomplish their task. It was established that time for the presentation would range from 4 to 6 minutes.

In the third meeting dancers presented their piece of choreography and the other dancers commented and made suggestions.

In the fourth and final meeting, dancers re-presented their piece of choreography by making use of their mates' comments and their own reflection. There was a group talk discussing the benefits of this type of assessment.

IV. RESULTS AND DISCUSSION

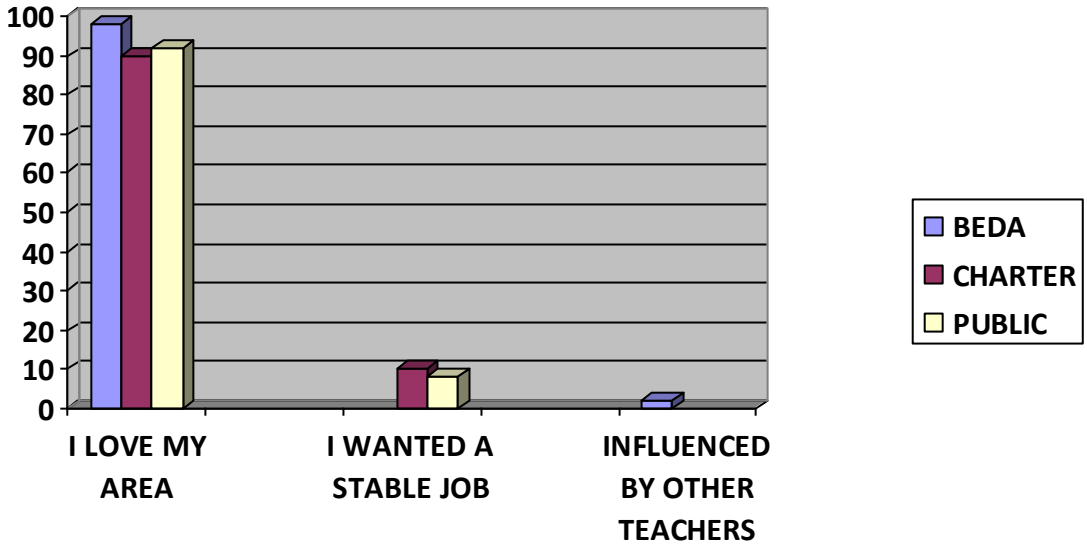
4.1. Part 1 – The Questionnaires

4.2. Questionnaires for head teachers

150 teachers from Bilingual Schools in the Community of Madrid answered a twenty-question questionnaire whose objective was to find out how Multiple Intelligences, assessments, homework, teacher trainings and meetings are dealt with in these institutions. We divided the bilingual schools into three categories: public schools (state schools in the UK, which are free of charge), catholic charter schools from the BEDA (Bilingual English Development and Assessment) program and other charter schools. Twenty head teachers from each of these three categories of school were surveyed. These teachers taught Biology, Geology, English Language, Arts, History, Technology and Physical Education.

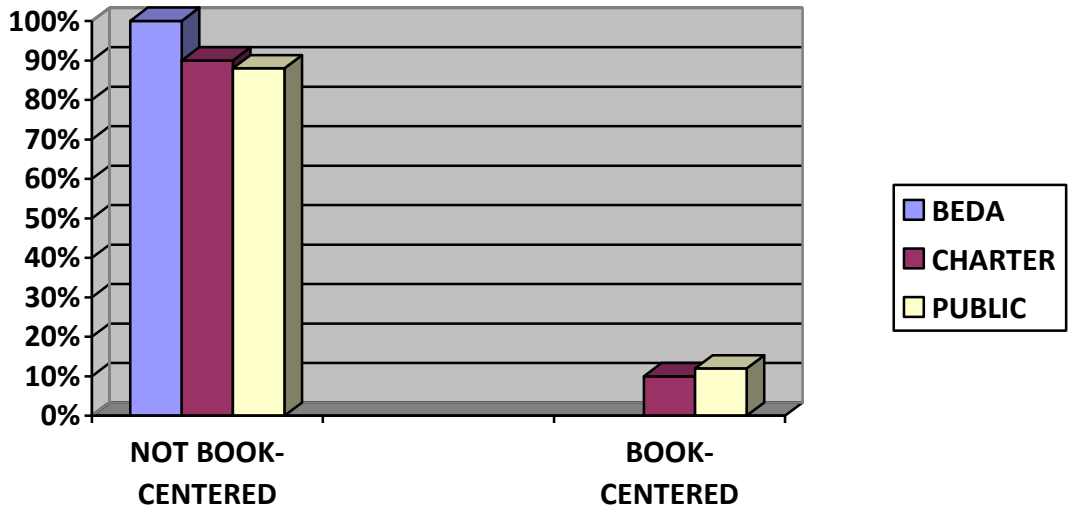
The following 11 tables present key finding of the questionnaire study for teachers.

1. The reason why teachers have chosen their specific area



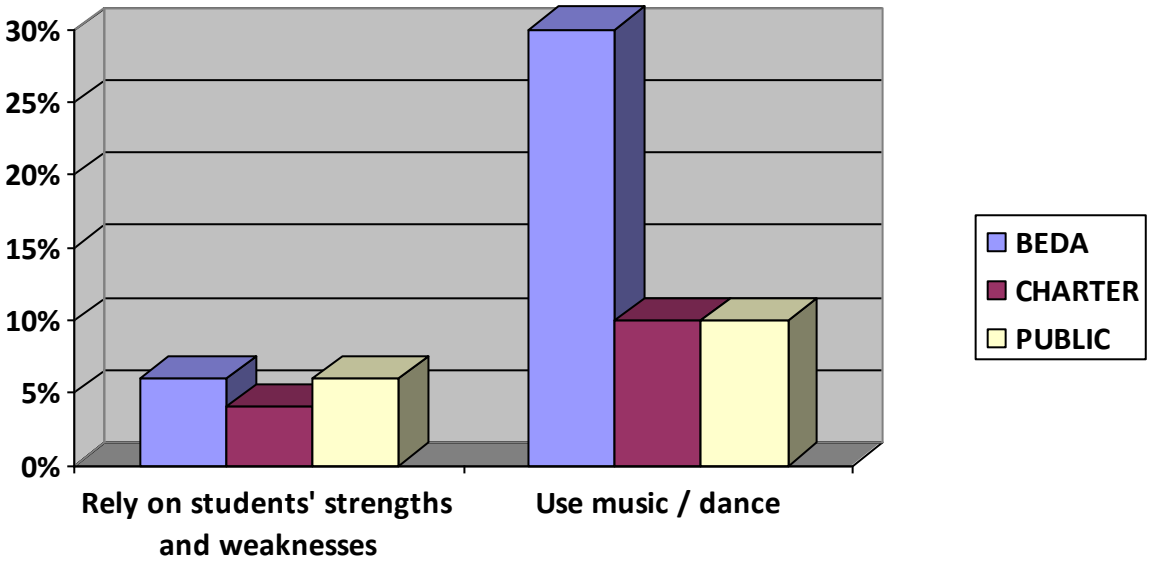
As evidenced by the chart, at least 90 percent of all the teachers love the area they work in. It is amazing how all the teachers have always shown interest in the areas they teach at present. The biology teachers mentioned that they have always loved nature, collecting shells and nature related themes. The teachers of English said they have always loved languages and some of them have always liked English exclusively. The Arts teachers have always enjoyed drawing, cutting and making creative things. These answers support Gardner's idea of people's strengths. We also found out that ten percent and eight percent of the teachers from the charter and public schools, respectively, decided to be a teacher because they were looking of a stable job. Two percent of the teachers belonging to the BEDA program said that they were influenced by other teachers who were their friends or family members.

2. How book-centered teachers are



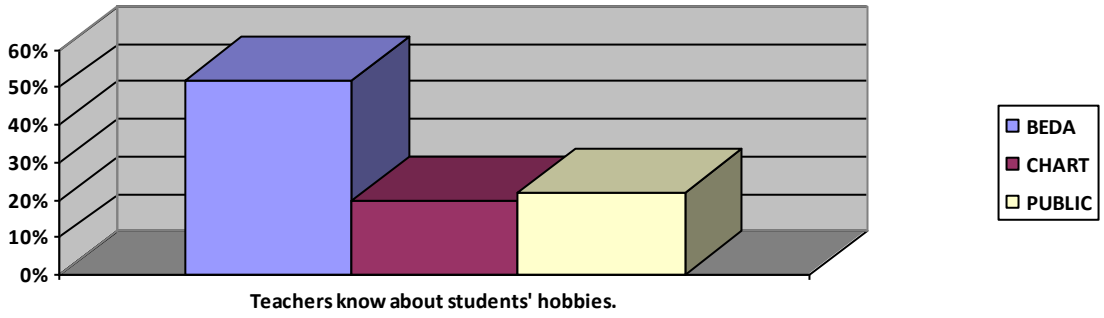
It can be seen that the great majority of the teachers are not book-centered. These teachers mentioned that they use the Internet, other books apart from the students' textbook, overhead projector and also sometimes students present small projects on PowerPoint.

3. Teachers rely on your students' strengths and weaknesses to prepare the class



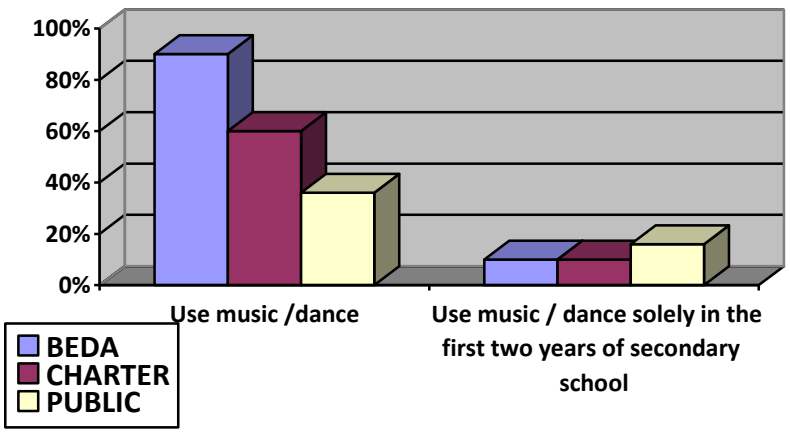
Only six percent of the teachers from BEDA and public schools and four percent from charter rely on their students' strengths and weaknesses to teach. These figures suggest that teachers are not aware of or do not attend to MI theory. Notwithstanding, thirty percent of the teachers from BEDA and ten percent from charter and public school use music and dance in their classes. When asked the reason why the teachers use music and dance, all of them answered that it is in order to motivate student. That is, these educators are once again confirming that they do not rely on MI theory to teach their classes. Let us mention that these figures contemplate some teachers from public school that only use music and dance in the first two years of ESO.

4. Teachers' knowledge of their students' hobbies:



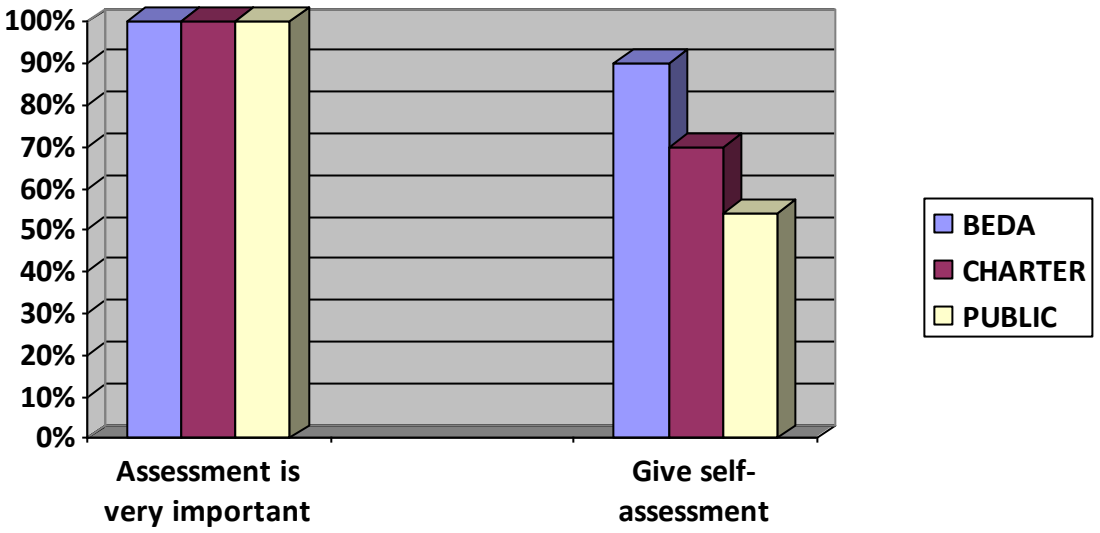
From the chart we can see that more than 50 percent of the teachers belonging to the BEDA program know about their students' hobbies while 22 percent of the teachers in the public schools and 20 percent of teachers in Charter schools are aware of their students' hobbies. All the teachers that are aware of their students' hobbies believe that these hobbies may help students learn the subject. Some teachers make the syllabus around these topics, others try to make these hobbies into the classroom. These data also suggest that most teachers do not rely on MI theory to prepare their classes.

5. Teachers use music, dance or any other artistic technique to help students with the subject



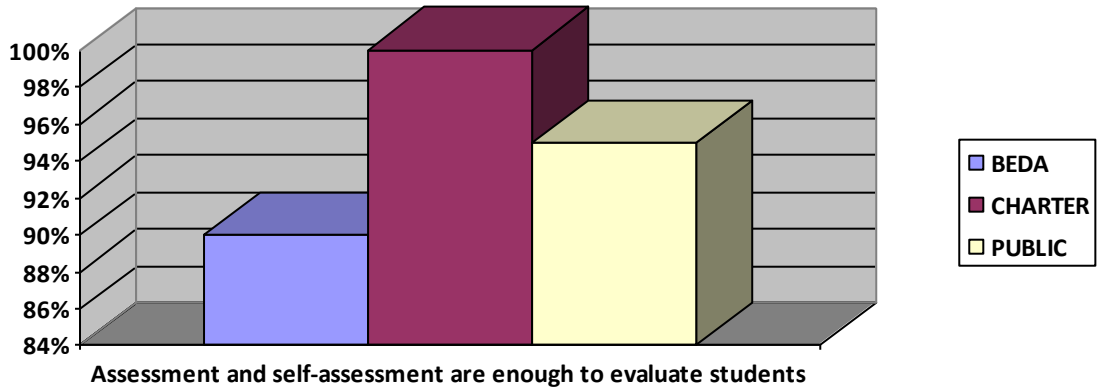
As evidenced by the chart, all teachers from the BEDA program use music and dance to help students; however, ten percent of these teachers use these aids only in the first two years of secondary school. Similarly, ten percent of the teachers from the public schools and 16 percent from the Charter schools do not use music or dance in classes because they have too much content to teach and time is short.

6. The importance of assessment



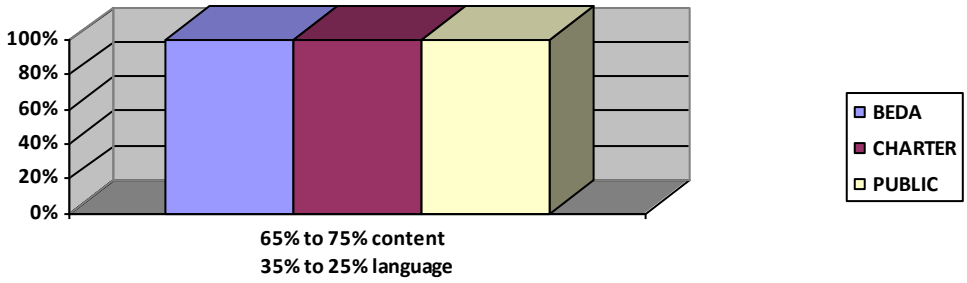
All teachers agree that assessment is one of the most essential parts of the teaching / learning process. More than 54 percent of all the teachers give self-assessment to their students, sometimes they give them a check list and students have to mark from 1 to 5 their weaknesses and strengths in some aspects of their subject. Other teachers mentioned to use self-assessment only with few activities. When asked what is done with these particulars teachers were not consistent and answered that this piece of information gives them enlightenment about common mistakes, how students see the classes. However the actions that are taken after reading this information were not mentioned.

7. Assessment and self-assessment are enough to evaluate students



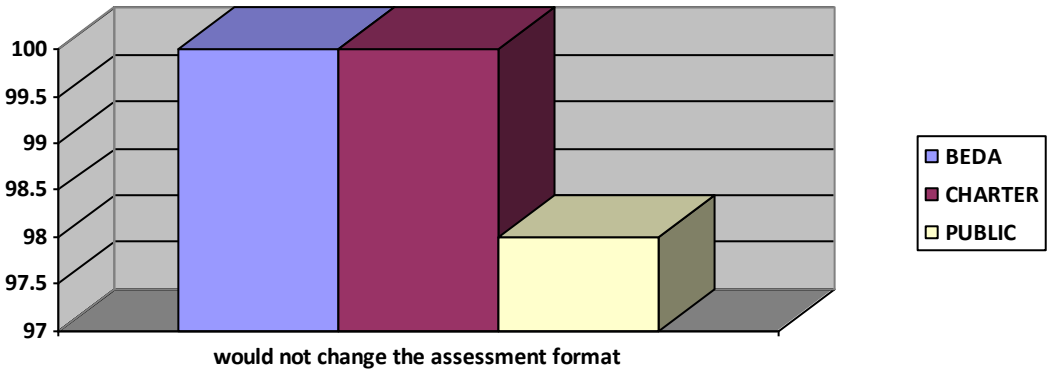
When teachers were asked if students' self-assessments and teachers' assessment were enough, at least 90 percent of all teachers answered *yes*. The ones who answered *no,* mentioned that it would be interesting to have meetings with the parents and also use peer-assessments. With regard to student's performance, teachers know if they performed poorly because of lack of the language or lack of content by analyzing they written exams and by analyzing their students in the classroom. The English teachers also mentioned they do not have this worry, as they are not content teachers.

8. The percentage teachers attribute to English Language and knowledge of the content when grading



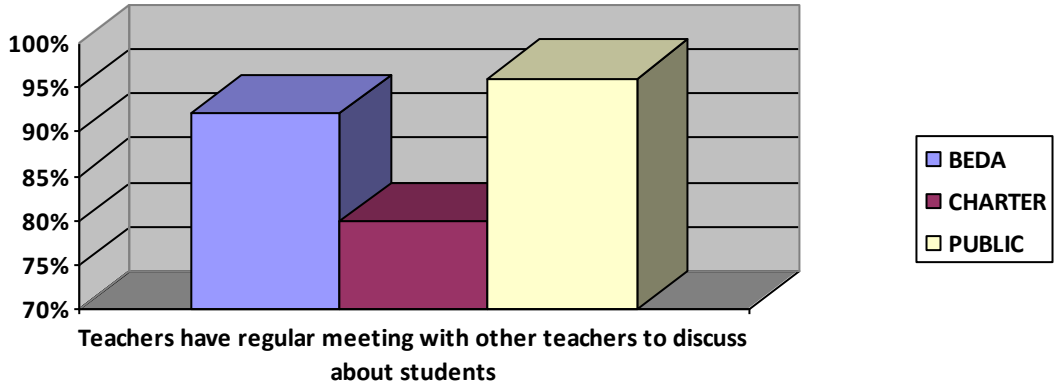
It can be seen that all teachers attribute from 65 to 75 percent of the grade to the content. In the case of the English teachers, content and language cannot be dissociated, therefore they grade the language exclusively.

9. Percentage of teachers who would not change anything in the assessment format



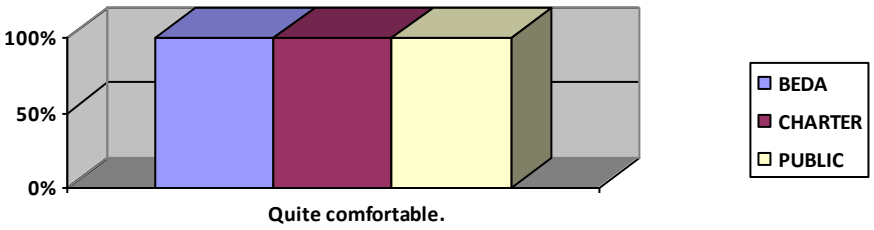
It is interesting to highlight that the two percent of the public school teachers who would change the format, would like either to make the evaluation more qualitative and less quantitative or would relate exams more to real life.

10. Teachers have regular meeting or informal talks with other teachers to discuss about assessment, learning issues, helping students



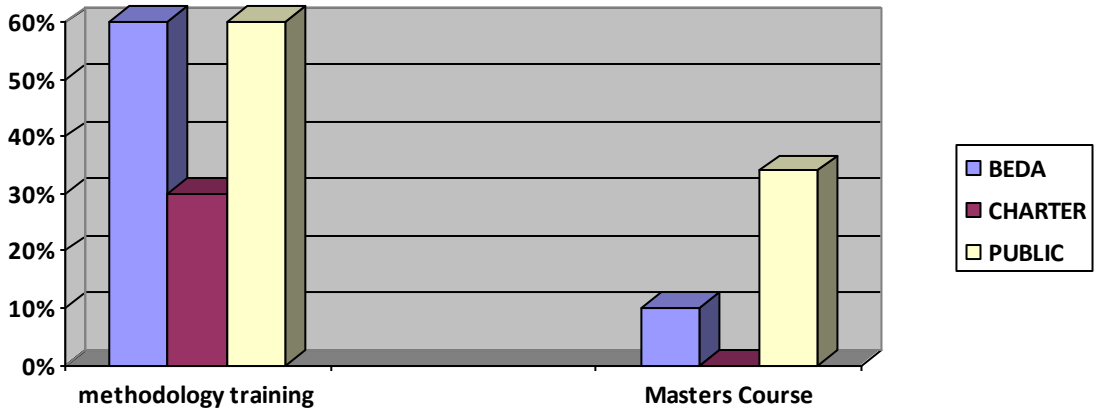
It is important to notice that some teachers in the public schools are tutors and meetings not only with other teachers but also with parents once a week. All teachers have to fill in a paper with information about the students. In charter and BEDA program these meetings also happen weekly.

11. How comfortable teachers feel speaking in English in the classroom



As evidenced in the graph, all teachers feel quite comfortable speaking English in the classroom. Nonetheless, no one said they can express themselves in English as well as they can in Spanish and they explained that the most important thing is to be constant and learn and improve day by day. This may explain the fact that we found some minor spelling mistakes, mainly made by head teachers from the public school.

12. Training and courses teachers have recently received



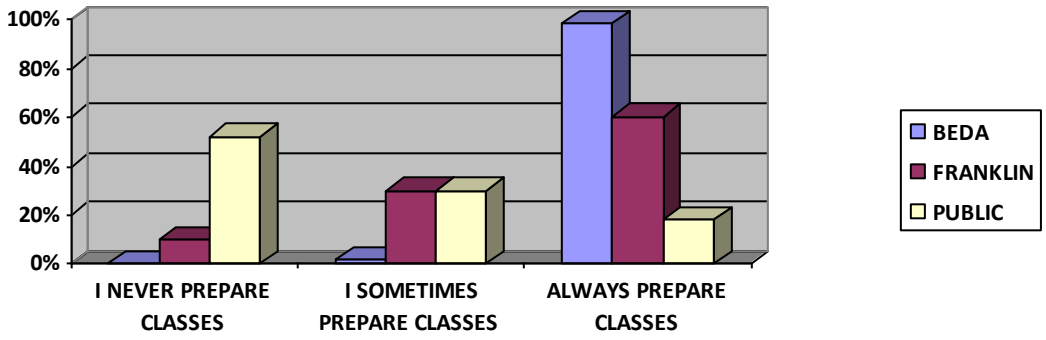
The graph shows us that more than 50 percent of the BEDA and Public School teachers participate in regular trainings. The subsidy to public teachers by the Community of Madrid is responsible for the high levels in the Master's Courses. When teachers were explicitly asked if they made use of MI Theory in the classroom, only two teachers from the Public and one from the BEDA said to partly use it as it is a way to motivate their students. The data may suggest that most teachers are not familiar with MI Theory.

4.3. Current performance of language assistants from the secondary public schools (Public), BEDA program (BEDA), and from Franklin Institute (Franklin)

The majority of the surveyed language assistants work as conversational assistants in Science, English Language and History classes; however, we also found out assistants who lead and prepare the whole class or are even asked to teach at a moment's notice. In some BEDA schools they also work as English teachers without the presence of the head teachers, these assistants also grade students.

The following 14 tables present key finding of the questionnaire study for language assistants.

1. The frequency assistants prepare classes



Regarding the first question from the language assistants' questionnaire, asking them what media they use when they prepare their classes, we got two very different panoramas. On the one hand, for instance, fifty four percent of the public school assistants do not prepare classes at all. These assistants stated "I am a language assistant, therefore I do not have to prepare classes."

On the other hand, we encountered 30 percent of the public schools assistants who do prepare some classes on request. The remaining 18 percent prepare classes on a daily basis. As shown in the graph, 98 percent of BEDA assistants prepare their classes and some

even work as a head teacher. These assistants-teachers stated that their students are required to finish their textbooks from the Macmillan by the end of the year, therefore their main concern is to complete their current textbook. We have also found that the assistants from Franklin have got restricted autonomy and those who do not prepare classes is because the head teachers do not allow them to do so. Nevertheless, these assistants have expressed their wish to have more autonomy in the classroom.

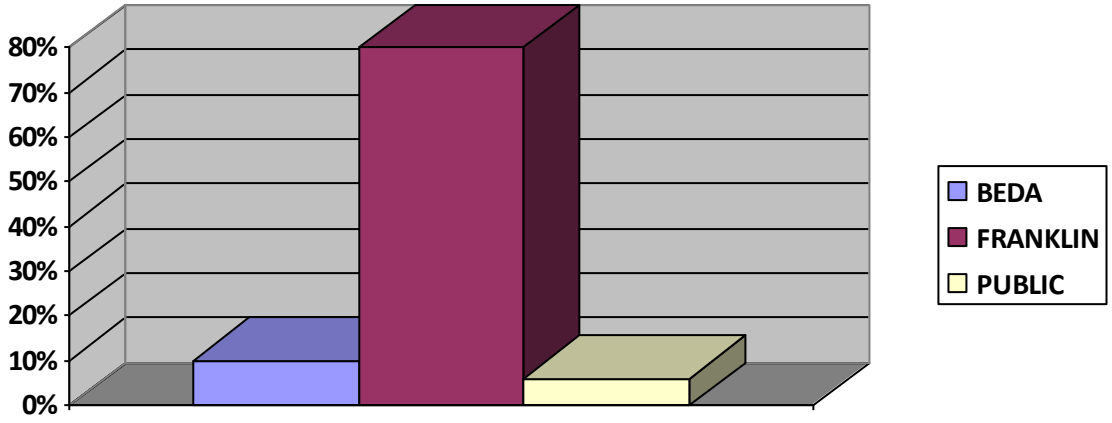
From the teachers who prepare classes, the means they use are:

- Public school assistants: PowerPoint on various American customs, games and the Internet.
- BEDA assistants: PowerPoint, games, songs, the Internet, TV programs in English, role-plays.
- Franklin assistants: YouTube videos, Internet and text from the Internet, games, posters, CDs, BrainPOP[15]. Two assistants use these media only if the school has a smart board. Only one assistant stated that she uses no media as the school has very limited resources.

The data show that the assistants belonging to the Franklin Institute and to the BEDA program rely on a wider range of aids to teach.

[15] BrainPOP is a group of educational websites with over 1,000 short animated movies for students from ages 6 to 17, covering the subjects of science, social studies, English, mathematics, arts and music, health and technology. BrainPOP is used in more than 25% of U.S. schools and also offers subscriptions for families and homeschoolers.

2. Language assistants rely on their students' strengths or weaknesses to prepare their classes:

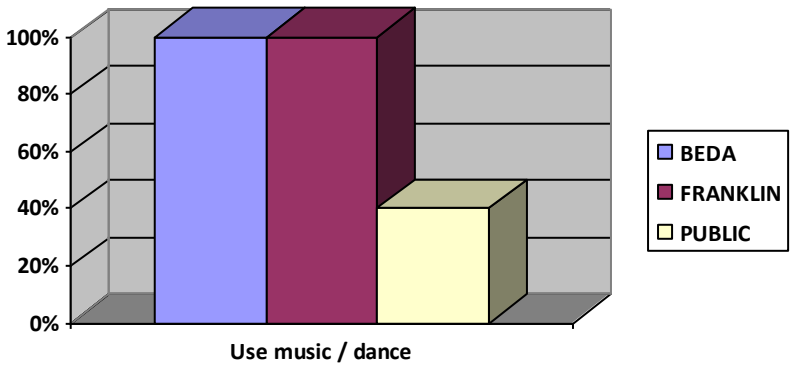


Rely on students' strengths and weaknesses

When it comes to know about students' strengths and weaknesses, Franklin assistants are by far more concerned about this feature. 80 percent of these assistants take into consideration their students' strong and weak points whereas only ten and eight percent of the assistants from BEDA and Public schools, respectively, are aware of these facts. It was also interesting the reports of some assistants from the Franklin Institute who said that they are aware of the students' strengths and weaknesses; nevertheless, the head teachers are not.

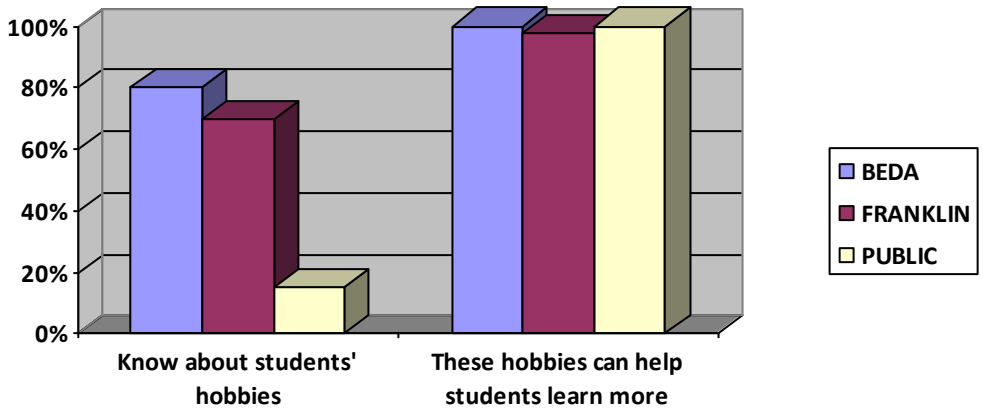
One answer, regarding students' strengths and weaknesses, from one of the BEDA assistant, who works indeed as a head teacher was the following: "No, because they have varying levels and also it is believed that catering to a class' strengths or weaknesses is not beneficial because they do not have a solid level across all aspects. Therefore, I focus on all aspects." This idea is totally opposed to MI theory beliefs. This assistant might have not understood the question or she really believes that the classroom is a single unit, where students are taught in the mass and do not have the chance to boost their strengths and work on their weaknesses and even use their strengths to help them deal with their weaknesses, as we have done in the second part of this study by using dancers bodily-kinesthetic intelligence to help them learn phonetics and chemistry.

3. **With respect to the use songs, videos, dance or any other artistic technique to help them with the subject, assistants' attitudes are:**



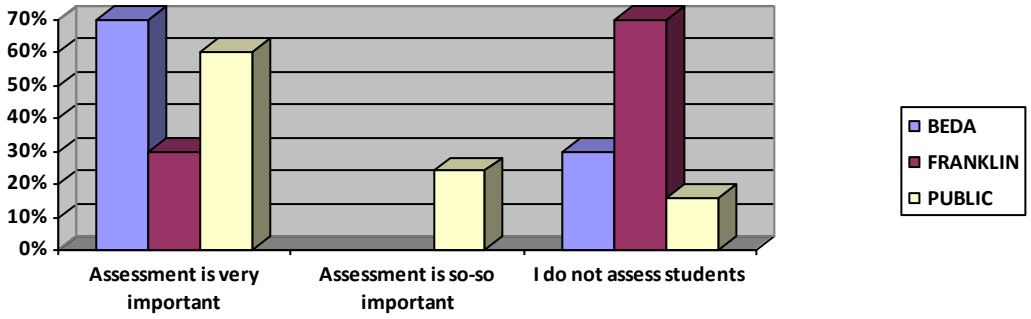
As evidenced by the chart, all assistants both from BEDA and Franklin use music and / or dance in the classroom. Although only ten percent of the assistants from BEDA rely on their students' strengths and weaknesses, all of them rely on music, mainly songs and some of them also on dance. These assistants may benefit more if they were aware of their students' strong and weak points, as Howard Gardner suggests. Three assistants from the BEDA program said to use Alpha wave music to help students learn. One assistant from the public school mentioned video clips from bands the learners enjoy. Around 30 percent of the assistants from BEDA and Franklin also rely on drama plays or sketches to help their students improve their English.

4. How aware assistants are of their students' hobbies



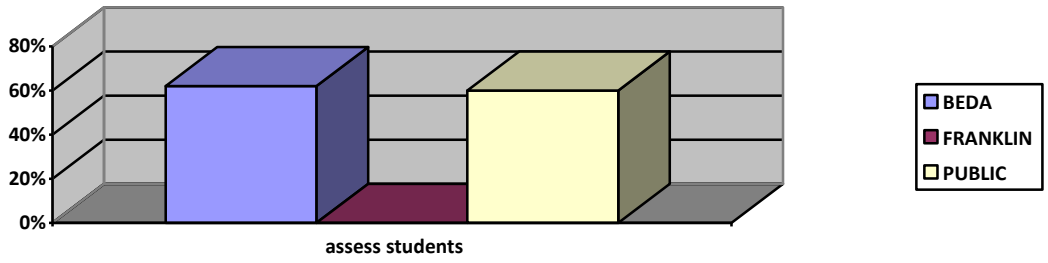
While 22 percent of the public teachers are aware of their students' hobbies, only 15 percent of the public assistants know about their hobbies. Assistants explained that they have to be in many classes and sometimes they have more than 300 students what makes it impossible for them to learn more about their students. Some assistants affirmed that they know more about the most extroverted since they participate more. The accounts from the BEDA assistants differ a bit. They say one of the first things they do is to know about their students' likes and dislikes, consequently, their hobbies. Some BEDA assistants also said it is a good way to learn about their 350 students' names. This may explain why BEDA assistants know more about their students' hobbies than the head teachers themselves. Assistants from the Franklin program asserted that in conversation classes, hobbies are an important topic and also you can learn about their favorite games in class. Whether these hobbies are possible to help them learn the subject, all the assistants who know about their students' hobbies believe so, only four assistants from the Franklin Institute affirmed that hobbies might help students learn more. When asked how these hobbies could help students; assistants answered that talking about their hobbies motivate students to speak, assistants can find reading topics (magazine, website) related with these hobbies, it is a good way to get to know them the first couple of weeks. Knowing about these hobbies can help assistants to find songs based on the learners' likes and assistants can use their favorite games in the classroom.

5. The importance language assistants attribute to assessment



The graph shows us that 70 percent of the language assistants from the Franklin Institute are aware of their role: language assistants are not supposed to evaluate the students. We can infer that the other 30 percent of these assistants, despite knowing their role, they must have expressed their interest in evaluation, as an important part of the educational system. However, 70 percent of the language assistants from the BEDA program think assessment is very important. Because we found out in the following question that there are language assistants in the BEDA program who work as a head teacher and grade students (62 percent of them), we cannot be sure whether the role of the assistant is clear for this institution or not.

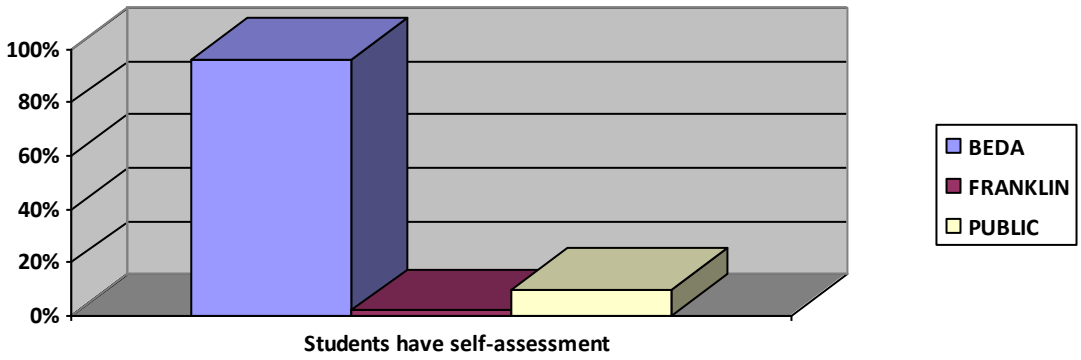
6. Language assistants participation in the assessment



Although the Regional Ministry of Education established that language assistants must not evaluate students, Franklin assistants seem to be the only ones to respect the role

of the language assistants, although some of them expressed their willing to grade students' oral production, as the assistants are native speakers and could evaluate students better. The teachers from the public school who assess their students, usually do it individually by grading their speaking performance from 1 to 10. Regarding the assistants from the BEDA program, this is one example of answer that we obtained "I do not have a head teacher in my classroom, so I am responsible for grading my students." Not only is this attitude against the Ministry of Education Statute, but also against BEDA's own regulation which states that assistants must carry out tasks accompanied by a teacher in the classroom (see Theoretical Framework 2.1.6., page20)

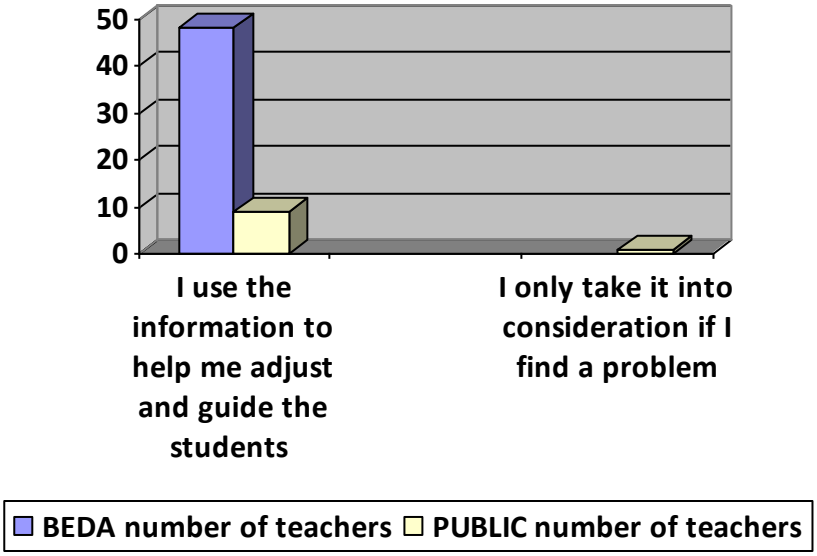
7. Students have self-assessment



Most BEDA students go to a small one-to-one meeting with the language assistant to have a self-evaluation.

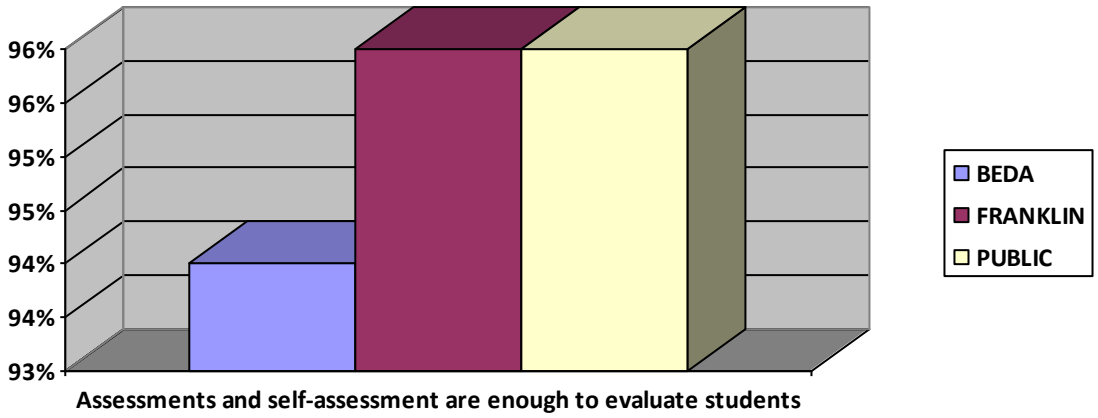
Although these self-assessments are not part of the procedures of the assistants from the Franklin Institute, two of these assistants said students should have these assessments as they are important. Another assistant from Franklin expressed that unfortunately his school was not concerned with the students' progress. Only one assistant said that the students have one self-assessment in speaking abilities in which they are graded by the language assistant from 1 to 10, as per the instructions of the head teacher.

8. Language assistants were asked what measures are taken with the information found in the students' self-assessment



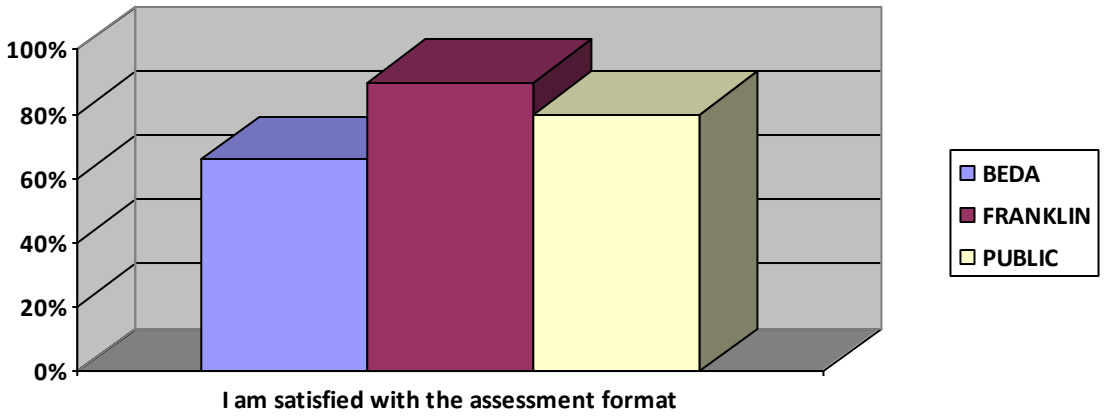
Owing to the fact that 48 teachers from the BEDA and 10 from the public give self-assessment, this graph shows the number of teachers involved instead of the percentage. From these assistants who deal with self-assessment, all of them use the information found in it to help themselves improve and guide students, except one assistant from the public school who said to look for hints of bullying, lack of self-esteem in this assessment; lest these traits be identified, then the assistant would take actions. We would like to highlight that not even one assistant deals with students' self-assessment in the Charter schools we observed.

9. Teachers' assessment and students' self-assessment are enough to evaluate students



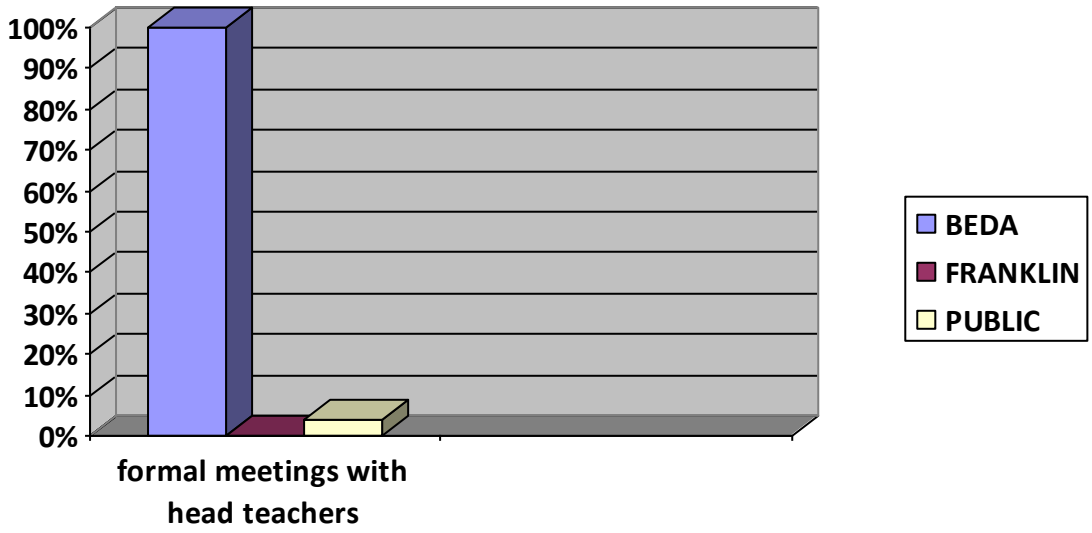
As table 9 depicts, the majority of assistants believe teachers' assessments and students' self- assessment are enough to appraise students. One teacher from the BEDA program suggested that students should apply English outside the classroom, in the streets or another country and be observed by a teacher; once they do this, they will know how proficient they really are in English.

10. With regard to the assessment format, language assistants responded:



As table 10 shows, we can see that at least 66 percent of the language assistants are satisfied with the format of the assessments. Those who differ, think currently there are too many exercises and exams, irrelevant content - memorizing the three bones of the ears, for instance, instead of learning their function. Another suggestion by an assistant of the BEDA program and by four assistants from Franklin is to increase students' participation, as a very small percentage of the assessment is allotted to it. "We have to involve students in the assessments; use projects and presentation to grade them as well."

11. Language assistants' formal meetings with head teachers



As graph 11 depicts, only the assistants from the BEDA program have regular meetings with the head teachers, or in the case that the assistant works as a head teacher, he meets with the coordinator of the school. This meeting is held once a week and it lasts from thirty minutes up to two hours, depending on the issues to be discussed. Only four percent of the surveyed assistants from the public schools have formal meetings, albeit 22 percent of them have informal chats with head teachers. 30 percent of assistants from the Franklin Institute also have informal talks with teacher. Many assistants from the public schools and the Franklin Institute also mentioned that head teachers are not interested in helping them. According to the statute of the Instituto Franklin (see Theoretical framework, page 19), assistants would have talks with the head teachers at the beginning of the school year; however, these talks never happen.

12. The participation of the language assistant in the classroom

When asked if the participation language assistants have in the classroom was enough or if he /she should be allotted more time leading some activities, the results were as follows:

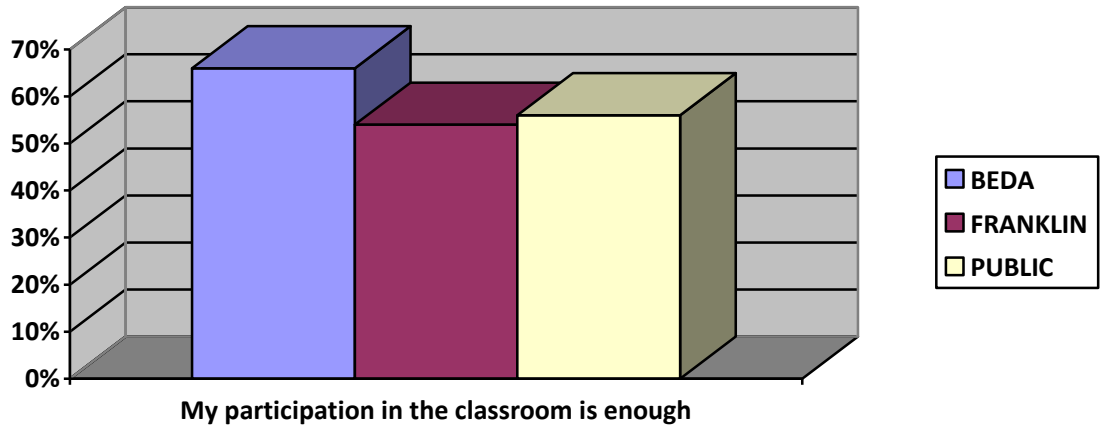
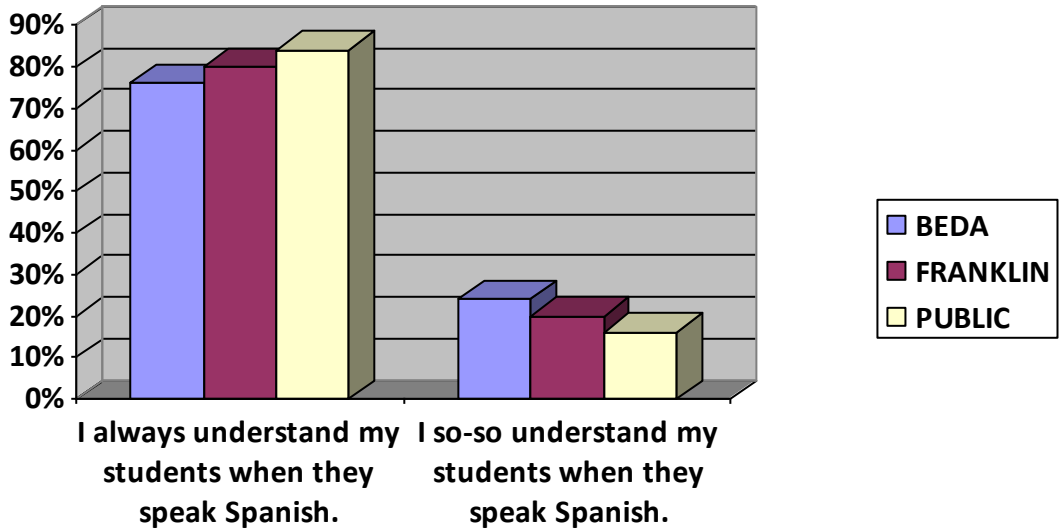


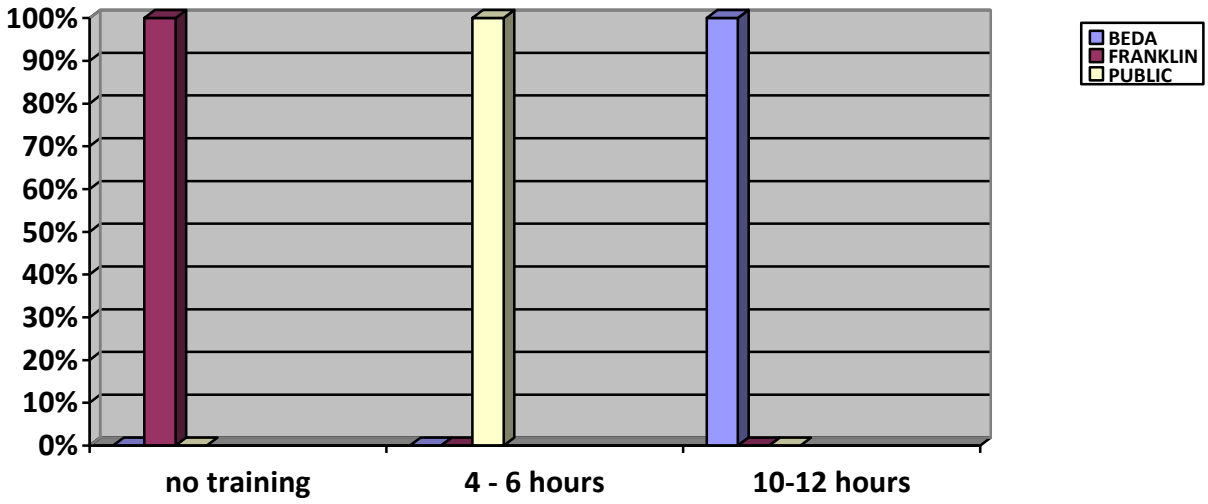
Table 12 shows us that almost half of the language assistants are not satisfied with the amount of time they teach and they wish they were allowed more time, as eight assistants from the public school and six from the Franklin Institute expressed. Another assistant from a public school said that head teachers are rooted in their routines and unwilling to change, especially the older generation and many times she feels ignored by these teachers. On the other hand, we also found out assistants in the BEDA program who teach their own classes and do not have to share their authority or time with a head teacher. Four assistants from the Franklin Institute also stated that they many times taught 100 percent of the class while the head teachers were sitting down.

13. Language assistants understanding of their students speaking Spanish



According to the chart, language should not be a factor to impede communication as the majority of the assistants can understand students well. Two BEDA assistants said they were trained to only use their Spanish in cases of emergency, i.e. sickness, or a fight. The ones who so-so understand their students reported that they ask students to paraphrase what they said, to say that slower or to say that in English.

14. How much training language assistants received before become an assistant



As evidenced by the chart, the assistant from the Franklin Institute do not receive any training previous to their start of activities in the school. Nevertheless, they pursue a Master's degree in the program *Teach & Learn* offered by the Franklin Institute, at the University Alcalá de Henares. All the assistants from Franklin expressed their desires to participate in a training prior to the beginning of their work as assistants. Some of these assistants confessed to have been thrown into the classroom and they would have immensely benefited from a training. The creation of a training was suggested with orientation for incoming teachers on how to behave in the classroom, assistants' roles and responsibilities, methodologies to use in the classroom. Four assistants said that their role is not clear yet, as some teachers sit at their desks while they teach the whole class and when they go to another classroom, they may be asked only to distribute material, check students' homework; that is, they may work as secretaries instead of language assistants. The assistants from the public school have one meeting prior to the beginning of their activities, offered by the Comunidad de Madrid, which lasts from four to six hours. Assistants are told how they should behave, their roles and they have the opportunity to ask any questions.

The assistants belonging to the BEDA program reported to participate in an intensive twelve-hour training course before they start being assistants. The course is delivered by Universidad de Comillas, which coordinates the BEDA program. BEDA language assistants also have weekly meetings with a coordinator in which they discuss methodology and teaching skill. Besides that, they have a two-year training course in *Teaching a Foreign Language* at Universidad de Comillas, whose length is 60 hours each year.

With regard to the quality of the training, language assistants from the Franklin institute expressed that they would like to have a training prior to the beginning of their work in order to solve problems such as: what to do when head teachers ignore the language assistants, teaching methodologies, cultural differences, discipline techniques, the role and duties of the language assistant and how to plan classes.

Ninety percent of the assistants from the public school said it needs improving.

The majority of the assistants from the BEDA program stated that the training is very good and some said that it is sufficient.

In case language assistants responded that the training needs improving, they were asked how it could be improved. The suggestions were as follows:

- Some students with autism and dyslexia were found in classes and the training does not even mention these students. (Public)
- The entire training was in Spanish, I could understand but I had difficulties expressing myself, so it would have been best if the course was in English. (Public and BEDA)
- Head teachers ignore language assistant, what to do in this case. (Public)
- First meeting lasts around 5 hours and is more a general welcoming, we suggest they talk more in depth about our role as language assistants. (Public)
- Second meeting is focused on how to get your NIE so it is not a pedagogical meeting. (Public)

- The third and last meeting which lasts 3 hours is mildly interesting, they spent a bit of time on how to engage kids using songs and rhymes, the first two trainings could be more like the third session. (Public)

- Too many assistants (more than 300) in the meetings, it is impossible to sort out your questions. (Public)

One major problem bilingual schools could be facing at present, regarding language assistants, is the disproportional growth of language assistants compared to the number of new grades at schools[16] . The study shows that, for the school year 2006-2007, there were 275 language assistants who were working in the 122 bilingual schools. Three years later, there were 206 bilingual schools and 600 language assistants. These figures would appear okay if we do not take a closer look at the scenario: each year there is one additional grade in each school. That is, one school that in 2007 offered only the first grade of primary, in 2010 they had the four grades of primary school. We found out through our questionnaires that at the beginning there were two language assistants working in three classrooms and now there are two assistants to deal with nine classrooms. This fact can be confirmed if we compare the number of students throughout the year. The same study shows that in the school year 2006-2007 there were 10.398 while in the school year 2009-2010, this number had quadrupled – 42.268 students.

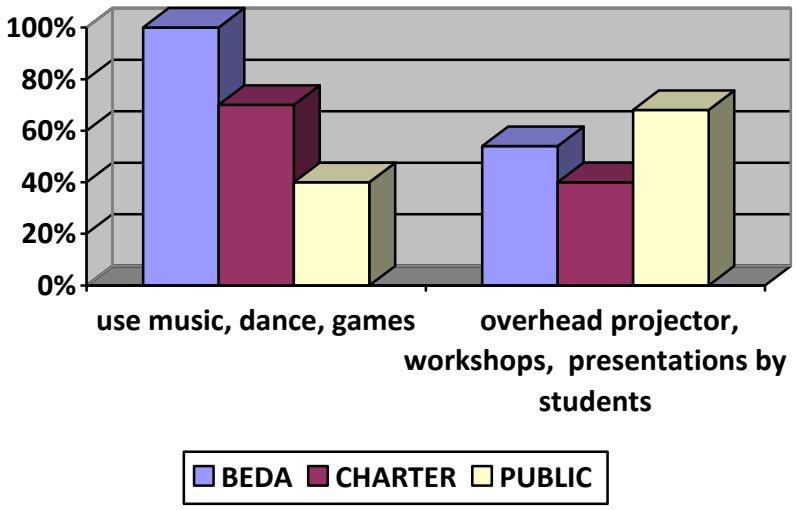
[16] According to research done by Instituto Ramiro de Maeztu in 2010 which comes under www.madrid.org

4.4. Current performance of students from the secondary public schools (Public), BEDA program (BEDA), and other charter school (Charter)

The surveyed students attend classes which are taught in English in the following subjects: Science, Biology, English Language, Religion, Technical Drawing (First of Bachillerato[17]), Physical Education, Technology, Art & Craft and History.

The following 15 tables present key finding of the questionnaire study for language assistants.

1. Teachers try to help learners by the use of dance, songs, drama, games, creative writings, workshops or are just book-centered (teachers only use the textbook)

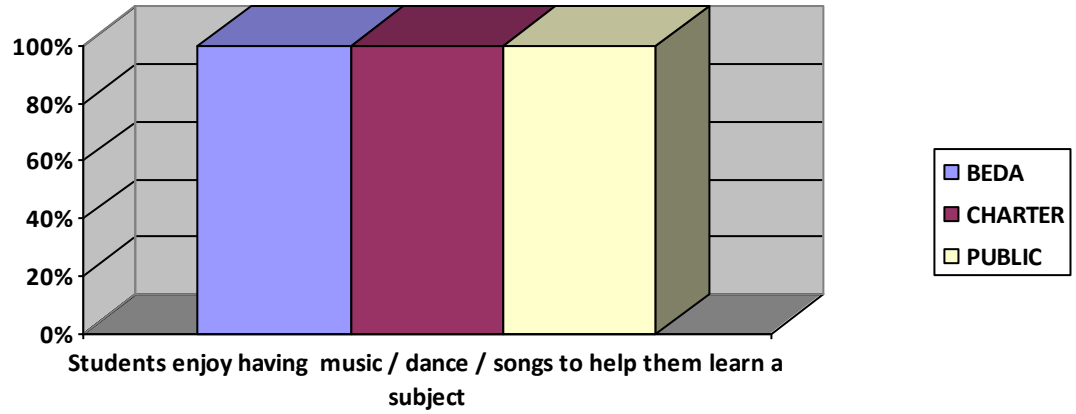


As evidence by table 1, all students from the BEDA program benefit from music and dance and many of them, 80 percent from the 3rd and 4th grade of Secondary School, also have to prepare presentations in different topics and expose them to the classmates. Games accounts for 90 percent of the activities presented by public school students. Whereas 60 percent of students from charter schools also have games to cheer up the class. All the 10

[17] Techinical Drawing is offered in First of Bachillerato (high school) in the International Baccalaureate Program (see Theoretical Framework 2.1.4, page 11).

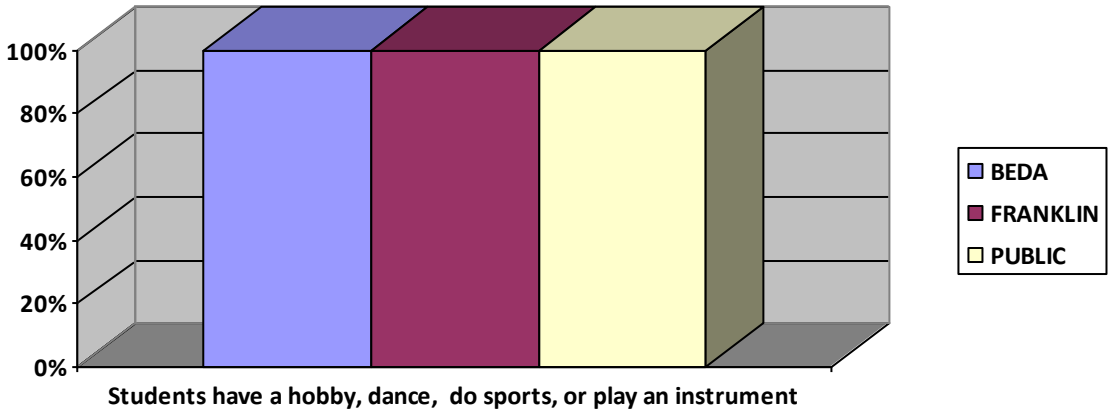
surveyed students from the first year of high school (*primero de Bachillerato*) have workshops and presentations as part of their routine. It is also important to mention that 28 students from the BEDA program have to either make up choreography or is taught one by the teacher to help them learn the subject or for the sake of singing a song and presenting it at the parties / fairs promoted by the school.

2. Students enjoy the fact that teachers help them by the use of dance, songs drama, games and workshops



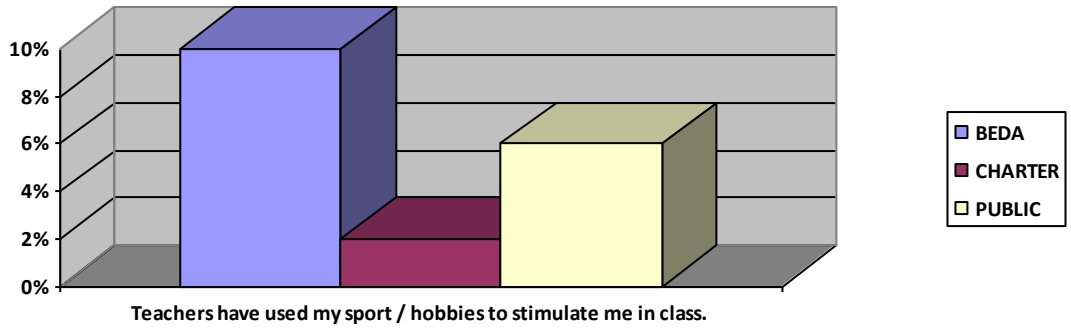
A key purpose of the questionnaire was to establish the extent to which students and Intelligences are related and how much we can learn from students by simply asking them about their interests. There is evidence that all surveyed students enjoy having music, dance, songs and drama; in other words, activities that are related to MI theory and may help them learn more easily. Therefore, the teachers should take advantage of students' likes and analyze their profile to boost their learning through their strengths. When students were asked why they enjoyed these activities, the reasons given were that the classes were shorter, more fun. Others said that they understand better the theme and teachers are more relaxed in class. Some students stated that they need help and these activities help them very much and other students said that they love dancing or singing.

3. Percentage of students who have a hobby, do sports, dance or play any instruments



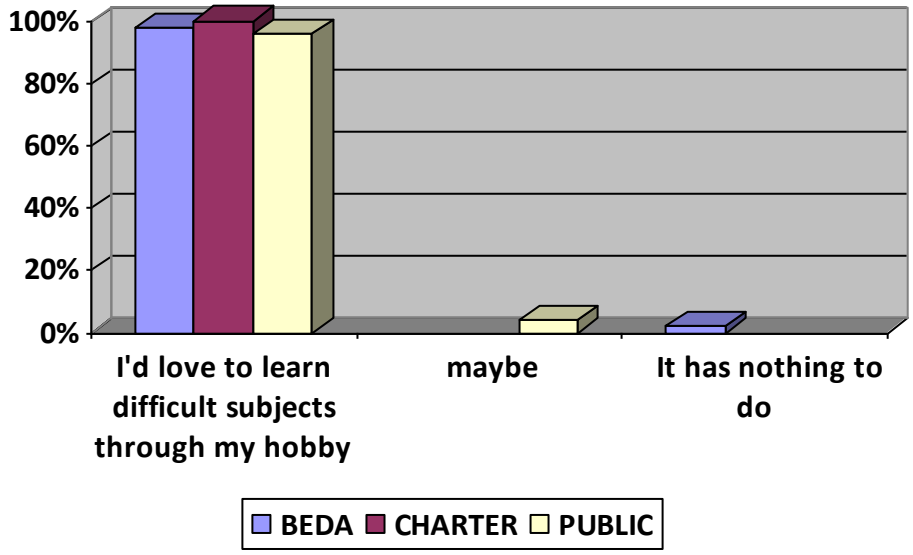
The total number of respondents have a hobby, dance, do sports or play any instruments. That is, all students have a proclivity for one or more intelligences. In the cases in which students like to collect shells, or leaves, for instance, we can encounter the naturalistic intelligence. By taking these students to a zoo, a park to teach biology or mathematics would be of great benefit for these students. We found out that the great majority of male students play soccer, volleyball or basketball. We would suggest an interdisciplinary attitude between the PE teacher and another subject teacher to boost these students' learning. Our questionnaire also uncovered many musical-intelligent students who enjoy spending their time playing the flute (3 students) (some students misused the word flute as it is a false cognate; *flauta* in Spanish means recorder), the recorder (6 students) and the xylophone (2 students). Other sports done by students are roller skating, tennis, table tennis and golf.

4. **Percentage of teachers who have used the students' sports, dance, collection, poetry or hobbies to stimulate them in class**



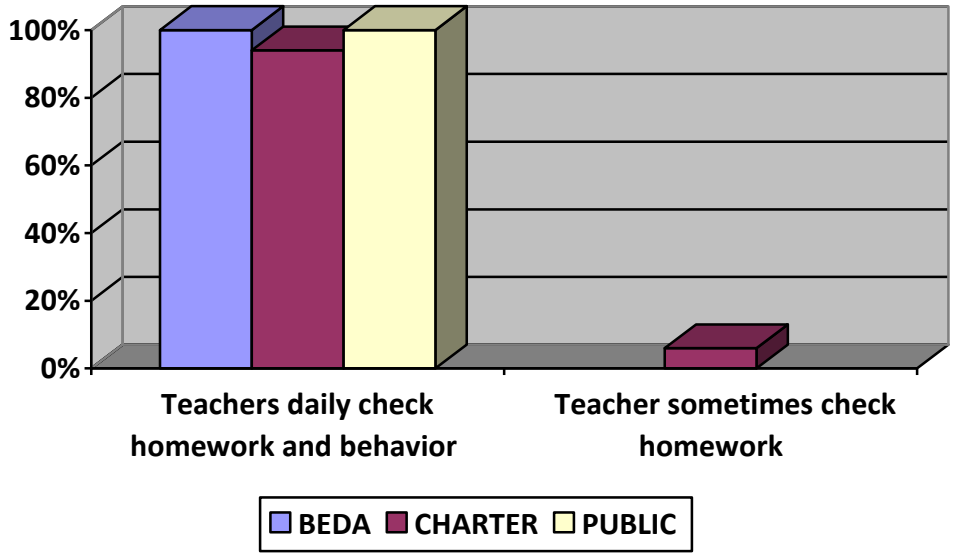
As the graph indicates, only a maximum of ten percent of the students stated that their teachers use their hobbies to stimulate them in class. These students were five girls who love dance and their teachers used songs with choreography in their BEDA program class. Six percent of the students from the public schools mentioned pop songs used by the teachers. The only activity mentioned by one charter school student was the soccer matches he loves in the Physical Education classes. These figures confirm that little attention is paid to students' strengths and weaknesses, as we have seen previously when a maximum of six percent of the teachers expressed that they rely on their students' weak and strong points. This poor awareness of what MI theory considers essential, results in less efficient activities proposed by the teachers.

5. **Students would like to learn difficult subjects through their hobbies (sports, dance, poetry)**



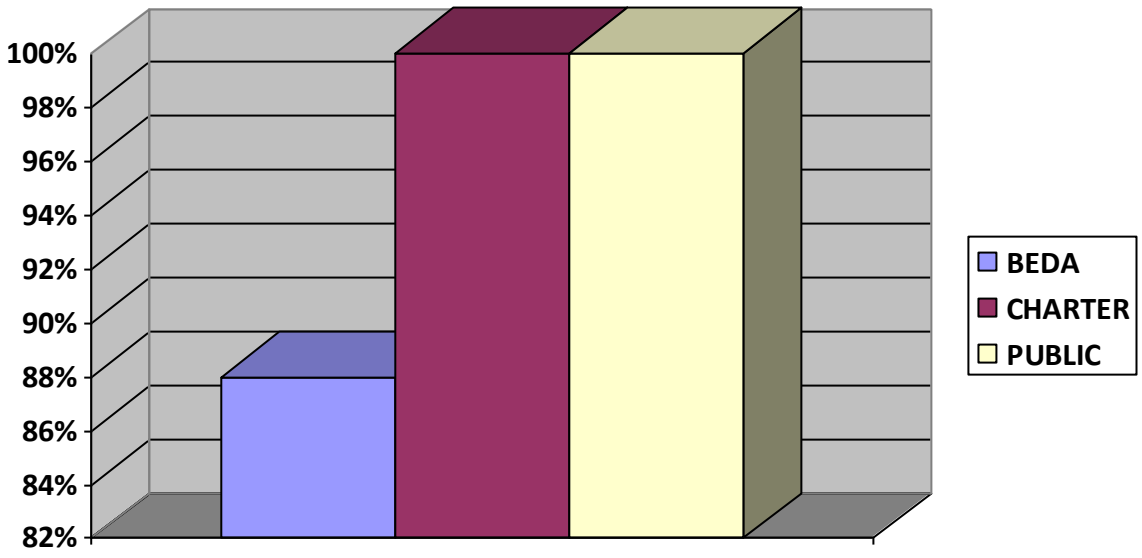
As we can see in graph 5, at least 96 percent of students would like to learn a difficult subject through their hobbies. When asked why they would like so, students stated that it would be easier or more fun. Only one student from the BEDA program was skeptical and said that hobbies and subject have nothing to do.

6. Students' grades are mostly reflected on teachers daily evaluation



The chart shows us that teachers in bilingual schools take homework very seriously. 100 percent of teachers from the BEDA program and from the public schools check (and assess) their students' homework on a daily basis and the great majority of the teachers in the charter schools also check the homework. Some students from BEDA expressed that the assigned homework will only affect their grades in case they do not do it.

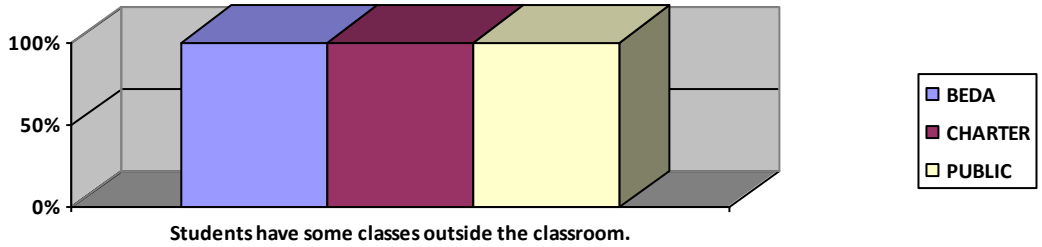
7. Students are satisfied with the evaluation system



Students' satisfaction with the assessment system.

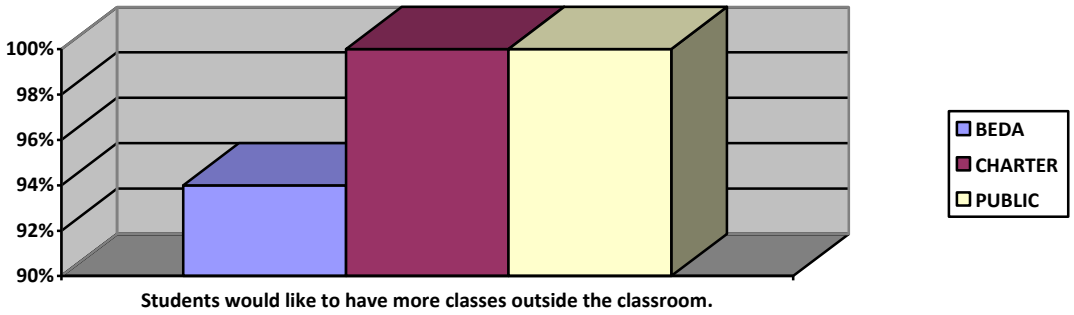
It can be seen that all learners from both the charter and public schools are satisfied with the evaluation system. When asked why they were not satisfied with the assessment system, the BEDA students argued that there is too much homework. They spend six hours at school and they still have to get home and spend a minimum of one hour doing their homework. Other BEDA students also expressed that there is too much content while studying for the exams.

8. Students have classes outside the classroom, in a science fair, in the computer labs, museums



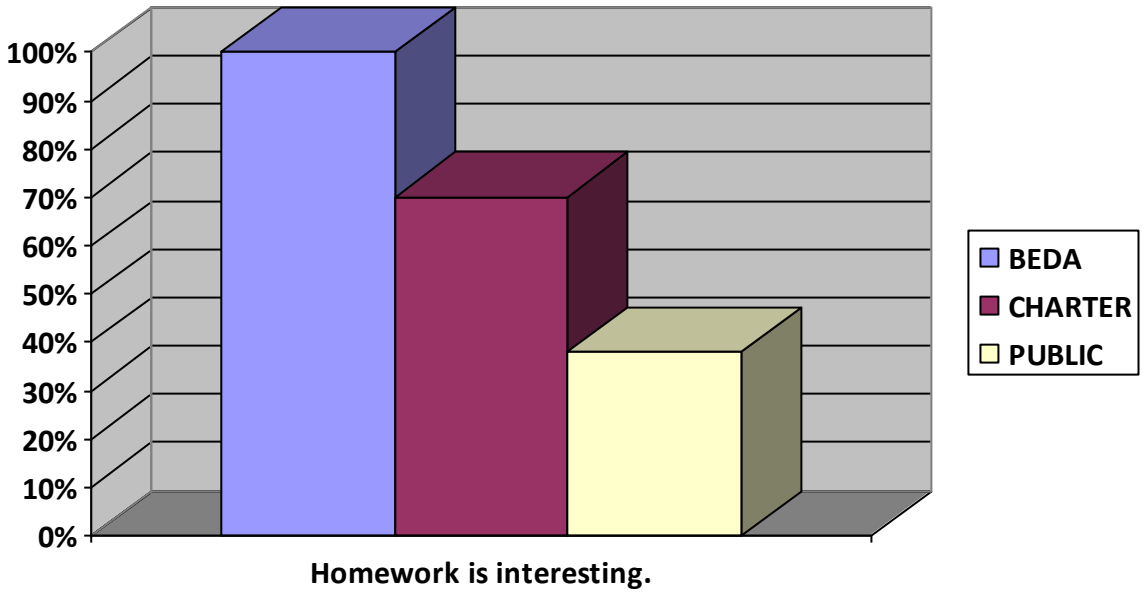
Most students affirmed that they have classes in the science lab, Physical Education in the court and computer lab. 98 percent of students from BEDA also asserted that they go to many science fairs and museums.

9. Students would like to have more classes outside the classroom



As evidenced in chart 9, all the students from the charter and state school would like to have more classes outside the classroom. The reasons given for that were that they would learn more things, they would move more, it would be more fun, and they would have the opportunity to have a good time with their teachers and classmates. The students from the BEDA program who stated that they would not like to have more classes outdoors is because they already have many classes outside the classroom.

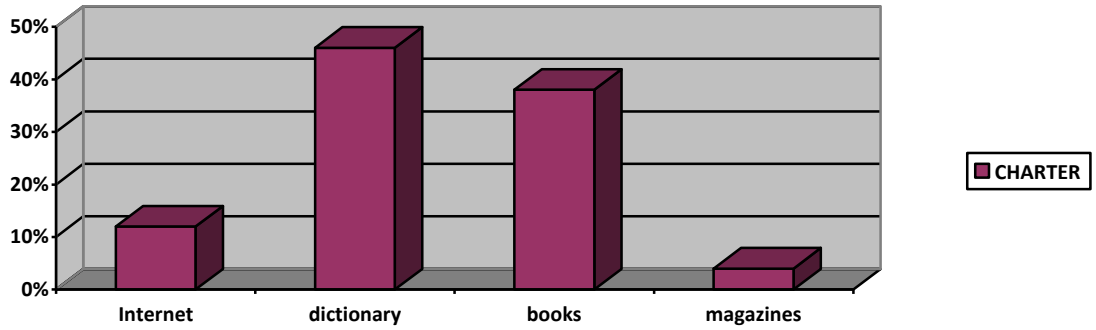
10. How interesting students find their homework



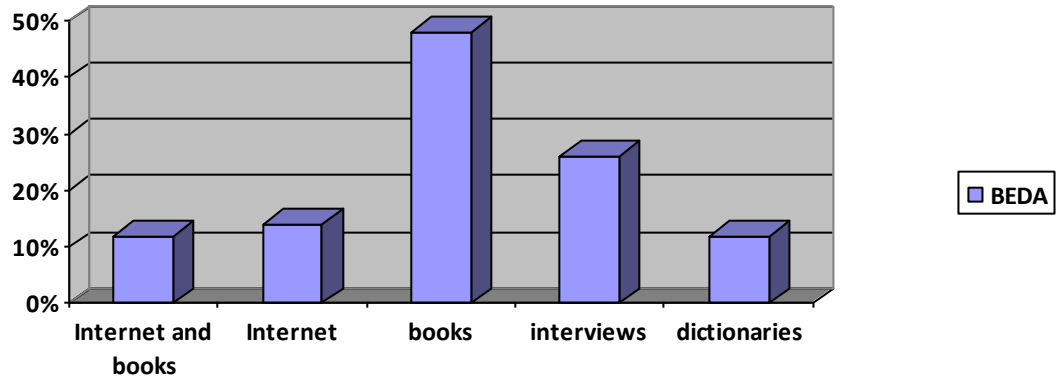
It is important to notice that 30 percent of the students from the public school, who are not contemplated in the graph, said that sometimes they enjoy doing their homework, the other 32 percent stated that they really do not find it interesting. The other 30 percent of the charter school students said that the homework does not engage their interest. We would like to highlight that the BEDA students were the only ones who complained about the evaluation system. One of the reasons given was the excess of homework they had to deal with daily. Although some of these students think they have too much homework to do, they find this homework interesting. We can suggest that the BEDA teachers not only assign homework but they think of interesting things to engage students.

The results also showed that students almost always do their homework individually but they also do it sometimes in groups.

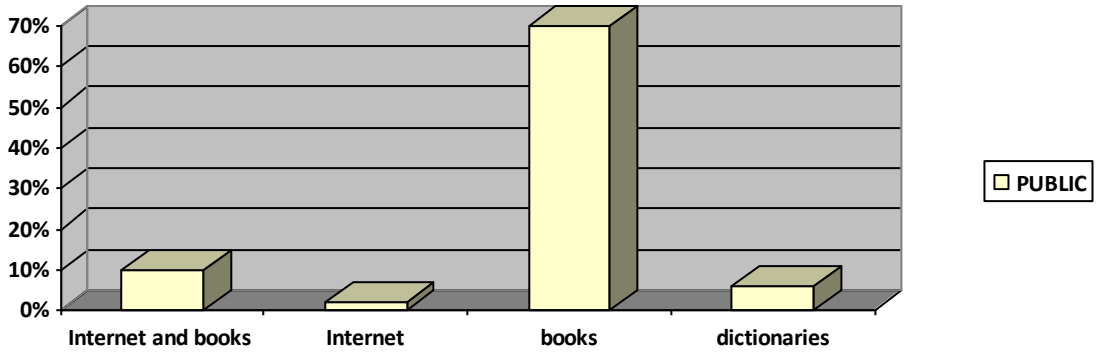
11.1. Now, let us analyze the sources students use to do their homework in charter schools



11.2. Sources used by student to do their homework in the BEDA schools

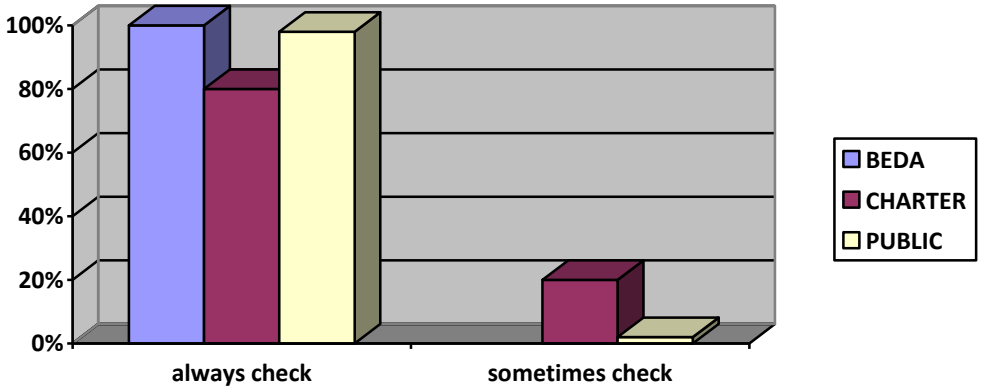


11.3. Sources used by students to do their homework in Public schools



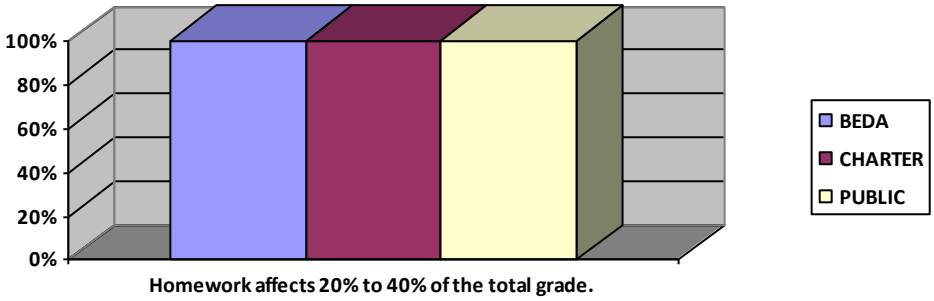
As evidenced by the graphs, we can see that books and the Internet are the most used sources used by students in bilingual schools. 46 percent of students from the charter schools stated to use dictionaries to do their homework. What we cannot be sure, however, is whether all students differentiated books from dictionaries or not.

12. When asked if teachers check their homework, learners stated:



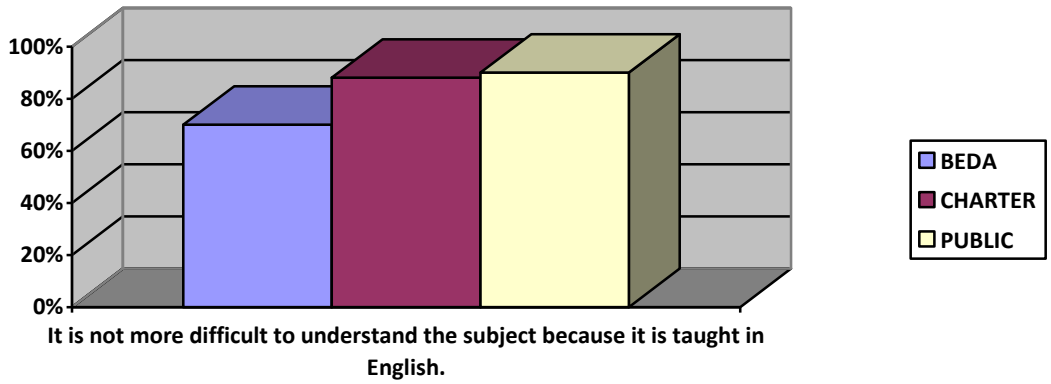
As we can see in the chart, all the teachers from the BEDA program check their students' homework. 98 percent of the teachers from the charter schools also check homework and 80 percent of the teachers from the public school do so. These figures suggest that teachers in bilingual schools are attentive to homework.

13. When asked the extent to which homework affect students' grade, the following was observed:



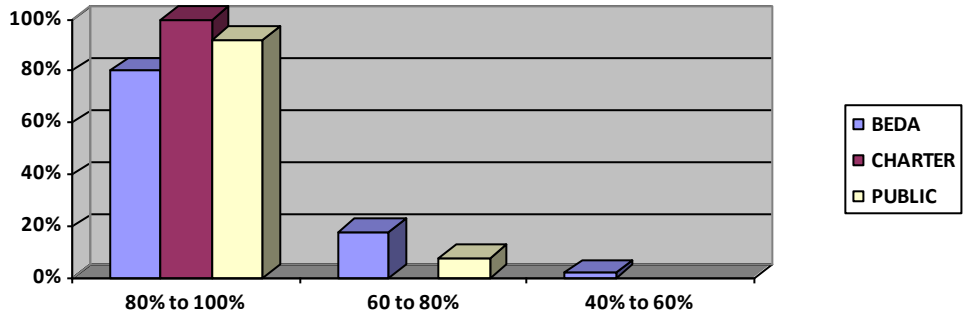
As the graph shows, all the students have their grades affected by their homework. All the students get a better grade if they do their homework. Nevertheless, we also found out that some charter school students have their grade decreased if they do not do their homework.

14. The difficulty of understanding the subject because it is taught in English:



As we can see in the graph, the majority of students do not think the subject is more difficult to be understood because it is taught in English. These figures suggest that the bilingual program is thriving and students are successfully learning English.

15. How much students understand the classes in English:



The results positively show that at least 80 percent of the students understand from 80 to 100 percent of the classes which are taught in English. The students from the BEDA program had a little bit more of difficulty when compared to the other students, however, this may account for a greater demand from this program.

4.5. Class observations

The two institutions which obtained in general the most and the least satisfactory results according to our questionnaires were subject to class observations.

BEDA program

Because the BEDA program showed the most satisfactory results in the previous part, it was chosen to be observed as a good model of teaching. A forty-five-minute Natural Science class, whose topic was food and nutrition, was tape-recorded in a class of third grade of secondary education (E.S.O.), only the head teacher was in the classroom and there were 29 students present (according to the teacher). The points which called our attention were:

- Students remained seated and silent during the whole class.
- Information came from the head teacher, instead of eliciting from students
- Teacher checked students' understanding of the topic by asking question at the end of her explanation
- The pronunciation of students were typically Spanish and in no moment they were corrected
- Spanish was not used in the classroom except when the teacher wanted to make sure her students knew the equivalent expression in Spanish

We cannot take for granted that the classes always work like that as we only have one fragment from one teacher. Nevertheless, if this teacher had been trained through MI he would have had a more dynamic lesson. For instance, the teacher could have used a video, so the visual part would have been activated and mainly spatial learners could have made associations more easily; teachers could have asked what students would have for lunch on that day or what they had brought to eat during their break, by doing so both linguistic and interpersonal intelligent students would have interacted in a meaningful way. In order to deal with the intrapersonal students the teacher could have asked them to write

about their eating habits or keep track of the food they would eat that week and conclude if they were taking in the necessary amount of carbs and fruits. Musical intelligent students and bodily-kinesthetic learners interested in dance, could have been assigned to make a song related to food and nutrition and present to it to the class. Students with a strong naturalist intelligence could have been asked to bring unusual vegetables and fruits to make a healthy nutrition pyramid.

The public school

Maybe because the public school is the largest group from the three analyzed model in this study, some different behavior from teachers and assistants was analyzed. Therefore we decided to tape-record a forty-five minute class about the endocrine system. The teacher dealt with the organism's internal control, glands of the body, main hormones, hormonal balance and most frequent diseases. The language assistant was in the classroom but she remained in silence, except when she called some students attention three times:

- *Guys, pay attention!*
- *Be quiet, please!*
- *Guys, be quiet!*

And when she corrected students' pronunciation:

- *liver, repeat liVVer* (drawing students' attention to the /v/ sound, as students were pronouncing /liber/)

When the head teacher could not control the class any longer, she shouted at the students:

- *Do you want to shut up?* The head teacher literally translated the Spanish expression *¡Os queréis callar!* But at least the students obeyed her after that.

From this class recording we observed:

- Students had the opportunity to walk to the board to fill in a chart with parts of the body
- Teacher mispronounced the following organs: esophagus, she pronounced /ezoufagus/ instead of /ɪ'safəgəs/; kidney /kiθnej/ instead of /'kɪdni/; bladder /bleider/ instead of /'blædər/ and pancreas /pankreas/ instead of /'pæŋkriəs/
- Students talked among them in Spanish
- The teacher and assistant only spoke in English. Except when the teacher asked for confirmation, for instance: *Do you know what liver means?*
- The students had the opportunity to give their opinions as the teacher explained the topic, actually they were welcomed to participate.
- The pronunciation of students were typically Spanish but they were sometimes corrected by the language assistant.

As we mentioned in the previous class observation, we do not have a big corpora to make assumptions, so we comment merely on this single class. However, it would have been great if the teacher had used the language assistant to pronounce these organs with the students or the teacher could have checked the pronunciation of these words in the dictionary. The positive aspects were that the assistant corrected students' pronunciation, it was a polite way to compensate for the teachers' mispronunciation. Students had the opportunity to repeat the words in a meaningful way, for instance, they were asked:

- What small organ helps your body to process food?

Most students answered:

Bladder /bleider/ at this moment the language assistant corrected students pronunciation.

We say /'blædər/, let's repeat: /'blædər/

Another positive aspect was that the teacher made use of the Smart Board and there was a picture of the organs (teacher used the same pictures when she first explained the

function of each organs and then she started asking questions about them. Students were invited to stand up and touch the organ on the board. In this class we could notice that the teacher cared about the students with a strong spatial intelligence; students with a strong linguistic intelligence had the opportunity to speak about what they thought the function of the organs were when the teacher was first introducing the topic to them. Of course, a greater care should have been given in order to embrace all the types or intelligences. For instance, by asking students with a strong naturalist intelligence could have been asked to do a search to compare the organs of the animals and the humans'.

4.6. Part 2 – The Trainings

Dancers were trained in the areas of phonetics and chemistry separately. There were six fifteen-minute sessions for each area.

4.6.1. Phonetics

There were twenty secondary school students in the control group (from now on, this group will be mentioned in the graphs and charts as control), twenty ballet dancers the experimental group 1 (from now on, exper.1), and twenty flamenco dancers in the experimental group 2 (from now on, exper.2). Each studied sound /ð/, /z/, /v/, /i:/, /æ/ and /e/, was analyzed ten times in the speech.

First recording: Production Pretest

There were twenty participants in each group and each studied sound, /ð/, /z/, /v/, /i:/, /æ/ and /e/, was analyzed ten times in the speech. The occurrence of correct pronunciation for each word can be observed below. If only one student pronounced one word correctly, for instance, there is a number 1 under the word, if everybody was wrong, there is a 0. In case that four participants pronounced a word well, there is a 4. A rule of three was used to calculate the percentage of correct answers. In this case, 200 is the extreme of the proportion (the total amount of correct answers, 20 students x 10 words= 200). For instance, the first analyzed phoneme /ð/ for group 1 was calculated thus: there were three students who were right just once in three words. Therefore we have 100 % = 200 correct answers and x%= 3 correct answers, using the rule of three we have: x = 3 x 100%/200. We can conclude that 3 correct answers = 1,5%

/ð /	that	they	brother	their	those	this	Them	mother	together	father	
Control	0	1	0	0	0	1	0	0	1	0	X=300/200=1,5%
Exper.1	0	1	0	0	2	2	1	0	1	2	X=900/200=4,5%
Exper.2	0	0	0	0	0	0	0	0	1	1	X= 200/200= 1%

/z/	Zac	zoo	used	as	using	zillions	zig	zag	knives	visits	
Control	0	0	0	0	0	0	0	0	0	0	x= 0%
Exper.1	0	0	0	0	0	0	0	0	0	0	x= 0%
Exper.2	0	0	0	0	0	0	0	0	0	0	x= 0%

/v/	very	volley	review	vegetable	avocado	vanilla	video	visits	van	knives	
Control	2	1	2	1	1	1	1	1	1	2	X=1300/200=6.5%
Exper.1	0	1	1	1	1	1	1	1	3	1	X=1100/200=5.5%
Exper.2	1	1	1	3	2	1	1	1	2	1	X=1400/200=7%

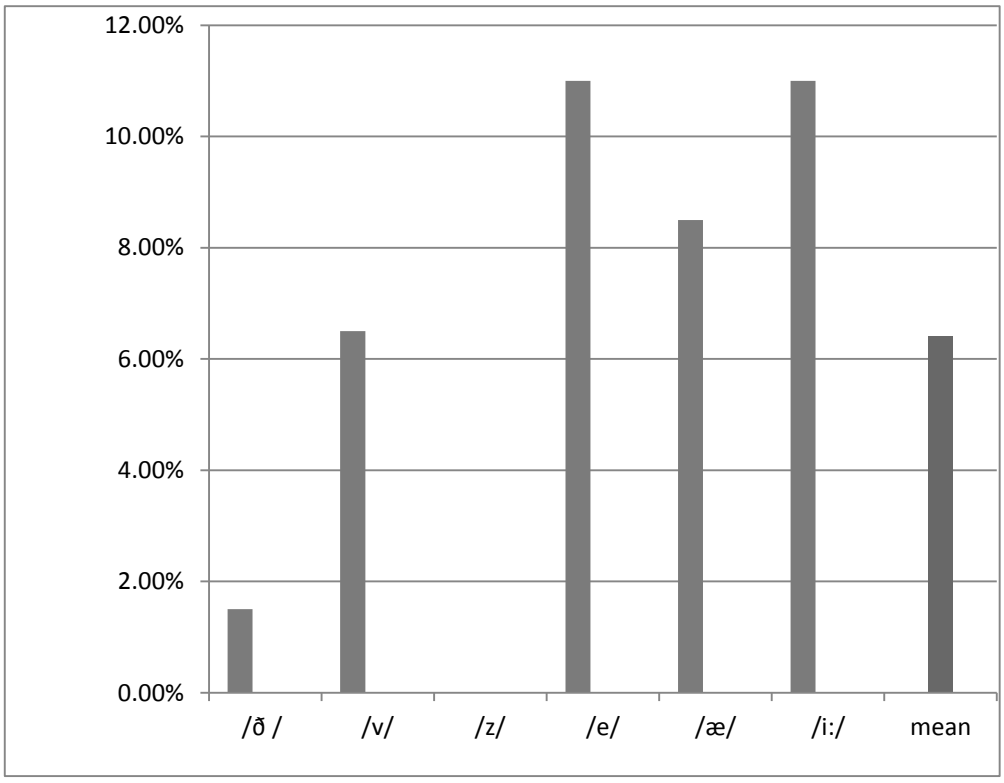
/æ/	bad	practice	thank	cabbage	lamb	apples	carrots	raspberry	ham	Ann	
Control	2	2	2	1	1	2	2	2	2	1	x=1700/200=8.5%
Exper.1	2	0	1	2	1	3	3	1	1	3	X=1700/200=8.5%
Exper.2	1	3	1	2	1	4	1	1	3	2	X= 1900/200=9.5%

/i:/	beans	beets	peas	beef	peach	leeks	lean	meat	three	screen	
Control	2	2	2	1	1	2	3	2	4	3	x=2200/200=11%
Exper.1	2	1	1	2	1	3	3	2	2	3	X=2000/200=10%
Exper.2	2	3	2	2	3	3	2	2	4	3	X=2600/200=13%

/e/	bed	Ben	met	set	let	ten	Ken	men	yell	well	
Control	2	3	5	3	2	3	1	0	1	2	X=2200/200=11%
Exper.1	3	4	5	4	1	0	0	1	0	0	X=1800/200=9%
Exper.2	1	3	4	5	4	1	1	1	0	0	X=2000/200=10%

In order to better visualize these figures, let us insert them into graphics:

Control group Production pretest – percentage of correct pronunciation



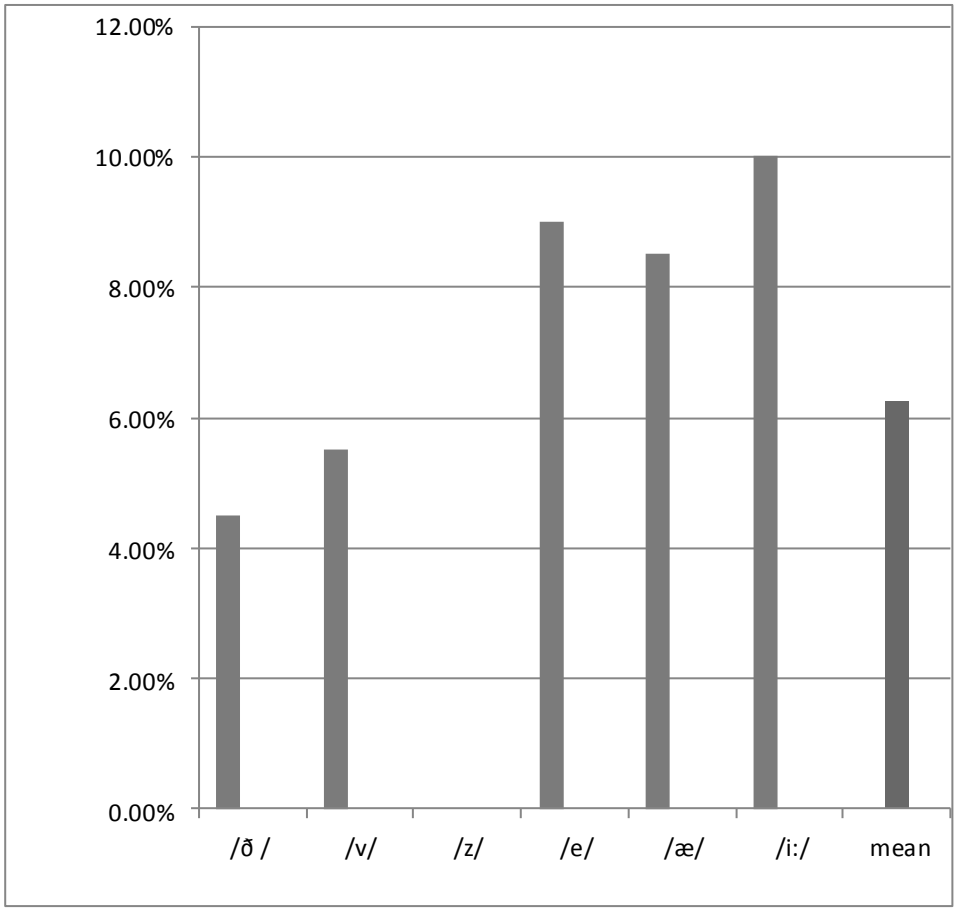
As evidenced by the graph, we can notice that not even one single participant was able to pronounce the sound /z/ properly. The mean in the graph shows the average of correct pronunciation; the sum of the six analyzed sound divided by six. Thus, mean = 1.5% + 6.5% + 0% + 11% + 8.5% + 11% / 6

mean = 38.5 / 6

mean = 6.41%

The mean of 6.41 percent of correct answer in this pretest suggest that participants in the control group had problems dealing with this sounds.

Experimental Group 1 Production pretest – percentage of correct pronunciation

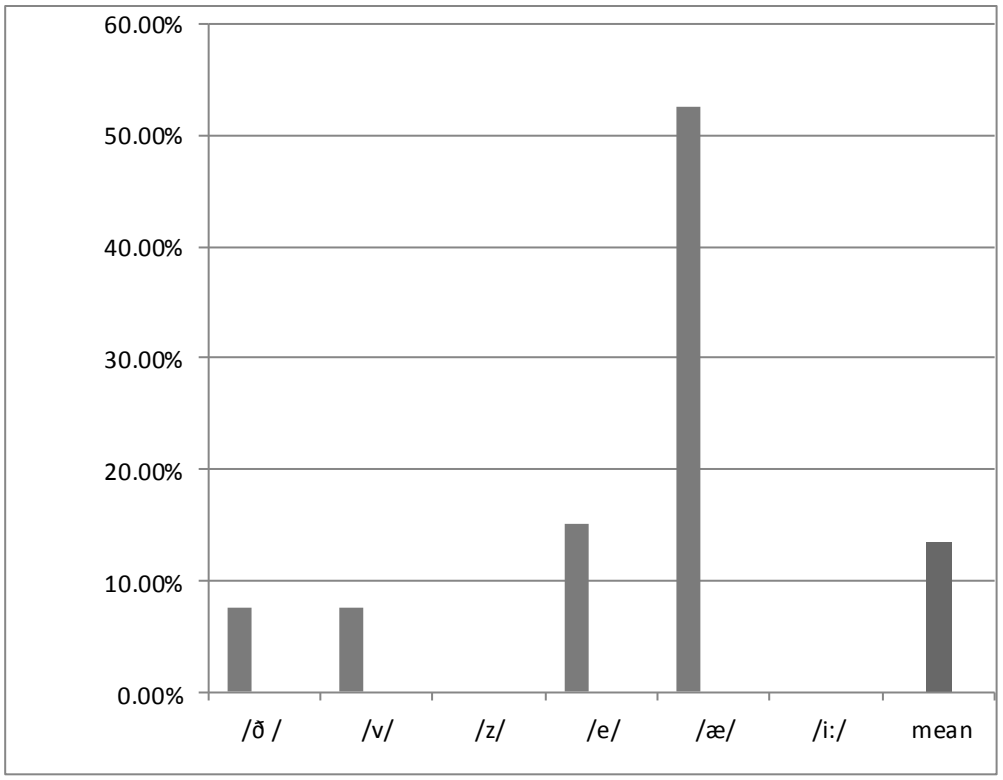


As the graph shows, both the control group and the experimental group 1 were not able to reproduce the sound /z/ properly; instead, they relied on the Spanish /s/ or /θ/ because the Spanish language lacks the /z/ sound (although some phoneticians defend that in words such as *mismo* and *desde* the allophone /z/ is used instead of /s/. However, this weak /z/ sound as in *de**s**de* and *mi**s**mo* never happens in initial position in Spanish; indeed, we defend that the /z/ sound is more an echo of the voiced consonants that precede and succeed the /s/ sound, as Daquila, J. (2011) suggests.

Gordon, L. (2008) and Daquila, J. (2011) believe that L2 perception begins as a copy of L1 perception in an initial stage; thus instead of using /z/, Spanish speakers use the closest sound in Spanish language, which is the /s/ sound or the /θ/ sound, which is the way our Spanish participants pronounce the letter Z, as in *zapatos* /θapatos/. This phenomenon of pronouncing the z letter as /θ/ is only true for native speakers from Spain, where the

letters C (followed by E or I) and Z are pronounced as /θ/. Participants also made use of their phonemic inventory when they mispronounced /j/, all participants used the Spanish equivalent /dʒ/; for the word **yell**, for instance, they pronounced /dʒel/. In these cases the negative transfer, as described by Nunan (2000), occurred.

Experimental Group 2 Production pretest – percentage of correct pronunciation



It can be noticed that the control group, experimental group 1 and 2 initially had more or less the same pronunciation level. The most serious problems were with the phonemes /ð/, /v/ and /z/; that is, the voiced consonants. It is also interesting to highlight the fact that all the students drew from their L1 inventory, not only when pronouncing the /z/ sound as mentioned in the previous graph. The /ð/ sound was pronounced as the interdental 'd 'in the Spanish word ***día*** /dia/, for instance; the /v/ sound was pronounced as in Spanish word *vía* /~~b~~ia/, which is a sound between /b/ and /v/, it is not a stop as in /b/ and it is pronounced with the lips more closed than in /v/.

Second recording: production posttest 1

The three groups had five fifteen-minute training sessions, which was followed by the immediate posttest1.

/ð /	**that**	**they**	**brother**	**their**	**those**	**this**	**Them**	**mother**	**together**	**father**	
Control	3	1	2	4	5	5	6	6	6	5	X=4300/200=21,5%
Exper.1	5	7	6	9	10	6	9	11	11	12	X=8600/200=43%
Exper.2	4	6	6	8	8	6	8	10	10	10	X= 7600/200= 38%

/z/	**Zac**	**zoo**	**used**	**as**	**using**	**zillions**	**zig**	**zag**	**knives**	**visits**	
Control	4	3	2	0	5	4	4	8	0	7	x=3900/200=19.5%
Exper.1	8	7	6	0	6	8	8	8	0	12	x=6300/200=31.5%
Exper.2	8	8	4	0	5	7	6	8	0	9	x=5500/200=27.5%

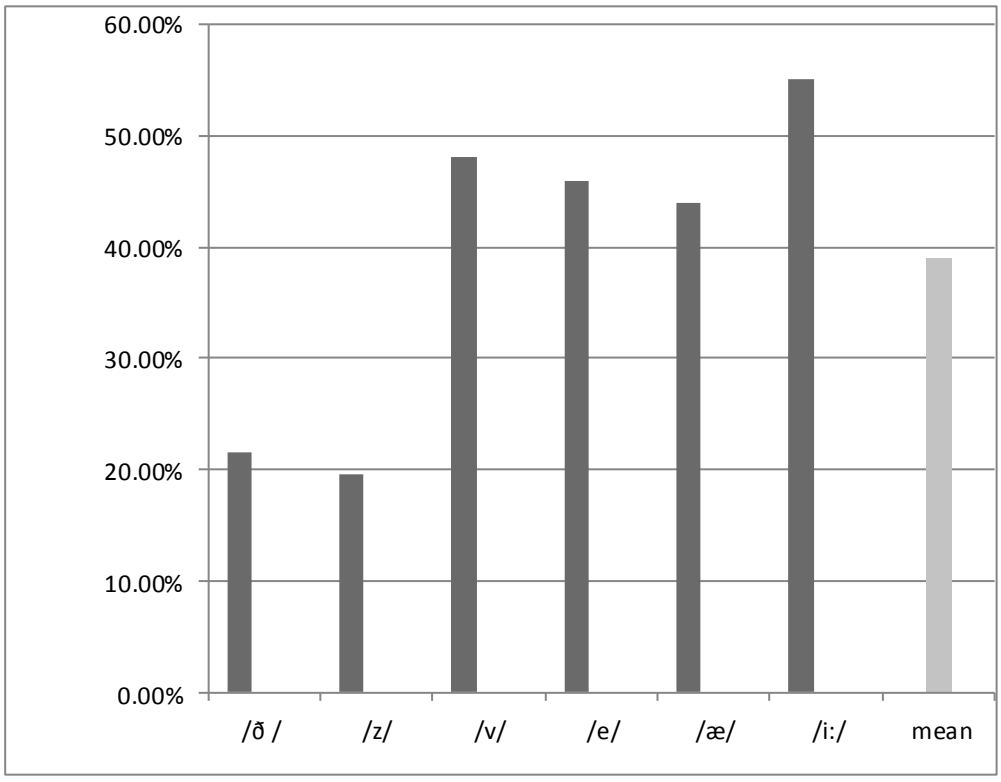
/v/	**very**	**volley**	**review**	**vegetable**	**avocado**	**vanilla**	**video**	**visits**	**van**	**knives**	
Control	7	8	7	11	10	11	10	12	14	6	X=9600/200=48%
Exper.1	12	12	10	16	11	13	16	13	13	9	X=12500/200=62.5%
Exper.2	12	13	10	13	10	11	10	12	13	8	X=12000/200=60%

/æ/	**bad**	**practice**	**thank**	**cabbage**	**lamb**	**apples**	**carrots**	**raspberry**	**ham**	**Ann**	
Control	12	12	7	9	8	8	6	7	9	10	x=8800/200=44%
Exper.1	13	12	9	11	12	14	10	8	11	13	X=11300/200=56.5%
Exper.2	13	13	10	10	12	13	9	8	10	12	X=11000/200=55%

/i:/	**beans**	**beets**	**peas**	**beef**	**peach**	**leeks**	**lean**	**meat**	**three**	**screen**	
Control	12	12	12	11	10	12	13	10	9	9	x=11000/200=55%
Exper.1	15	17	16	16	15	13	16	12	12	13	X=14500/200=72,5%
Exper.2	14	13	15	14	13	13	16	12	13	13	X=13600/200=68%

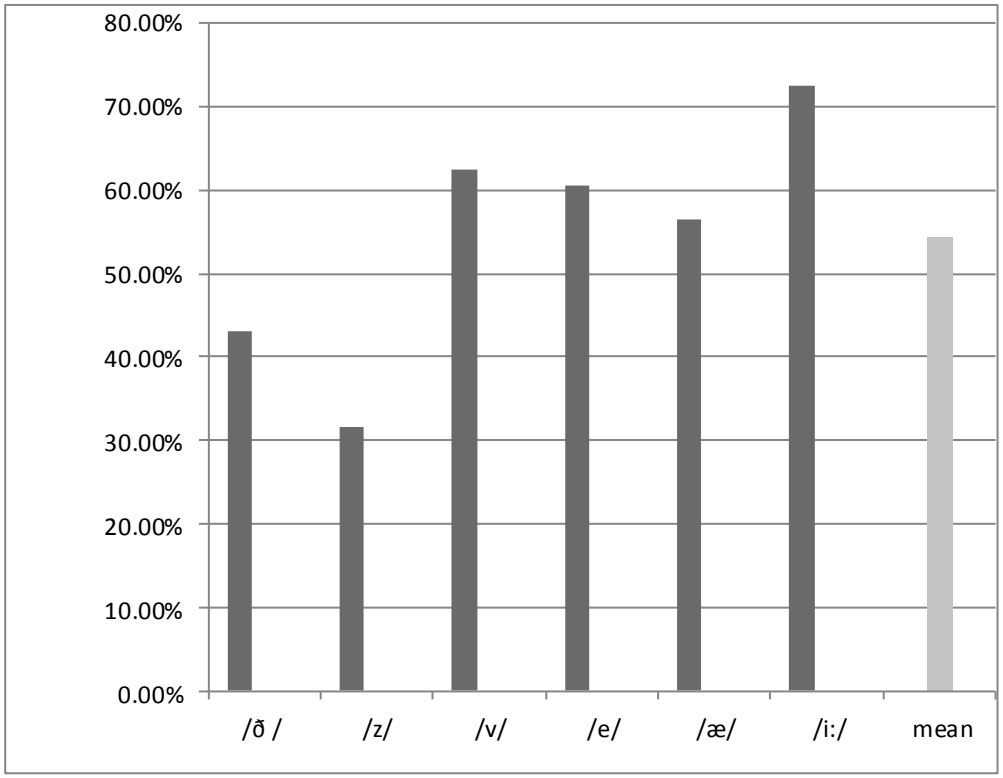
/e/	bed	Ben	met	set	let	ten	Ken	men	yell	well	
Control	10	9	9	11	12	8	11	7	7	8	X=9200/200=46%
Exper.1	13	14	14	14	13	10	11	11	10	11	X=12100/200=60.5%
Exper.2	11	13	14	13	13	12	11	10	10	10	X=11700/200=58.5%

Control Group - Production posttest 1 – percentage of correct pronunciation



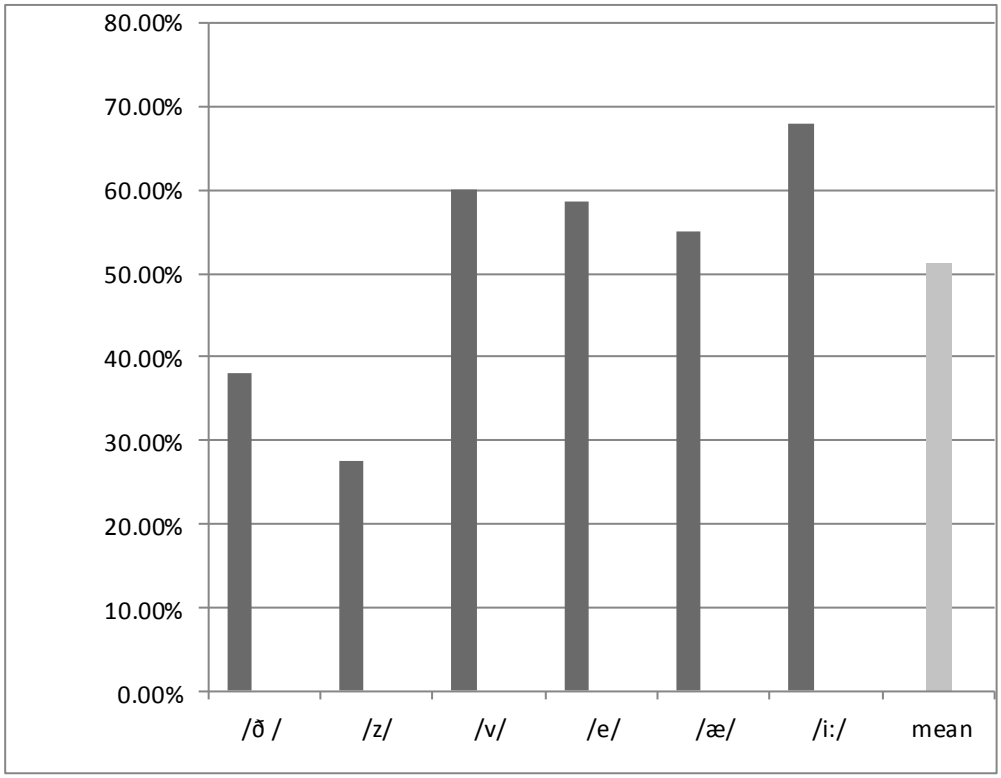
As we can notice in the graph, the control group improved all the sounds. The sound /z/ which had previously been the worst performance, now the group achieved 19.5 of correct answers. The mean increased from 6.41 percent of correct answers to 39 percent. The best performed sound was the /i:/, with 55 percent of correct pronunciation.

Experimental Group 1 - Production posttest 1 – percentage of correct pronunciation



As evidenced by the graph, the mean is 54.41 percent, more than fifteen percent better than the control group. The best performance was in the sound /i/ 72.5 percent. We justify this outstanding performance of the /i:/ sound due to a joke which was made when the sound was taught. Because the /i:/ has a lot of tension and the lips are spread, we told participants to have the sensation that they are constipated and are trying hard to evacuate. Participants immediately made the perfect sound by playing this joke.

Experimental Group 2 - Production posttest 1 – percentage of correct pronunciation



The graph shows us that the mean of correct pronunciation for the sounds was 51.25 percent, somewhat less than the mean of the ballet dancers.

Second recording: production posttest 2

In the posttest 2, participants received one more training session after the first posttest, the training session lasted fifteen minutes as the previous ones; however, before this final session, participants had ten minutes to check their mistakes in posttest 1 and were encouraged to ask questions regarding their mistakes.

/ð /	**that**	**they**	**brother**	**their**	**those**	**this**	**Them**	**mother**	**together**	**father**	
Control	3	3	4	5	7	5	6	6	7	6	X=5200/200=26%
Exper.1	7	10	11	13	16	10	17	17	16	17	X=13400/200=67%
Exper.2	6	9	11	10	13	10	9	12	11	11	X=102 /200=51 %

/z/	**Zac**	**zoo**	**used**	**as**	**using**	**zillions**	**zig**	**zag**	**knives**	**visits**	
Control	5	4	4	3	6	5	5	8	4	9	x=5300/200=26.5%
Exper.1	13	14	8	9	12	11	12	11	9	16	x=11500/200=57.5%
Exper.2	10	11	6	6	6	8	8	9	5	10	x=7900/200=39.5%

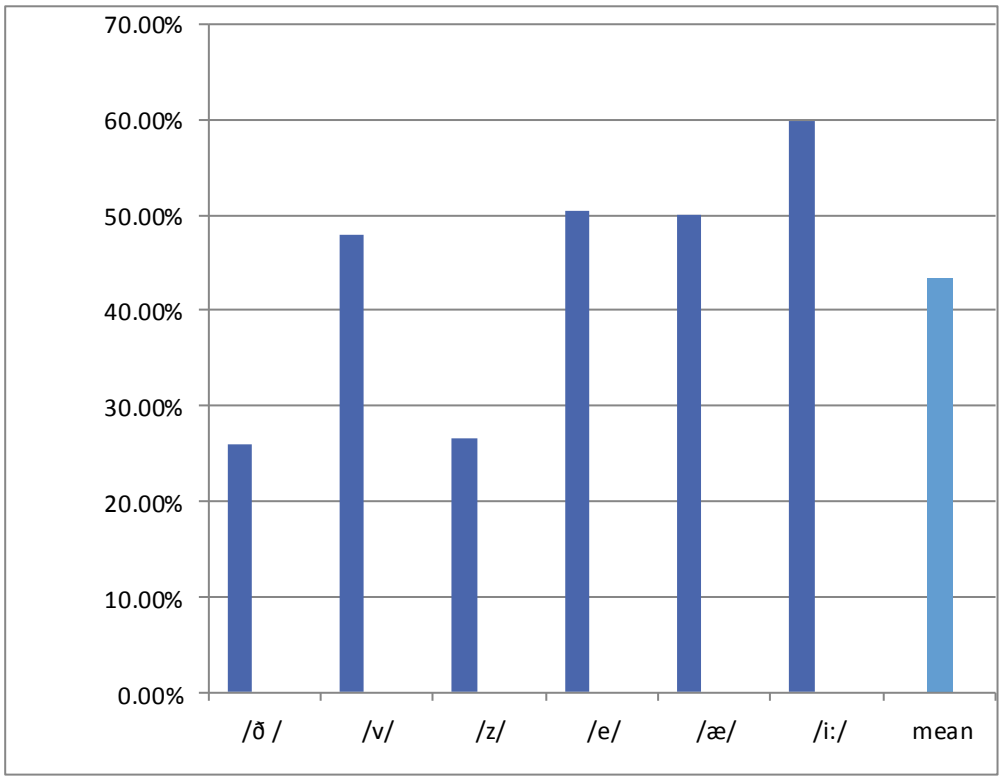
/v/	**very**	**volley**	**review**	**vegetable**	**avocado**	**vanilla**	**video**	**visits**	**van**	**knives**	
Control	7	8	7	11	10	11	10	12	14	6	X=9600/200=48%
Exper.1	12	12	10	16	11	13	16	13	13	9	X=12500/200=62.5%%
Exper.2	12	13	10	13	10	11	10	12	13	8	X=12000/200=60%

/æ/	**bad**	**practice**	**thank**	**cabbage**	**lamb**	**apples**	**carrots**	**raspberry**	**ham**	**Ann**	
Control	13	14	9	10	10	10	7	7	10	10	x=10000/200=50%
Exper.1	15	18	15	15	15	17	15	15	14	15	X=15400/200=77%
Exper.2	14	15	12	13	15	15	10	10	10	14	X=12800/200=64%

/i:/	beans	beets	peas	beef	peach	leeks	lean	meat	three	screen	
Control	14	13	12	12	10	12	13	13	10	10	x=11900/200=59.5%
Exper.1	18	17	16	16	15	18	16	15	16	18	X=16500/200=82.5%
Exper.2	15	15	15	15	14	15	16	14	15	14	X=14800/200=74%

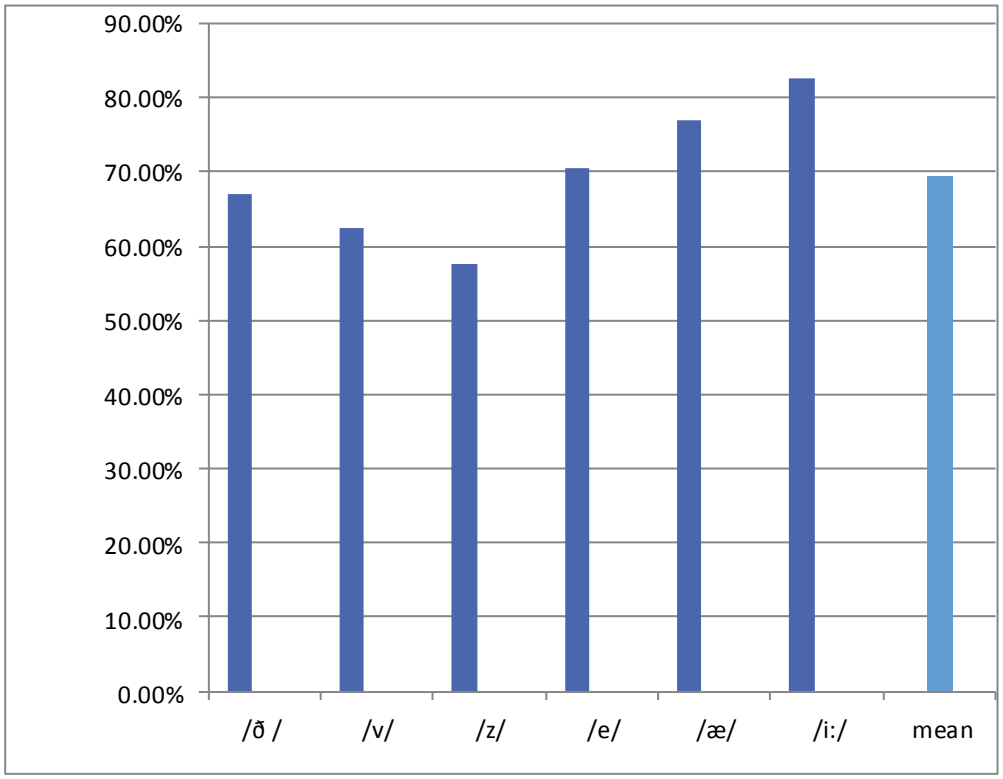
/e/	bed	Ben	met	set	let	ten	Ken	men	yell	well	
Control	10	10	9	11	13	10	11	8	10	9	X=10100/200=50.5%
Exper.1	15	18	16	15	15	15	12	11	13	11	X=14100/200=70.5%
Exper.2	12	15	15	14	15	14	11	10	10	10	X=12600/200=63%

Control Group - Production posttest 2 – percentage of correct pronunciation



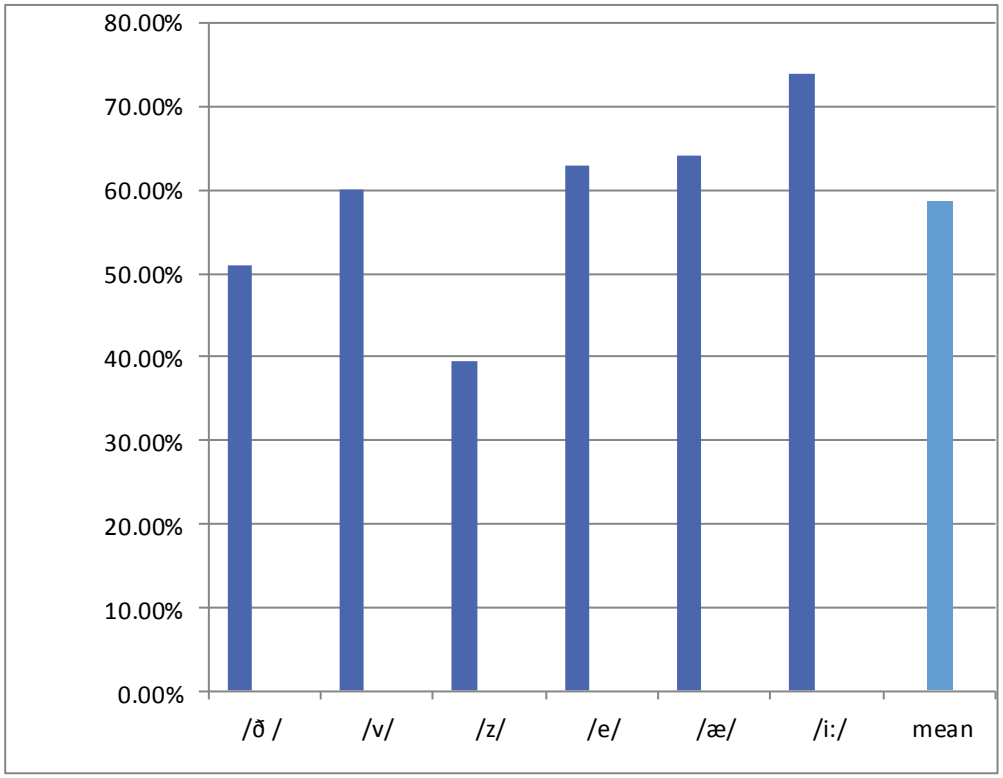
As evidenced by the graph, the mean of correct answers for the control group is of 43.41 percent. The best performance was the pronunciation of the sound /i:/, which obtained 59.5 percent of correct answers. The worst performance in the pretest had been the sound /z/ which improved from 0 to 27 percent of correct answers in the posttest 2.

Experimental Group 1 - Production posttest 2 – percentage of correct pronunciation



The mean for the experimental group 1 is of 69.5 percent of correct answers. /i:/ was the best performed sound with a total of 82.5 percent of correct pronunciation.

Experimental Group 2 - Production posttest 2 – percentage of correct pronunciation



As the graph shows, the mean for the experimental group 2 was of 58.58 percent. The best performed sound was /i:/, which obtained 74 percent of correct answers. The sound /z/ improved from 0% in the pretest to 39 percent in the posttest2.

Now let us look into each student individually. Each student was tested in ten words for each phoneme; consequently, we have ten words times 6 different sounds. Therefore, the total score for each student was 60.

From the individual scores we can see that no student was correct more than ten sounds out of a total of 60. We can also see that there was no outstanding grade, in other words, their level was more or less the same in both groups. The student who was least successful was the control student 4, who had only 4 correct answers.

Control Group individual scores:	**pretest**	**posttest 1**	**posttest 2**
control student 1:	6 out of 60	27 out of 60	32 out of 60
control student 2:	5 out of 60	25 out of 60	27 out of 60
control student 3:	5 out of 60	25 out of 60	29 out of 60
control student 4:	4 out of 60	24 out of 60	27 out of 60
control student 5:	4 out of 60	31 out of 60	32 out of 60
control student 6:	4 out of 60	25 out of 60	27 out of 60
control student 7:	4 out of 60	20 out of 60	24 out of 60
control student 8:	4 out of 60	19 out of 60	23 out of 60
control student 9:	4 out of 60	21 out of 60	24 out of 60
control student 10:	4 out of 60	22 out of 60	24 out of 60
control student 11:	4 out of 60	22 out of 60	24 out of 60
control student 12:	4 out of 60	23 out of 60	26 out of 60
control student 13:	4 out of 60	23 out of 60	25 out of 60
control student 14:	3 out of 60	25 out of 60	28 out of 60
control student 15:	3 out of 60	22 out of 60	25 out of 60
control student 16:	3 out of 60	24 out of 60	25 out of 60
control student 17:	3 out of 60	22 out of 60	24 out of 60
control student 18:	3 out of 60	22 out of 60	25 out of 60
control student 19:	3 out of 60	24 out of 60	26 out of 60
control student 20:	3 out of 60	22 out of 60	24 out of 60

Students were ranked from 1 to 20 according to their performance in the pretest of the pronunciation training, being the student with the highest score control student 1. In case students got the same score, these students were randomly ranked; this is the case, for

instance, for control students 4 to 13, who all scored 4 in the pretest. Students ranked in the pretest of pronunciation, kept his position in both the pronunciation and chemistry experiments. That is, control student 19 in the pronunciation experiment is the same participant as control student 19 in the chemistry training. We would like to highlight that all students from the control group go to secondary school where they have a minimum of two hours per week of English lessons. Students 1 and 3 go to an English school where they have two more extra hours of English classes per week.

Experimental group1 individual scores:	**pretest**	**posttest 1**	**posttest 2**
experimental1 dancer 1:	8 out of 60	37 out of 60	48 out of 60
experimental1 dancer 2:	7 out of 60	37 out of 60	45 out of 60
experimental1 dancer 3:	6 out of 60	39 out of 60	47 out of 60
experimental1 dancer 4:	5 out of 60	36 out of 60	43 out of 60
experimental1 dancer 5:	5 out of 60	43 out of 60	52 out of 60
experimental1 dancer 6:	5 out of 60	36 out of 60	42 out of 60
experimental1 dancer 7:	5 out of 60	33 out of 60	41 out of 60
experimental1 dancer 8:	4 out of 60	32 out of 60	41 out of 60
experimental1 dancer 9:	4 out of 60	33 out of 60	42 out of 60
experimental1 dancer 10:	3 out of 60	28 out of 60	40 out of 60
experimental1 dancer 11:	3 out of 60	34 out of 60	40 out of 60
experimental1 dancer 12:	3 out of 60	34 out of 60	40 out of 60
experimental1 dancer 13:	3 out of 60	33 out of 60	39 out of 60
experimental1 dancer 14:	3 out of 60	34 out of 60	40 out of 60
experimental1 dancer 15:	2 out of 60	34 out of 60	40 out of 60
experimental1 dancer 16:	2 out of 60	30 out of 60	40 out of 60
experimental1 dancer 17:	2 out of 60	26 out of 60	39 out of 60

experimental1 dancer 18:	2 out of 60	25 out of 60	39 out of 60
experimental1 dancer 19:	2 out of 60	25 out of 60	39 out of 60
experimental1 dancer 20:	2 out of 60	24 out of 60	38 out of 60

From the experimental group 1, only five dancers go to secondary school and two participants, experimental dancer 1 and 3 go to an English school where they have two more extra hours of English lessons per week. Student 5, who stood out from the others dancers, is 25 years old and works as an art restorer. Maybe the precision demanded by her job, made her concentrate more easily than the others; the student has never lived in an English speaking country and the last time she had been in contact with English was when she finished high school.

Experiemntal group 2 individual scores:	**pretest**	**posttest 1**	**posttest 2**
experimental2 dancer 1:	20 out of 60	39 out of 60	46 out of 60
experimental2 dancer 2:	5 out of 60	33 out of 60	42 out of 60
experimental2 dancer 3:	5 out of 60	34 out of 60	41 out of 60
experimental2 dancer 4:	5 out of 60	30 out of 60	38 out of 60
experimental2 dancer 5:	5 out of 60	31 out of 60	38 out of 60
experimental2 dancer 6:	4 out of 60	30 out of 60	38 out of 60
experimental2 dancer 7:	4 out of 60	35 out of 60	42 out of 60
experimental2 dancer 8:	3 out of 60	29 out of 60	36 out of 60
experimental2 dancer 9:	3 out of 60	30 out of 60	35 out of 60
experimental2 dancer 10:	3 out of 60	31 out of 60	36 out of 60
experimental2 dancer 11:	3 out of 60	32 out of 60	35 out of 60
experimental2 dancer 12:	3 out of 60	28 out of 60	35 out of 60
experimental2 dancer 13:	3 out of 60	29 out of 60	35 out of 60

experimental2 dancer 14:	2 out of 60	29 out of 60	35 out of 60
experimental2 dancer 15:	2 out of 60	27 out of 60	34 out of 60
experimental2 dancer 16:	2 out of 60	29 out of 60	35 out of 60
experimental2 dancer 17:	2 out of 60	29 out of 60	36 out of 60
experimental2 dancer 18:	2 out of 60	30 out of 60	37 out of 60
experimental2 dancer 19:	2 out of 60	30 out of 60	34 out of 60
experimental2 dancer 20:	2 out of 60	29 out of 60	34 out of 60

The reason why dancer 1 stood out is due to the fact she lived for one year in London and she had had English classes since she was six years old in language schools. This participant expressed her passion for the language and was very interested in the training sessions and always asked if the sounds she was making were correct. Dancers 2 and 3 go to an English school. Dancer 7 had a good performance as well, it may be because she, along with dancer 1, was the oldest dancer in the group, which means she was very concentrated and even took notes at the end of the sessions. Age factor played an important role in this study because the oldest participants in experimental group 2 were the ones who got one of the greatest marks. This shows that motivation and determination may be important factors to acquire a better pronunciation. This study is in keeping with Krashen's input hypothesis (Krashen, 1985), which assumes not only that L2 acquisition is similar in nature to L1 acquisition, but also that this is the case for learners of any age. There were five students intentionally chosen at the age of 12 in the control group, the limit age for the Critical Period Hypothesis; nevertheless, these students did not stand out in the training, two of them ranked among the lowest results and the other three in average positions.

Comparing the pretest with the posttest 2 individual scores, a great difference can be seen. While in the pretest, no student was correct in more than eight words in the three groups, except for one student, in the second posttest the lowest grade in control group was 24 whereas in experimental group 1 and 2, it was respectively 35 and 32. An obvious improvement can be seen in the experimental group while the control group improved

slightly. To prove that this difference among control group, experimental group 1 and experimental group 2 is meaningful, let us apply a test for homogeneity of variance:

Descriptive analysis

right answers	N	Mean	Standard deviation Σ	95% Confidence interval		Minimum	Maximum
				Lower limit	Upper limit		
control	20	26.05	2.56	24.85	27.25	23	32
experimental 1	20	41.75	3.61	40.06	43.44	38	52
experimental 2	20	37.10	3.28	35.57	38.63	34	46
Total	60	34.97	7.34	33.07	36.86	23	52

As we can observe in the table above, the mean of correct answers for the control group 26.5 (Standard deviation, Σ =2.56); the mean for the experimental group 1 is 41.75 (Σ=3.61) and for the experimental group 2 37.10 (Σ = 3.28).

Control group

Right answers	Frequency	Percentage
23	1	5%
24	6	30%
25	4	20%
26	2	10%
27	3	15%
28	1	5%
29	1	5%
32	2	10%
Total	20	100%

Experimental group 1

Right answers	Frequency	Percentage
38	1	5%
39	4	20%
40	6	30%
41	2	10%
42	2	10%
43	1	5%
45	1	5%
47	1	5%
48	1	5%
52	1	5%
Total	20	100%

Experimental group 2

correct answes	Frecuencia	Porcentaje
34	3	15%
35	6	30%
36	3	15%
37	1	5%
38	3	15%
41	1	5%
42	2	10%
46	1	5%
Total	20	100%

Group difference hypothesis

Are there meaningful differences, statistically speaking, in the correct answers regarding the three groups?

In order to contrast this hypothesis, let us use the ANOVA test. Previously, we have performed the kolmogorov Smirnov (K-S test) to analyze the normality in the three groups and the results showed that the three groups are normal.

The hypotheses in the present test are:

Ho: The mean of the three groups are the same.

H1: At least one group is different.

After performing the ANOVA test, we obtained a frequency F = 333,382, using a significance level less than 0.05, therefore, the test allows us to reject the null hypothesis which suggests that the means of both groups are equal and we can conclude that there is a significant difference in the means.

In order to find out where the difference is, we performed the Bonferroni Post Hoc test and the differences found can be seen in the following table:

Multiple Comparisons

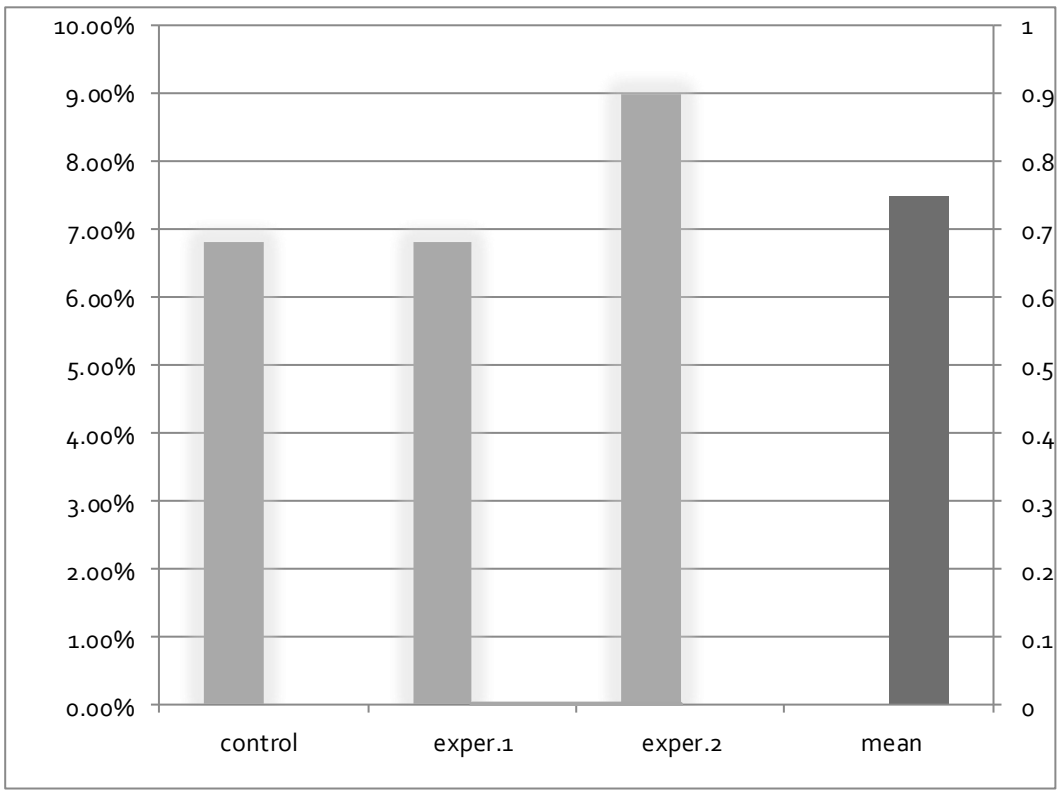
Correct answers Bonferroni					Conclusions
(I) group	**(J) group**	Difference of means (I-J)	Typical Error	Sig.	
control	**experimental 1**			,00	Experimental 1 > control
control	**experimental 2**	11,050	1,00569	,00	Experimental 2 > control
experimental 1	**experimental 2**	4,650	1,00569	,00	Experimental 1 > Experimental 2

As we can observe, there are differences in the three groups, being the means of the experimental groups greater than the control group and there is also statistically meaningful differences between experimental group 1 and experimental group 2. This result confirms the hypothesis posed initially in the Introduction section that the ballet dancers would obtain results when compared to the flamenco dancers.

4.6.2. Chemistry

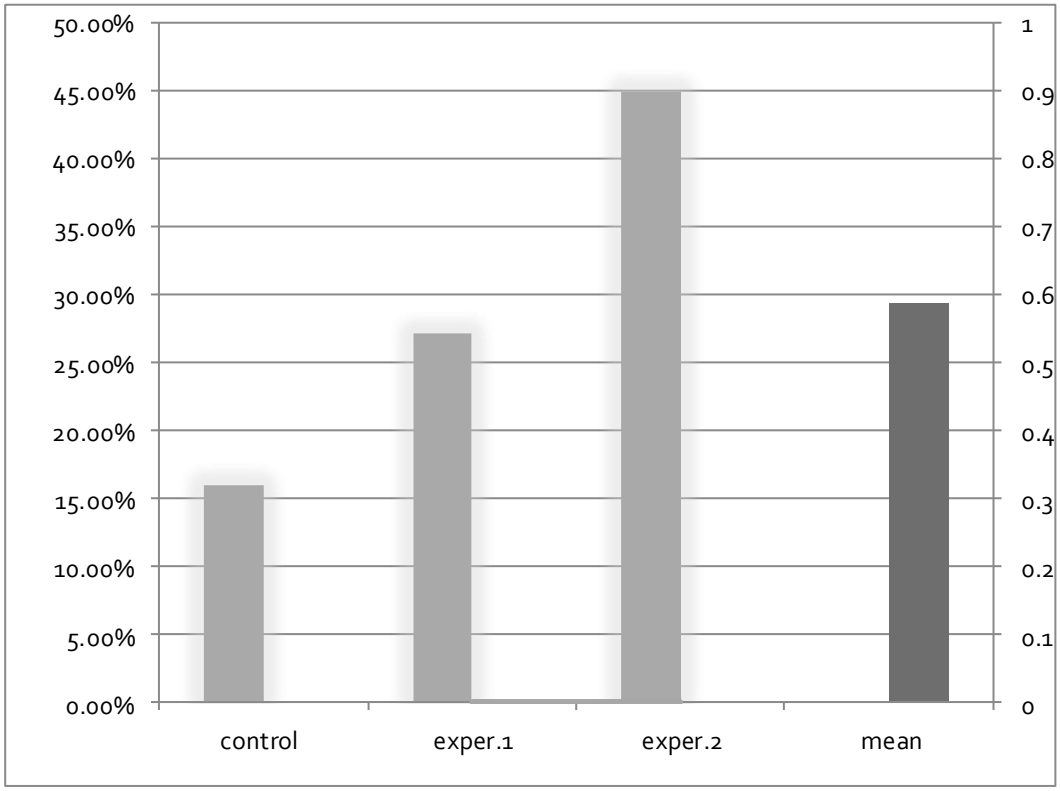
There were twenty dancers in each experimental group and twenty students in the control group. 44 elements in the periodic table were to be filled in.

Control, experimental group 1 and 2 Production pretest % of correct elements



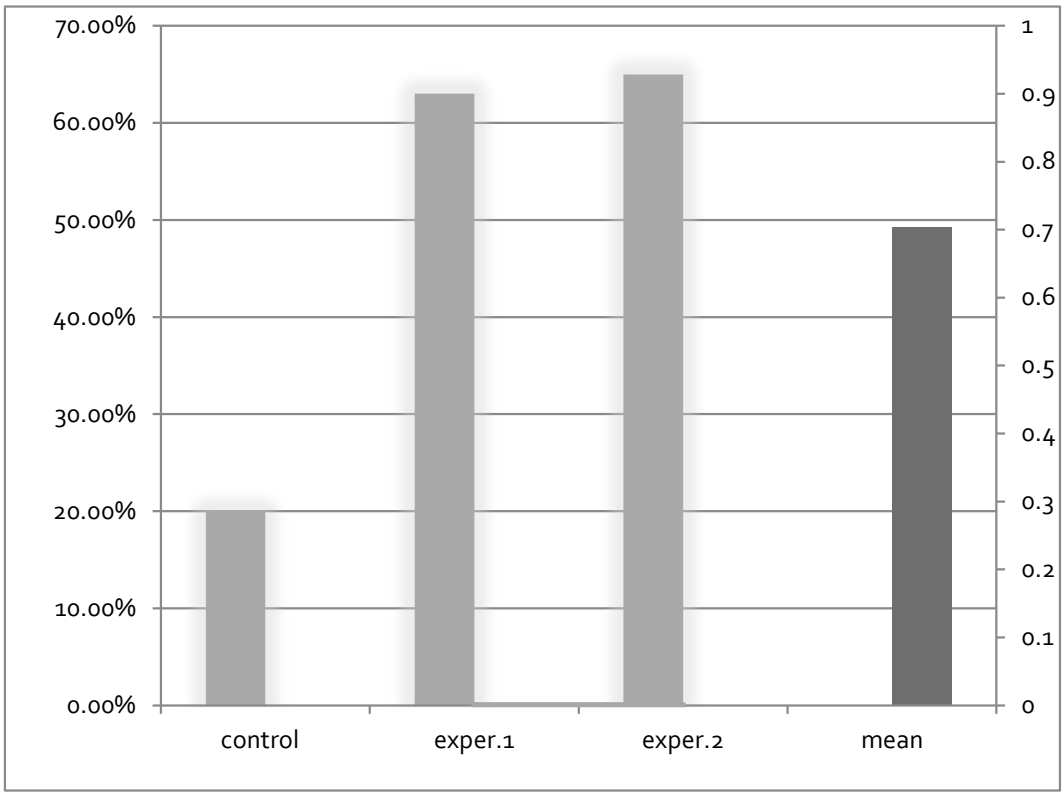
The control group and the experimental group 1 had 6.8 percent of right answers. The experimental group 2 had 9% of correct answers. In the pretest we notice that there was not a significant difference in the three groups. The mean of these groups is 7.5% of correct answers.

Control, experimental group 1 and 2 Production posttest 1 % of correct elements



The control group students had 15.9% of right answers. The experimental group 1 had 27.2% of correct answers. What accounts for the high performance in the experimental group 2, which answered 45% of the chemical elements correctly, is the fact that one of the dancers has a degree in Chemical Engineering and in the first posttest she got 43 out of 44 correct answers. At the moments she works as an instrument Engineer. Nevertheless, the same student got only 3 correct answers in the pretest. The mean of the three groups is 29.3%, more than three times better than in the pretest. It is clear that the training improved all groups but mainly the experimental groups whose training was a conjunction of chemistry and dance.

Control, experimental groups 1 and 2 Production posttest 2 % of correct elements



It is important to notice that in the second posttest, the experimental groups show a threefold increase compared to the control group, which suggests that joining training and an area of the students' strength may help them improve their performances in the school subjects, in this case, chemistry. It is important to keep in mind that the three groups had the same amount of training, the difference was that experimental group 1 and 2 were training while they performed ballet and flamenco movements respectively. The control group only repeated the chemical elements as they usually do in the classroom. Motivation can also be one aspect to be taken into account when analyzing these figures. The control group did not have any motivation, they were repeating for the sake of repeating while the dancers were doing something they enjoyed and had their colleagues involved in the same task as they performed the 'Chemistry choreography' as a group.

Now let us look into each student individually. Each student was tested in 44 chemical elements. Therefore, the total score for each student was 44.

From the individual scores we can see that no student was correct more than seven out of a total of 44 elements. We can also see that there was no outstanding grade, in other words, their level was more or less the same in the three groups. The student who was least successful was the control student 4, who had only 4 correct answers.

Control Group individual scores:	**pretest**	**posttest 1**	**posttest 2**
control student 1:	5 out of 44	13 out of 44	14 out of 44
control student 2:	5 out of 44	14 out of 44	15 out of 44
control student 3:	4 out of 44	9 out of 44	11 out of 44
control student 4:	4 out of 44	8 out of 44	11 out of 44
control student 5:	4 out of 44	9 out of 44	11 out of 44
control student 6:	4 out of 44	9 out of 44	10 out of 44
control student 7:	4 out of 44	6 out of 44	7 out of 44
control student 8:	4 out of 44	7 out of 44	7 out of 44
control student 9:	4 out of 44	8 out of 44	8 out of 44
control student 10:	3 out of 44	7 out of 44	8 out of 44
control student 11:	3 out of 44	8 out of 44	8 out of 44
control student 12:	3 out of 44	7 out of 44	8 out of 44
control student 13:	3 out of 44	8 out of 44	9 out of 44
control student 14:	3 out of 44	7 out of 44	8 out of 44
control student 15:	3 out of 44	7 out of 44	7 out of 44
control student 16:	2 out of 44	7 out of 44	8 out of 44
control student 17:	2 out of 44	5 out of 44	7 out of 44
control student 18:	0 out of 44	4 out of 44	7 out of 44

control student 19:	0 out of 44	2 out of 44	6 out of 44
control student 20:	0 out of 44	3 out of 44	7 out of 44

As it can be observed from the individual scores, control students, who go to secondary school, did not improve as the experimental groups. This fact may be attributed to motivation, as they were just repeating the elements by the sake of it. There was no challenging or goal. In the case of the dancers, they were motivated by the dance, they knew they were supposed to finish the elements and conclude their choreography, therefore, there was an objective, and the task was more challenging and motivating. Not only can MI principles help students improve a subject area, but also it can motivate students and make classes more interesting.

Experimental group1 individual scores:	**pretest**	**posttest 1**	**posttest 2**
experimental1 dancer 1:	7 out of 44	16 out of 44	34 out of 44
experimental1 dancer 2:	5 out of 44	14 out of 44	33 out of 44
experimental1 dancer 3:	4 out of 44	13 out of 44	33 out of 44
experimental1 dancer 4:	4 out of 44	13 out of 44	32 out of 44
experimental1 dancer 5:	4 out of 44	13 out of 44	32 out of 44
experimental1 dancer 6:	4 out of 44	13 out of 44	29 out of 44
experimental1 dancer 7:	4 out of 44	13 out of 44	28 out of 44
experimental1 dancer 8:	4 out of 44	13 out of 44	27 out of 44
experimental1 dancer 9:	4 out of 44	12 out of 44	27 out of 44
experimental1 dancer 10:	4 out of 44	12 out of 44	27 out of 44
experimental1 dancer 11:	3 out of 44	11 out of 44	26 out of 44

experimental1 dancer 12:	3 out of 44	12 out of 44	26 out of 44
experimental1 dancer 13:	3 out of 44	11 out of 44	26 out of 44
experimental1 dancer 14:	3 out of 44	11 out of 44	26 out of 44
experimental1 dancer 15:	3 out of 44	10 out of 44	26 out of 44
experimental1 dancer 16:	1 out of 44	11 out of 44	25 out of 44
experimental1 dancer 17:	0 out of 44	11 out of 44	25 out of 44
experimental1 dancer 18:	0 out of 44	11 out of 44	25 out of 44
experimental1 dancer 19:	0 out of 44	9 out of 44	24 out of 44
experimental1 dancer 20:	0 out of 60	10 out of 44	23 out of 44

In the experimental group 1, the ballet dancers showed a better improvement as compared to the control group. Nevertheless, in the experimental group 2, flamenco dancers obtained even better results than the ballet dancers.

Experiemntal group 2 individual scores:	**pretest**	**posttest 1**	**posttest 2**
experimental2 dancer 1:	7 out of 44	43 out of 44	44 out of 44
experimental2 dancer 2:	5 out of 44	10 out of 44	40 out of 44
experimental2 dancer 3:	5 out of 44	10 out of 44	39 out of 44
experimental2 dancer 4:	5 out of 44	10 out of 44	28 out of 44
experimental2 dancer 5:	5 out of 44	10 out of 44	28 out of 44
experimental2 dancer 6:	5 out of 44	10 out of 44	28 out of 44
experimental2 dancer 7:	4 out of 44	10 out of 44	27 out of 44
experimental2 dancer 8:	4 out of 44	10 out of 44	27 out of 44
experimental2 dancer 9:	4 out of 44	10 out of 44	27 out of 44
experimental2 dancer 10:	4 out of 44	10 out of 44	27 out of 44

experimental2 dancer 11:	4 out of 44	10 out of 44	26 out of 44
experimental2 dancer 12:	4 out of 44	10 out of 44	25 out of 44
experimental2 dancer 13:	4 out of 44	10 out of 44	25 out of 44
experimental2 dancer 14:	4 out of 44	10 out of 44	25 out of 44
experimental2 dancer 15:	4 out of 44	10 out of 44	25 out of 44
experimental2 dancer 16:	4 out of 44	10 out of 44	26 out of 44
experimental2 dancer 17:	3 out of 44	10 out of 44	26 out of 44
experimental2 dancer 18:	3 out of 44	10 out of 44	26 out of 44
experimental2 dancer 19:	1 out of 44	10 out of 44	25 out of 44
experimental2 dancer 20:	0 out of 60	10 out of 44	24 out of 44

As we can observe, experimental2 dancer 1 obtained the best results in the first and second posttest, besides having a degree in Chemical Engineering, which may have helped her recall the elements more easily. Additionally, the dancer was 28 years old, she was one of the oldest student in the group, by that we may explain responsible and attitude; she was always interested in the trainings and the pronunciation of the elements in English.

The fact that the experimental group 1 (composed of ballet dancers) performed slightly better than the experimental group 2 (composed of flamenco dancers) rejects our hypothesis that ballet dancers have a better performance when learning content compared to flamenco dancers due to the greater discipline required in ballet classes. Nevertheless, let us prove if there is a meaningful difference between the control group, when compared to the experimental groups 1 and 2, let us apply a test for homogeneity of variance. Our first step is to make a descriptive analysis of the three groups. To do so, we had to eliminate experimental 2 dancer 1 as she distorted our analysis. This student stood out from the rest and would mislead the interpretation of our results. Only the data from the posttest 2 was taken into consideration, as it is our final result and at this stage there should be difference in the groups.

Descriptive analysis

Right answers	N	Mean	Standard deviation Σ	95% Confidence interval		Minimum	Maximum
				Lower limit	Upper limit		
control	20	8,85	2,43	7,71	9,99	6	15
experimental 1	20	27,70	3,31	26,15	29,25	23	34
experimntal 2	19	27,32	1,92	26,39	28,24	24	31
Total	59	21,19	9,28	18,77	23,60	6	34

As we can observe in the table above, the mean of correct answers for the control group 8,85 (Standard deviation, Σ =2,43); the mean for the experimental group 1 is 27,70 (Σ=3,31) and for the experimental group 2 27,32 (Σ = 1,92).

Control group

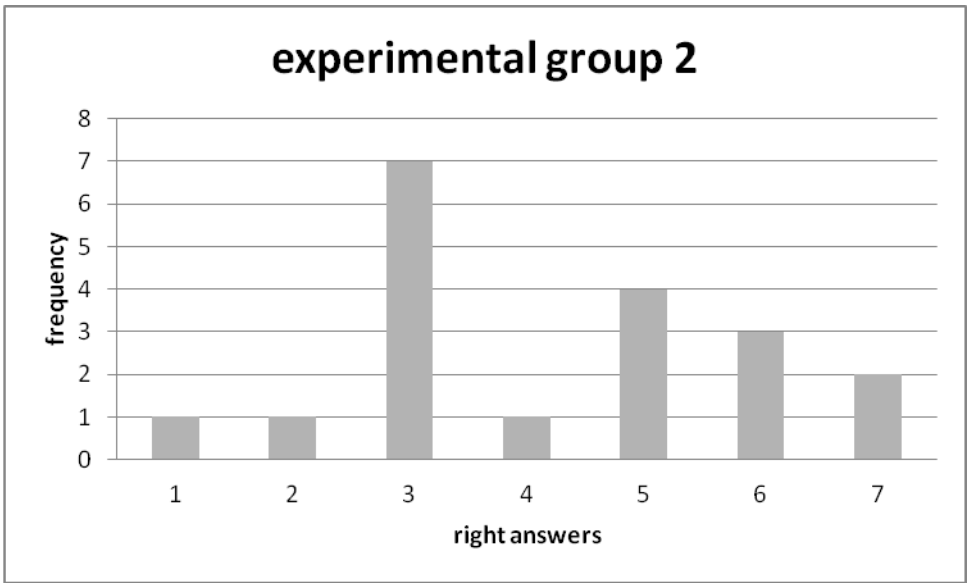
Right answers	Frequency	Percentage
6	1	5%
7	6	30%
8	6	30%
9	1	5%
10	1	5%
11	3	15%
14	1	5%
15	1	5%
Total	20	100%

Experimental group 1

Right answers	Frequency	Percentage
23	1	5%
24	1	5%
25	3	15%
26	5	25%
27	3	15%
28	1	5%
29	1	5%
32	2	10%
33	2	10%
34	1	5%
Total	20	100%

Experimental group 2

Right answer	Frequency	Percentage
24	1	5,26%
25	1	5,26%
26	7	36,84%
27	1	5,26%
28	4	21,05%
29	3	15,79%
31	2	10,53%
Total	19	100,00%



Group difference hypothesis

Are there meaningful differences, statistically speaking, in the correct answers regarding the three groups?

In order to contrast this hypothesis, let us use the ANOVA test. Previously, we have performed the kolmogorov Smirnov (K-S test) to analyze the normality in the three groups and the results showed that the three groups are normal.

The hypotheses in the present test are:

Ho: The mean of the three groups are the same.

H1: At least one group is different.

After performing the ANOVA test, we obtained a frequency F = 333,382, using a significance level less than 0.05, therefore, the test allows us to reject the null hypothesis which suggests that the means of the groups are equal and we can conclude that there is a significant difference in the means.

In order to find out where the difference is, we performed the Bonferroni Post Hoc test and the differences found can be seen in the following table:

Multiple Comparisons

right answer Bonferroni					Conclusions
(I) group	(J) group	Difference of means (I-J)	Typical Error	Sig.	
control	experimental 1	-18,85000*	,83115	,000	Experimental 1 > control
control	experimntal 2	-18,46579*	,84202	,000	Experimental 2 > control
experimental 1	experimntal 2	,38421	,84202	1,000	Experimental 1 = Experimental 2

As we can observe, the difference lies in the control and the two experimental groups, being the means of the experimental groups greater than the control group. Nonetheless, we have not found statistically meaningful differences between experimental group 1 and experimental group 2. Although the ballet dancers (experimental group 1) obtained slightly better results when compared to the flamenco dancers, (experimental group 2), we cannot support our hypothesis initially posed in the Introduction Section of this study which claims that there is a sigficant difference between the ballet dancers and the flamenco dancers. Nevertheless, we were able to prove that in the Phonetics training.

Let us analyze some reasons why there was a difference in the results of Chemistry and the Phonetics training:

Phonetics is part of the language and can be associated with Linguistic Intelligence which is located in the left hemisphere of the brain. Ballet dancers need a precise mathematical Intelligence which is also located in the left hemisphere of the brain. The left side is also responsible for memorizing and assimilating information, thus, the Chemistry training must have activated mainly the left hemisphere of the dancers in order to memorize the 44 elements. Spatial intelligence is also germane for ballet dancers as they are the ones who need the greatest precision when dancing, precision of their own movement and precision regarding the dancer's position concerning the others. A deeper analysis of brain functioning by neurologists could cast light on this matter.

Another possibility could be that as all dancers had previously been in contact with these elements at school in the past, some of them might have more facility to recall these elements.

Questionnaire for dancers just after training

All the dancers from both experimental groups were asked to fill out another questionnaire after the last training session (see appendix I, page 203).

Regarding question number 1, all the dancers agreed that it was easier to memorize the content through dance. The reasons given were:

- They can relate movement and rhythm with the different elements
- The rhythm of our body itself joins that what we are studying with the choreography.
- What we are studying becomes just one more element that needs to be memorized in order to perform the choreography
- The content become part of the dance

In the following question, all the dancers enjoyed the fact that their dance style was used to learn the content. Dancers stated that:

- The class learning content in conjunction with dance was very motivating, especially when after the eights[18] in which we had to perform the choreography and content, we had the opportunity to make up another eight of choreography ourselves.
- The traditional method bores students so they do not concentrate.
- When you are dancing you are always concentrated because we need both to say the content and perform the choreography at a time.
- Both the music and the dance make it more fun.
- When we are dancing we never lose concentration because we do not like to make mistakes while dancing

[18] Each part of the routine or choreography has eight music beats.

- It was very positive because we have applied something dynamic like dance to something monotonous like the periodic table

Next, the dancers were asked if the task was easier because they were using their dance style, for instance, ballet dancers were trained with ballet not with funky. All the dancers agreed that due to the fact that their dance style was used it was both easier and more fun to perform the task.

Question number 4 asked if dance and music were used in classes, this would make classes more motivating than just using textbooks.

- It would be really nice however people who do not like dance may not benefit from it.
- Students would be more motivated, therefore they would dedicate more to homework and to class activities.
- Drama or singing could also be used for those students who do not like to dance.

In the final question, dancers were asked if they would like to learn content through the aid of dance. All of them responded yes, because:

- Classes would be easier and more fun.
- I would not get bored attending classes as I always do.
- I would not miss so many classes.
- It would be good for me because I have difficulties memorizing things that I do not like or understand.

By combining the outstanding results obtained in the trainings by the experimental groups and their positive account on their experience of learning through music and dance, we can infer that MI theory when well adapted to the classroom needs can be really motivating and reach very positive results. Either the lack of motivation in the control or the use of less parts of the brain while taking the trainings have led them to lower results.

4.7. Part 3 – The Processfolio

In order to expand the art forms proposed by Gardner in the by the Arts PROPEL (Gardner, 2006: 156 -166), which are: music, visual art and imaginative writing, as well as to have more data on our experiment (the application on dance to improve school subjects), we decided to add a fourth art form, dance, in order to check how dancers create, have ideas, and act upon the dance realm.

In the first meeting after dancers had some time to think about the themes to be presented as choreography, the following themes were proposed in case the dancers did not come up with any ideas to perform (see appendix N, 209).

Feudalism was the theme proposed in the subject of history; demographics of Spain in Geography, Earthquakes in Geology and systems in the subject of technology.

In the second meeting, dancers showed up with the following topics: thre dancers chose the proposed themes: demographics of Spain, systems and earthquakes. The reason why the dancer chose demographics was because she could not think about any other topic and she did not know much about the topic either. Earthquakes were chosen because the theme inspired the dancer to create movements and she was interested in and she wanted to find out about their causes as well. The dancer who chose systems works as a computer programmer, therefore, this topic called her attention. The other five dancers came up with themes of their own: the pointillism from neo-impressionism of Georges Seurat (the dancer thought it would make great choreography), acari (due to a program the dancer had just watched); mathematic formula for Fahrenheit to Celsius conversion; trigonometry Newton's law of universal gravitation, and soccer rules.

Initially, the processfolio was meant to deal with subjects that students had difficulty with; notwithstanding, the dancer who chose pointillism, proposed a theme related to creativeness, and as the focus of this third part is to boost creativity and experiment types of arts other than the ones proposed by Gardner, we accepted her chosen topic. Now dancers had one week to prepare their choreography and present it to the group.

In the following meeting, dancers performed their piece of choreography. At the end of the performances, the dancers commented on their own performance and made suggestions to improve his own and his mates' choreography.

It was amazing how they were able to create and deal with subjects that many people would never imagine that they could be expressed through dance. Dancer used many resources: their own body, other dancers' bodies. Written words / formulas on flip chart, painting (pointillism), singing, speaking and obviously and mainly dance.

In the fourth and final meeting, dancers re-presented their piece of choreography by making use of their mates' comments and their own reflection. There was a group talk discussing the benefits of this time of assessment. The results could not have been better, all dancers expressed that at the beginning they were a bit skeptical and did not think they could relate such different topics to dance. Everyone agreed that these beautiful visual classes will be forever kept in their minds and this experience should be applied more frequently to help people with difficulties in a specific topic.

V. CONCLUSION

This study has focused on the evaluation of bilingual schools in Madrid and the benefits of Multiple Intelligences when used in the classroom to help students improve any subject areas.

In the first part of our study, which analyzed bilingual school head teachers, students and language assistants, we found many positive aspects as well as others which can be improved.

With respect to head teachers, the answers to our two first research questions are that more than 90 percent of them are not book-centered and they make use of other media, mainly the Internet and other books apart from the students' textbook. For the third research question related to teachers' interest in learning about their students, the actions they take with data found in students' self-assessment and in teachers' assessment, we observed that teachers were not consistent and answered that this piece of information gives them information about common mistakes and how students see the classes. However, the actions that are taken after reading this information were not mentioned. Our next question inquired about the use of creative materials in class, such as music, dance, creative writing. Unfortunately, only 30 percent of the BEDA teachers use creative material in class and when it comes to public and charter schools the panorama is even more alarming, only 10 percent of them make use of these creative materials (some teacher only consider these materials appropriate to first and second of ESO). For the fifth research question, we discovered that teacher do not have problems to know the border between language and content, they know when a student performed poorly in an exam due to lack of knowledge in the language or because they do not master the content by analyzing their students in the classroom, as teachers know their students' proficiency, it is not a problem for them to find out why a student may fail in communicating. Concerning research question number six, it was observed that regular meetings to boost learning processes are quite frequent, 96 percent of public school teachers have a weekly meeting, and besides this fact, some of these teachers are tutors and have meetings not only with other teachers, but also with parents once a week. All teachers have to fill in a form with information about the

students. The percentage found in BEDA regarding these meetings was of 92 percent, while for charter schools it was of 80 percent. In these two last institutions, the meetings are also held weekly. The final research question concerning head teachers inquired about their L2 level. All of them said to feel comfortable teaching in English/ French (a few respondents work in bilingual schools teaching French). Nevertheless, some of these teachers still need to be trained in order to improve their proficiency, we encountered some teachers with pronunciation problems /beri/ instead of saying /very/, for instance; with literal translation "Do you want to shut up?", in place of "Please, be quiet" and spelling errors were also detected when teachers filled in our questionnaires. We also discovered that only about five percent rely on their students' weaknesses and strengths to prepare their classes. This is a clear signal that these teachers are not aware of MI and its benefits to the class and that MI is still in its infancy in Spain and it should be included in future trainings so that these teachers have more tools to deal with their students' learning skills. Although teachers sometimes rely on music and dance in their classes, the reason is merely to motivate students rather than knowledge about MI Theory. When teachers were explicitly asked if they used MI in the classroom, only three teachers out of 150 said to partly use it as it motivates students. With regard to assessment, all teachers agreed that assessments are important and only one percent of the teachers would change something in the assessment. This data is strongly linked to teachers' values and beliefs. In order to make use of MI Theory which values much more the process than a single fragment of the term which is called exam, educators would need to detach a bit from these values and reflect upon the importance of the learning process.

Concerning language assistants, we unearthed that BEDA program and Franklin institute have more prepared assistants as both institutions train their assistants for one year. In general and maybe because these assistants are in the process of learning and receiving current training on new trends and methodologies, they are more aware of MI principles than head teachers. 80 percent of Franklin assistants take into account their students' strengths and weaknesses. Due to the fact that assistants unlike head teachers, do not use books, these assistants have to be more creative while preparing their activities, so compared to head teachers, language assistants use many other means such as,

videos, plays, role-plays and games to teach. Regular meetings only happen in the BEDA system, every assistant has a weekly meeting to talk about their students and classes. Assistants from the other two surveyed institutions complained that many times head teacher are unwilling to help or talk to them. Regarding the training previous to the beginning of their work as assistants, the lack of this type of training by the Franklin Institute could be easily tackled if Franklin Institute start providing a training course to their assistants. It would also be a good idea if the head teachers had a clear idea of the assistants' role. In other words, head teachers should also be trained to know how to behave in the presence of a language assistant.

With respect to students, we found out that at least 40 percent of public schools students and the totality of BEDA students benefit from music and dance in the classroom and all students without exception enjoy learning through these aids. This may be a starting point for education if teachers become aware of what lies beyond dance, music and drama. To do so, the Community of Madrid and the respective institutions in charge of teachers' training have to offer more effective trainings and supervise what is being done in the classrooms. The fact that the great majority of students understand from 80 to 100 percent of their classes in English and all of them were able to understand and answer the questionnaire of this study in English, shows us that the program is efficient to teach a second language and that students are able to express themselves in the L2 as well. However, most students show a strong Spanish accent.

As for the second part of our study, it was evidenced in the results that training is an effective way to improve both pronunciation of individual phonemes within words and chemical elements at least in the short run. A great improvement can be observed after each posttest, mainly in the experimental groups in which dance was used as a potent stimulus to help students to better intake the content. All the trained students achieved a better pronunciation. The study showed that a low performance in pronunciation may have as one of its causes the lack of phonetic teaching and that phonetic training contributes to an improved performance in the discrimination and identification of L2 (as proposed by Iverson & Evans, 2007; Logan & Pruitt,1995) as well as a better oral speech sound

production. This was evidenced by the fact that the oldest dancer in experimental group 2 was the one who got one of the greatest marks. On this basis, this paper claims that phonetics should be taken more seriously in the classroom and that a better performance may be achieved at any age when phonetics is taught by well-prepared practitioners.

With reference to the great improvement in the experimental groups, experimental group 1, which consisted of ballet dancers, participant 5 stood out from the others in the phonetics training, she is 25 years old and works as an art restorer. Maybe the precision demanded by her job, made her concentrate more easily than the others. The dancer had never lived in an English speaking country and the last time she had been in contact with English was when she finished high school. Regarding her Chemistry training, she was among the three top results. In experimental group 2, regarding Phonetics, we highlighted mainly the participant dancer 1 who ranked number one in the pretest and in the first posttest and dancer 5, who stood out in the second posttest. With regard to Chemistry, again participant 1 stood out, the reason which accounts for her brilliant performance may be the fact that she is a chemical engineer. In the pretest the participant had as many right answers as the majority of other dancers; however, she was the best student in the first production posttest; in the second production posttest, the dancer was flawless. So being a chemical Engineer helped her recollect more easily the periodic table. Another factor to be highlighted is that she was the oldest student (the age in the experimental group 2 ranged from 19 to 28, and this dancer was 28 along with dancer 7). It can be inferred then, that attitude from student 7, who was always interested in the trainings and asked us many questions; motivation from both students 1 and 7 and experience (the fact that student 1 had lived abroad for one year, made her stand out in the pronunciation training), have played a greater role when learning pronunciation and Chemistry in this study, as though these factors were more important than age. After performing the Bonferroni Post Hoc test we found out that the ballet dancers had a statistically meaningful difference compared to the flamenco dancers in the phonetics results, which confirmed our hypothesis that that ballet dancers use their brains more actively. In Chemistry, ballet dancers also obtained better results; nevertheless, they were not statistically meaningful.

This paper has attempted to show that students' strengths and weaknesses have to be taken into consideration in the classroom and only with a simple fifteen-minute training, students can achieve a much better performance. We would like to reinforce that Chemistry and phonetics were used arbitrarily in this study, educators can and should use any subject topics to assist learners. A short session was preferred to a long one due to the fact that this study was designed to be applied in the classroom, to help teachers improve their students' weaknesses in any subject, in the case of this study, chemistry and phonetics. Because teachers usually work in schools which make them meet deadlines and teach all the contents in the textbooks, long training sessions might be impossible to be carried out simultaneously with the demands made by the institutions.

This paper presents a number of limitations as well as suggestions to improve them in future research. The first limitation regards the number of participants in the second and third part of this study. Having groups of twenty participants in the experiments may not be enough to test for homogeneity. In future studies an increased number of participants would certainly increase the strength of the results and therefore the ability to more accurately generalize the findings of the present study. Another suggestion would be to take into consideration parents' perceptions of their kids in the bilingual school programs. A similar three-year survey was conducted by the British Council / MEC project (Dobson, A., Murillo, M.D., Johnstone, R., 2010) and it shed light on many issues such as their perception on their kids' proficiency of English, personal development and career prospects and their concerns about their children's command of the language. A neurological study made by a specialist would certainly shed light on the exact part of the brain in which each training, in the case of this study Phonetics and Chemistry, is taking place. Besides, a study of the size of the brain of ballet dancers compared to other dancers, could be used as evidence of greater activity or not, as the study made of musicians' brains which proved to have a bigger left hemisphere when compared to other human beings. Future studies in Bilingual Schools could also analyze if the school premises are equipped to receive handicapped students such as parking space for handicapped parents, restroom facilities, wheelchair ramps and others, compulsory features at any schools in the United States of America.

The present study marks a solid beginning for questions related to the study MI in bilingual schools, not only in Madrid, but in Spain. The design of this study and its size will allow for several follow-up studies and opportunities to examine in greater depth some of the issues that have been raised here. The first follow-up will be a more detailed study of the training task. The data collection used for this study tracked listener responses during the chemistry and phonetic task, responses which can be analyzed and coded in order to study dancers' interaction with the task and specifically, whether or not accuracy improved as the task progressed. Analyzing more participants in this way may shed more light on the findings on training obtained in the present study.

A long-term goal is to explore MI applied in schools. The present study and those which will follow are a necessary beginning to a line of research directed towards finding not only the link between MI and learning but also the factors which facilitate learning. In such a line of research questions regarding the cognitive skills and personal attributes of the learner can also be explored. In summary, this study marks a first step in what is hoped to be a long line of research on MI in schools.

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VII. APPENDIX

A. Questionnaire for Students

Grade: _____ (example: 1º de bachillerato, 3º de la ESO)

1. What subjects do you attend in English?

_____
_____

2. Does your teacher try to help you by the use of dance, songs, drama, games, creative writings, and workshops or is it just book-centered (the teacher only uses the textbook)?

_____
_____
_____

3. If your teacher tries to help you by the use of dance, songs drama, games, workshops, do you like it?

_____

Explain why you like it or not.

_____
_____

4. Do you do any sports? Do you like to dance? Do you play any instruments?

_____
_____

5. If so, have your teachers ever used your sport, dance or hobbies to stimulate you in class?

_____
_____
_____

6. In case you have a hobby (sports, dance, poetry), would you like to learn difficult subjects through these hobbies?

_____
_____
_____
_____

7. Do you think that your grades (marks) are mostly reflected on your exams or do your teachers evaluate you daily?

_____
_____
_____

8. Are you satisfied with the assessment (evaluation) system?

_____
_____
_____

9. Are all your classes in the classroom or do you sometimes have classes outside the classroom, in a science fair or in the computer lab, for example?

_____
_____
_____

10. Would you like to have (more) classes outside the classroom?

_____

Why?

_____
_____
_____

11. Is your homework interesting?

_____
_____
_____

12. Do you usually do your homework in groups or individually?

_____
_____
_____

13. What sources do you use to do your homework? (The Internet, books, magazines, textbooks, television, interviews)

_____
_____
_____

14. Do your teachers check your homework?

_____
_____

15. Does your homework affect your grade?

_____
_____

16. Is it more difficult to understand the subject because it is taught in English?

_____
_____

17. How much do you understand the classes in English?

___ 80 – 100% ___ 40 – 60%

___ 60 – 80% ___ less than 40%

B. Questionnaire for teachers

Type of school: ☐ **private school** ☐ **state school** ☐ **charter School (concertado)**

Subject you teach: _____

Age: ☐ **20 to 30** ☐ **31 to 40** ☐ **41 to 50** ☐ **over 50**

1. Why did you decide to become a teacher in your area? (History teacher, science teacher, Physical education teacher…)

_____
_____
_____

2. What media (textbook, Internet texts, magazines, PowerPoint) do you usually use when you prepare your classes?

_____
_____
_____
_____

3. Do you rely on your students' strengths / weaknesses to prepare your class?

_____
_____
_____
_____

4. Do you ever use music, dance or any other artistic technique to help them with the subject?

_____
_____
_____

5. Do you know about your students' hobbies (sports, poetry, dance, music)?
_____
_____
_____

6. Do you think these hobbies are possible to help them learn the subject?

_____
_____

6b. If so, how?

_____
_____

7. How is assessment important for you?
_____
_____
_____

8. Do your students have self-assessments, in other words, do they evaluate their own progress?

_____
_____

9. If so, what measures are usually taken with the information found in students' self-assessment?

_____
_____
_____

10. Do you think teachers' assessment and students' self-assessment are enough to evaluate the student?

_____
_____
_____

11. When evaluating your students, how do you know if a student performed poorly due to lack of knowledge in English or because he did not master the content?

_____
_____

12. What is considered more important for you, a good level of English in the exams or knowledge of the content? What percentage do you usually attribute to each feature?

_____
_____

13. Would you change anything in the assessment format?

_____
_____

14. Do you have regular meeting or informal talks with other teachers to discuss about assessment, techniques to boost learning or ways to help a student with a specific difficulty?

_____
_____

15. How comfortable are you in class to speak English?

_____
_____
_____

16. Are you able to express yourself in English as well as you are in Spanish?

_____
_____

17. How much training did you get when you joined the bilingual program (number of hours, weeks)?

_____
_____

18. How often do you have official training or meetings to update or improve the teaching in bilingual schools?

_____
_____

19. Have you taken any courses recently related to your teaching area? (Master's course, Grants, conventions, national or international meetings).

_____

19b. If so, which courses have you taken?

_____
_____

20. Do you make use of any of the methodologies above in your classes?

☐ Higher order thinking ☐ Multiple Intelligences ☐ critical thinking ☐ _____

Why do you rely on this methodology / these methodologies?

_____
_____

C. Questionnaire for language assistants

Subject(s) you teach: _____

Type of school: ☐ **private school** ☐ **state school** ☐ **charter School (concertado)**

1. What media (textbook, Internet texts, magazines, PowerPoint) do you usually use when you prepare your classes?

_____
_____
_____
_____

2. Do you rely on your students' strengths/ weaknesses to prepare your class?

_____
_____
_____
_____

3. Do you ever use music, dance or any other artistic technique to help them with the subject?

_____
_____

3b. Why?

_____
_____
_____

4. Do you know about your students' hobbies (sports, poetry, dance, music)?
_____
_____
_____

5. Do you think these hobbies are possible to help them learn the subject?

_____
_____

5b. If so, how?

_____
_____

6. How important is assessment for you?

☐ extremely important

☐ important

☐ so-so important

☐ not important at all

Please, explain your answer:

_____
_____
_____

7. Do you participate in the assessment of the students, in other words, does the head teacher let you help him by assessing the students?

_____
_____

7b. If so, do you grade them from 1 to 10 or you grade their performance (excellent, very good, good, needs improvement, poor performance)

_____

7c. When evaluating your students, how do you know if a student performed poorly due to lack of knowledge in English or because he did not master the content?

_____
_____

8. Do your students have self-assessments, in other words, do they evaluate their own progress?

_____
_____

9. If so, what measures are usually taken with the information found in students' self-assessment?

_____
_____
_____

10. Do you think teachers' assessment and students' self-assessment are enough to evaluate the student?

_____
_____
_____

11. Would you change anything in the assessment format?

_____
_____
_____

12. Do you have regular meeting or informal talks with other teachers to discuss about assessment, techniques to boost learning or ways to help a student with a specific difficulty?

_____
_____

13. Is your participation in class enough or do you think the head teacher could allow you more time leading some activities?

_____
_____

14. Are you able to understand your students in case they speak Spanish?

_____
_____

15. How much training did you get before you started being a language assistant?

(Number of hours, weeks or months)

_____

16. Who provided this training (university, Comunidad de Madrid, the school itself)?

_____

17. Was this training enough or does it need improving?

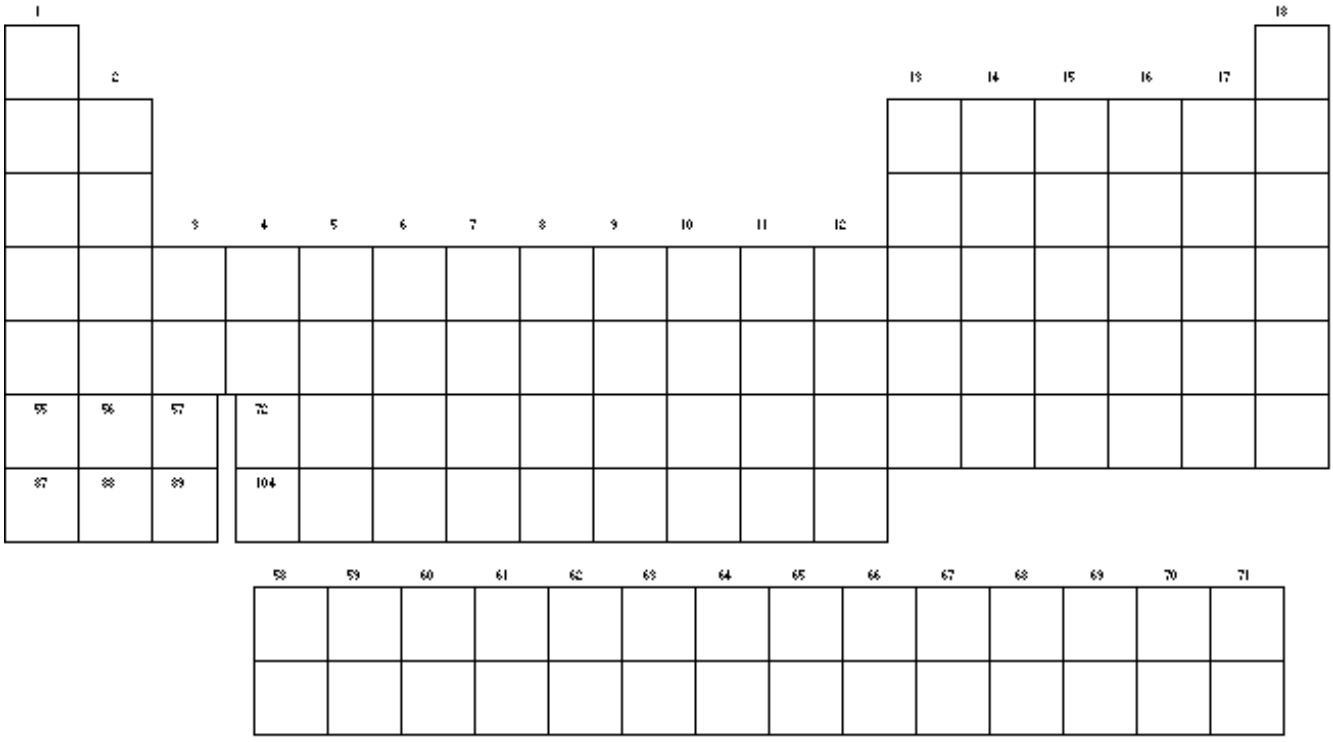
_____

18. In case you think it needs improving, how could it be improved?

_____
_____

D. Pretest and posttest task

Periodic Table in Blank



E. Pretest task (phonetics)

Please, read the following words:

bad – zoo – mad – sea – bed – sad –seek - let – cesium – neon – xenon – zinc – need – zig-zag – Zorro – Zac – ham – cat – set – met – mat – Ben – zone – bee – ten – deep – men – Ken – meet – beat – back – zoom – pause – well – pea – sea – well – use – very – volley – review – vegetable – avocado – vanilla – video – visits – van – knives– that – they – brother – their – those – this – them – mother – together – father

F. Words read by the participants (posttest)

mad	deep	ask	back
Ben	beat	met	Zorro
zig	meet	mad	xenon
ten	zinc	let	seek
ham	cesium	Zac	zoom
cat	mat	Ken	ask
neon	man	xenon	zag
zone	sea	yell	use
pea	bad	pause	well
very	volley	review	vegetable
avocado	vanilla	video	visits
van	knives	that	they
brother	their	those	this
Them	mother	together	father

G. (posttest)

Pictures shown to dancers so that they uttered the object printed in them out loud. These pictures were the same as the ones used in the phonetic training, however, now the participants can only see the picture, not the written word.

 (bee)

 (van)

 (sad)

 (bed)

 (zoo)

 (father)

H. Pretest form for dancers

1. Name:_____

2. Type of dance: Flamenco / Classic Ballet

3. How long have you been dancing _____? I have been dancing for____ year.

4. Age ____15 to 20 ____21 to 25 _____26 or older

5. Occupation:

6. School grade or university degree:

_____

7. Studies of English (private classes, hours at school, English school)

_____

I. Questionnaires for dancers

(just after training)

1. Do you think learning phonetics and chemistry through dance was easier for you to memorize/ understand them?

_____

1b. How?

_____
_____

2. Did you enjoy more the classes due to the fact that the dance style you dance was applied to teach you other subjects?

_____
_____

3. Was it easier to memorize the aspects you learnt through your dance style?

_____
_____

4. Do you think if school used dance or music, for instance, the students could be more motivated than just by learning through books?

_____
_____

5. Would you like to learn subjects through the aid of dance?

_____
_____

J. Questionnaire for dancers

(just after choreography made by students)

1. When you made your choreography on your weak subject (or theme you have difficulty with), was it difficult for you to express your chosen topic through your body?

_____
_____

2. Do you think now you feel more comfortable with your chosen topic?

_____
_____

3. What do you think if schools used dance to help teach other subjects?

_____
_____

4. How did your colleagues' ideas help you to improve your performance?

_____
_____

5. Did you learn from your colleagues' performance?

_____

5b. how?

_____
_____

K. Dancer's Final Assessment

1. Now that you had the opportunity to make a final performance, making use of your friends' ideas, how well do you think you improved your creativity?

_____
_____
_____
_____

2. Did this second performance make you even more comfortable with your topic?

_____
_____
_____
_____
_____

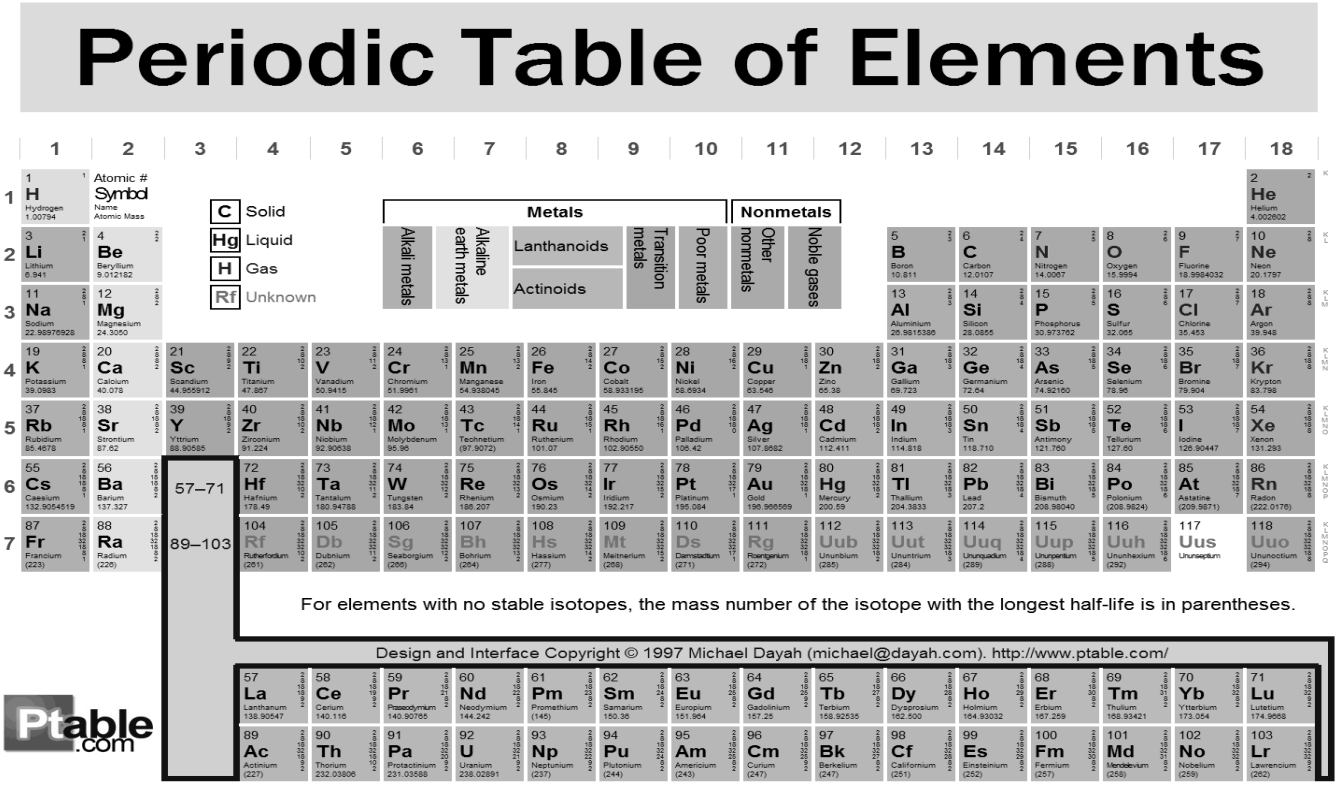
3. Did the changes made help you understand the topic better?

_____
_____
_____
_____

4. Did you get a greater knowledge from your colleagues' second performance?

_____
_____
_____
_____

L. Chemistry Training



M. Pronunciation training

drill A

/æ/	/i:/	/e/
		
sad	bee	bed
mad	deep	Ben
ask	beat	met
pad	meet	set
Zac	seek	let
ham	cesium	ten
cat	neon	Ken
mat	xenon	men
back	sea	yell
Bad	pea	well

drill B

/z/	/ ð/	/v/
		
zoo	father	van
zone	that	very
Zorro	they	volley
xenon	brother	review
zinc	their	vegetable
cesium	those	avocado
zig	this	vanilla
zag	them	video
use	mother	visits
pause	together	knives

N) Themes suggested for dancers. Key concepts were translated into L1 to guarantee that students were able to relate terms in English to their mother tongue.

Second grade of Secondary school (2º de la ESO)

Subject: History

Feudalism

Feudalism was a set of legal and military customs in medieval Europe that flourished between the 9th and 15th centuries, which, broadly defined, was a system for structuring society around relationships derived from the holding of land in exchange for service or labor.

The term *feudalism* and the system it describes were not conceived of as a formal political system by the people living in the medieval period. In its classic definition *feudalism* describes a set of reciprocal legal and military obligations among the warrior nobility, revolving around the three key concepts of lords (señores feudales), vassals (vasallo), and fiefs (feudo).

Vassalage

Before a lord could grant land (a fief) to someone, he had to make that person a vassal. This was done at a formal and symbolic ceremony called, which was composed of the two-part act of homage and oath of fealty (juramento de fidelidad). The lord and vassal entered into a contract in which the vassal promised to fight for the lord at his command, whilst the lord agreed to protect the vassal from external forces. Also, the peasants (campesinos) bound by manorialism (señorío), and the estates of the Church. In feudalism, if one was born poor, he would die poor.

Third grade of Secondary School (3º de la ESO)

Subject: Geography

Demographics of Spain

Spain has 47,150,819 inhabitants according to 1/1/2010 municipal records (*Padrón Municipal*). Its population density, at 91.4/km² (229/sq. mile), is lower than that of most Western European countries. With the exception of the capital, Madrid, the most densely populated areas lie around the coast.

The population of Spain doubled during the twentieth century, but the pattern of growth was extremely uneven due to large-scale internal migration from the rural interior to the industrial cities, a phenomenon which happened later than in other Western European countries. No fewer than eleven of Spain's fifty provinces saw an absolute decline in population over the century.

The last quarter of the century saw a dramatic fall in birth rates. Spain's fertility rate of 1.47 (the number of children the average woman will have during her lifetime) is lower than the EU average, but has climbed every year since the late 1990s. The birth rate has climbed in 10 years from 9.10 births per 1000 people per year in 1996 to 10.9 in 2006.

Spain has no official religion. The Spanish Constitution of 1978 abolished the Roman Catholic Church as the official state religion, while recognizing the role it plays in Spanish society. 76.7% of the population define themselves as Catholic, 20.0% as non-believers or atheists, and 1.6% other religions. Among believers, 55.3% assert they almost never go to any religious service; by contrast, 17.0% attend one or more masses almost every week.

Fourth grade of Secondary School (4º de la ESO)

Subject: Geology

Earthquakes

An **earthquake** (also known as a **quake**, **tremor** or **temblor**) is the result of a sudden release of energy in the Earth's crust that creates seismic waves.
The **seismicity**, **seismism** or **seismic activity** of an area refers to the frequency, type and size of earthquakes experienced over a period of time.

Earthquakes are measured using observations from seismometers. The moment magnitude is the most common scale on which earthquakes larger than approximately 5 are reported for the entire globe. The more numerous earthquakes smaller than magnitude 5 reported by national seismological observatories are measured mostly on the local magnitude scale, also referred to as the Richter scale. These two scales are numerically similar over their range of validity. Magnitude 3 or lower earthquakes are mostly almost imperceptible or weak and magnitude 7 and over potentially cause serious damage over

larger areas, depending on their depth. The largest earthquakes in historic times have been of magnitude slightly over 9, although there is no limit to the possible magnitude. The most recent large earthquake of magnitude 9.0 or larger was a 9.0 magnitude earthquake in Japan in 2011 (as of October 2012)

At the Earth's surface, earthquakes manifest themselves by shaking and sometimes displacement of the ground. When the epicenter of a large earthquake is located offshore, the seabed may be displaced sufficiently to cause a tsunami[19]. Earthquakes can also trigger landslides, and occasionally volcanic activity. Earthquakes are caused mostly by rupture of geological faults, but also by other events such as volcanic activity, landslides, mine blasts, and nuclear tests. An earthquake's point of initial rupture is called its focus or hypocenter. The epicenter is the point at ground level directly above the hypocenter.

First grade of high school (primero de Bachillerato)

Subject: Science and Technology

(a) **Natural System**: Our universe is a system. Then all galaxies are sub-systems. There are many systems in nature such as water system, wind system, ecosystem etc. Our body is also build from 9 systems.

(b) **Fabricated or Artificial System**: Man made system is called fabricated system. In this system, man and machine assemble the entire component to obtain objective. There are many examples of this type of systems. All the system is artificial except natural systems.

Example:

19 It is a series of water waves caused by the displacement of a large volume of a body of water, typically an ocean or a large lake. Earthquakes, volcanic eruptions and other underwater explosions (including detonations of underwater nuclear devices), landslides, glacier calvings, meteorite impacts and other disturbances above or below water all have the potential to generate a tsunami.

7. Computer system: It is also an artificial system in which all the components like as input unit, processor and output unit are busy to process data.

8. Business organization: The business organization is a system made from many sub-systems to obtain goal of organization. It has production department, marketing department, purchasing department, advertising and account department. All departments have different functions, but objective is only one to obtain organization goal.

Characteristics of System: The system is an integrated and organized organization in which all components work on same objective. Some important features are:

a. **Organization**: The organization is an organized order of components. So, we can say, a system of an organization of components.

b. **Interaction**: Interaction among components is common thing in system. Each component interacts for each other.

c. **Interdependence**: All components depend on each other.

d. **Integration**: The theme of integration is “we are one”. All components are integrated to obtain system objective.

e. **Objective**: All systems have its own objective. For instance, soap manufacturing system’s objective revolves around the soap manufacturing, advertising, marketing, sale and market research.

2. System Professional Development

A long queue software development professional is employed in software industries or system consultancy. Like a film, only hero and heroine are highlighted, all gone behind the curtain. In software industries also, system analyst and programmers are highlighted.

(a) **System Analyst**: System analyst is a post of high status and highly paid. He/ She is highly responsible for system development.

The attributes of System analyst:

- **Highly qualified**: A system analyst is a highly qualified person with unique skills. He/ She may be higher degree in computer/ management science with work experience.
- **Knowledge of Organization**: He/ She must have enough knowledge of relevant organization for which he/ she is going to develop system.
- **Knowledge of Computer**: He / She must be rich in knowledge of computer hardware and software.
- **Communication**: The ability of motivation, verbal, written and listening skills are necessary attributes of System analyst. He / She must be expert speaker and command in one international language and regional language.
- **Good interpersonal relation**: The good personal relation offers opportunities. So, system analysts have to make good environment all round themselves.
- **Analytical mind**: It is also a very important condition to work as system analyst. The analytical brain will help to analyze problem quickly and progress becomes easy.
- **Common Sense**: System analysts have to apply common sense in many situations. Now, I am presenting example of common sense always seen in rural area. Once a bone of fish is anchored in throat of a child, surgeon suggested that without operation there is no way of remedy, but villager comes and given bitten rice to chew and shallow. The bone also swallowed with bitten rice. The merely bookish knowledge is not enough for the post of System analyst.

VIII. RESUMEN

Este estudio tiene como objetivos investigar como las escuelas bilingües de la Comunidad de Madrid están desarrollando su trabajo y si éstas utilizan la Teoría de Inteligencias Múltiples como herramienta para facilitar el aprendizaje. Gardner describe ocho inteligencias, son ellas: inteligencia lingüística, inteligencia lógico-matemática, inteligencia corporal-kinestésica, inteligencia musical, inteligencia (visual)-espacial, inteligencia interpersonal, inteligencia intrapersonal e inteligencia naturalista. Nuestro trabajo se centra en la inteligencia corporal-kinestésica. Una hipótesis propuesta es que debido al hecho de que el ballet clásico parece ser la danza más exigente técnicamente, puede que trate más intensamente con más inteligencias que otras danzas; por lo tanto el ballet puede ser más efectivo cuando usado para enseñar otras asignaturas escolares, en contraste con el flamenco, en este estudio.

La primera parte de este estudio analiza el trabajo que viene siendo realizado por profesores, alumnos y auxiliares lingüísticos. Para ello, hemos distribuido cuestionarios y observado clases.

La segunda parte de nuestro estudio amplía la investigación para descubrir si los bailarines clásicos y bailaores tienen una mejoría significativa en las áreas de fonética y química cuando entrenados con el auxilio de la danza clásica y flamenca. Ambos grupos serán comparados al grupo control (grupo con alumnos de Secundaria que recibirán el mismo entrenamiento a través del método tradicional).

Finalmente, tras analizar los datos, hemos detectado que los profesores no son conscientes de las inteligencias Múltiples y de sus beneficios al aula. Aunque los profesores a veces utilizan música y baile en sus clases, la razón es meramente para motivar los alumnos. Con relación a los exámenes, todos los profesores están de acuerdo que éstos son importantes. Más del 90% no utilizan únicamente el libro texto pero también otros medios, como el internet. Hemos constatado que los profesores conocen el límite entre lengua y contenido; es decir, ellos saben si el alumno no obtuvo éxito en el examen debido a falta de conocimiento lingüístico o porque ellos no dominan el contenido. Una media de

85% de los profesores tiene reuniones semanales para discutir sobre la evolución de los alumnos. Aunque algunos profesores aún necesiten entrenamientos para mejorar su competencia lingüística, todos se sienten cómodos para enseñar el L2. Con respeto a los auxiliares de lengua, vimos que los programas BEDA y el Instituto Franklin poseen auxiliares más preparados, comparado a los de la escuela pública. Tanto BEDA como Instituto Franklin entrenan sus auxiliares por un año y estos son más conscientes de principios de las Inteligencias Múltiples que los profesores, ya que el 80% de los asistentes del Instituto Franklin consideran los puntos fuertes y las debilidades de los alumnos. Tocante a los alumnos, 40% de los alumnos de la escuela pública y todos los alumnos del BEDA se benefician de música y danza en sus clases y todos los alumnos sin excepción aprecian aprender a través de estos auxilios artísticos. El hecho de que la mayoría de los alumnos entienden sus clases de inglés y todos han podido entender y contestar a nuestro cuestionario en este estudio redactado en inglés, demuestra que el programa bilingüe implantado por la Comunidad de Madrid es efectivo para enseñar un segundo idioma y son capaces de expresarse en el segundo idioma también. Sin embargo, la mayoría de los alumnos tiene un fuerte acento español.

Como demuestran los resultados de la segunda parte de nuestro estudio, el entrenamiento es una forma efectiva de mejorar tanto la pronunciación de la lengua extranjera como la asimilación de los conocimientos de química. Se puede observar una gran mejoría después de los post-tests, principalmente en los grupos experimentales en los que la danza fue utilizada como un potente estímulo para ayudar a los alumnos a comprender mejor los contenidos. Tras realizar los análisis de la varianza ANOVA, hemos detectado que existe una diferencia significativa entre el grupo de control y los grupos experimentales en el entrenamiento de química; así pudimos rechazar la hipótesis que arguye que no hay diferencia entre ambos grupos. Es decir, los grupos experimentales obtuvieron resultados considerables y superiores comparados al grupo control. En el entrenamiento de fonética, hemos detectado que existe una diferencia significativa entre los tres grupos. Es decir, el grupo control obtuvo resultados inferiores comparados a los otros dos grupos experimentales: el grupo experimental 1, compuesto de bailarines clásicos, obtuvo una diferencia significativa frente al grupo experimental 2, compuesto por bailarines

de flamenco. Los resultados del entrenamiento de fonética confirma nuestra hipótesis de que debido al hecho de que el ballet clásico parece ser la danza más exigente técnicamente, es más efectivo que el flamenco, cuando se utiliza como instrumento para enseñar otras asignaturas escolares. En los resultados del entrenamiento de química, el grupo experimental 1 obtuvo resultados ligeramente superiores al grupo experimental 2. No obstante, éstos no son estadísticamente significativos, lo que nos impide de confirmar nuestra hipótesis inicial de que el ballet clásico es más efectivo que otras danzas por supuestamente trabajar con más inteligencias. Sin embargo, hemos constatado que ambos flamenco y ballet pueden auxiliar los alumnos a aprender otras asignaturas.

El presente estudio y aquellos que seguirán son un inicio necesario de una línea de investigación que no solamente demuestre el fuerte vínculo que existe entre las Inteligencias Múltiples y el aprendizaje, sino también la influencia de otros factores que faciliten este último. En este sentido, también deberían de ser analizadas las habilidades cognitivas y atributos personales de los alumnos también pueden ser explorados. En resumen, este estudio supone un primero paso a lo que esperamos que sea una extensa línea de investigación sobre Inteligencias Múltiples en las escuelas.