

Multiple Intelligences and Curriculum Implementation: Progress, Trends and Opportunities

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Abstract

This paper describes the qualitative results of a study that aimed to identify developments, trends and opportunities for innovation in relation to the theory of Multiple Intelligences (MI) applied to the curriculum. A systematic review of the literature was conducted, using a strategy based on the snowball selection technique and a rigorously search strategy. The sample consisted of 244 publications produced between 1983 and 2015. The results obtained allow to identify the advances in terms of teaching models based on the theory; roles and actions that a teacher inspired by this approach applies; educational activities and teaching resources; criteria, strategies and instruments of assessment and; application experiences in real contexts. From this, the state of research is analysed and evidence-based theoretical elaborations are generated with a clear practical guidance.

Keywords: multiple intelligences, pedagogy, curriculum, systematic review.

Resumen

El presente artículo describe los resultados cualitativos de un estudio que tuvo como objetivo identificar desarrollos, tendencias y oportunidades de innovación en relación con la teoría de Inteligencias Múltiples (IM) aplicada al currículo. Se llevó a cabo una revisión sistemática de la literatura, por medio de la técnica de selección bibliográfica por bola de nieve y el uso de una estrategia de búsqueda rigurosamente definida. La muestra estuvo compuesta por 244 publicaciones, producidas entre 1983 y 2015. Los resultados obtenidos permiten identificar los avances en términos de modelos de enseñanza basados en la teoría; roles y acciones que aplica un docente desde este enfoque; actividades pedagógicas y recursos didácticos; criterios, estrategias e instrumentos de evaluación y; experiencias de aplicación en contextos reales. A partir de ello, se pone en evidencia el estado de la cuestión y se generan elaboraciones teóricas con proyección práctica y basadas en la evidencia.

Palabras clave: inteligencias múltiples, pedagogía, currículo, revisión sistemática.

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Introduction

Conceiving the development and cognition from a broader, more integrated and comprehensive perspective from the one considered at that time, Gardner (1983) proposed the theory of Multiple Intelligences (MI), whose definition of intelligence was reformulated in 1999, understanding it as "psychobiological potential to process information that can be activated in a cultural setting to solve problems or create products that are valued within that culture"(Gardner, 1999, p. 33). In this sense, it is acknowledged that all intelligence "is activated or not based on the given values of a determined culture, the opportunities available in that culture and the decisions taken by each person, family or teachers, and others" (Pérez-Sánchez & Beltrán-Llera, 2006, p. 149). This idea of a neurobiological support for the theory is argued along the texts that describe it and studies such as the one conducted by Sierra-Fitzgerald and Quevedo-Caicedo (2001), that point to it as "a neurocognitive theory based upon neurological, evolutionary and transcultural testimonies" (p. 1061).

Now, as far as education is concerned, an emphasis has been placed on the benefits of the same regarding the strengthening of teaching-learning processes; promoting a diversity-centered approach; improvement of school-family-community interactions; and inspiration for the creation of effective instruments, projects and experiences (Ferrándiz-García, 2005).

In the background, the theory of multiple intelligences requires to generate a fundamental shift in the way schools are structured. This gives educators around the world the strong message that all students that show up in schools at the beginning of each day have the right to live experiences that activate and develop all their intelligences. During a typical school day, every student must be exposed to courses, projects or programs that focus on the development of their intelligences and not just in standard verbal and logical skills that for decades have been exalted (Armstrong, 2009, p. 122).

A curriculum based on this theory integrates the teaching-learning processes and evaluation with the development of the intelligences, resulting in integrated and meaningful processes (Fogarty, & Stoehr, 2008). In addition to fostering rich experiences, it constantly provides inputs for a continuous monitoring while also generating a direct involvement with the material and objectives in a contextualized manner (Moran, Kornhaber, & Gardner, 2009).

So well, starting from this, it is important to know about how the theory is applied to curriculums and educational settings and, in that order of ideas, the current project establishes its object of study (see Figure 1) and formulates as general objective: Identify progress, trends and innovation opportunities regarding the application of MI theory as favorable for implementation processes in the curriculum in educational contexts. Hence, the specific objectives are: (1) Describe the components, contributions and implications of the applied theory in school settings; (2) Identify the state of affairs regarding pedagogical, didactic and instrumental experiences based on the same, and; (3) Generate awareness about trends and lines of work to be explored.

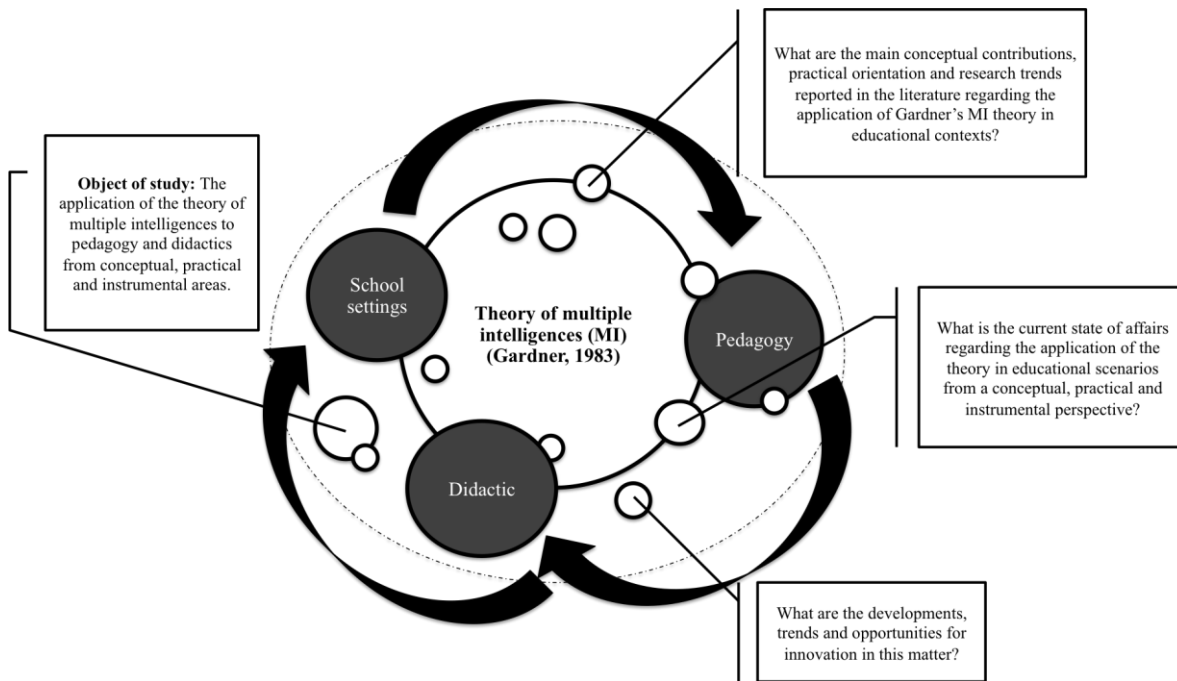


Figure 1. Establishment of study objective.

Method

Type of study

The current study, a systematic review of the literature, is defined as "a systematic, explicit and reproducible method to identify, evaluate and synthesize the existing body of work performed and recorded by researchers, academics and professionals". This is a "synthesis of the available evidence" as representing a "study of studies" (Manterola, 2009, p. 897).

Sample

The sample consists in 244 publications or analysis units, whose inclusion came from the three stages that are described in Figure 2 and whose characteristics are observed in Figure 3.

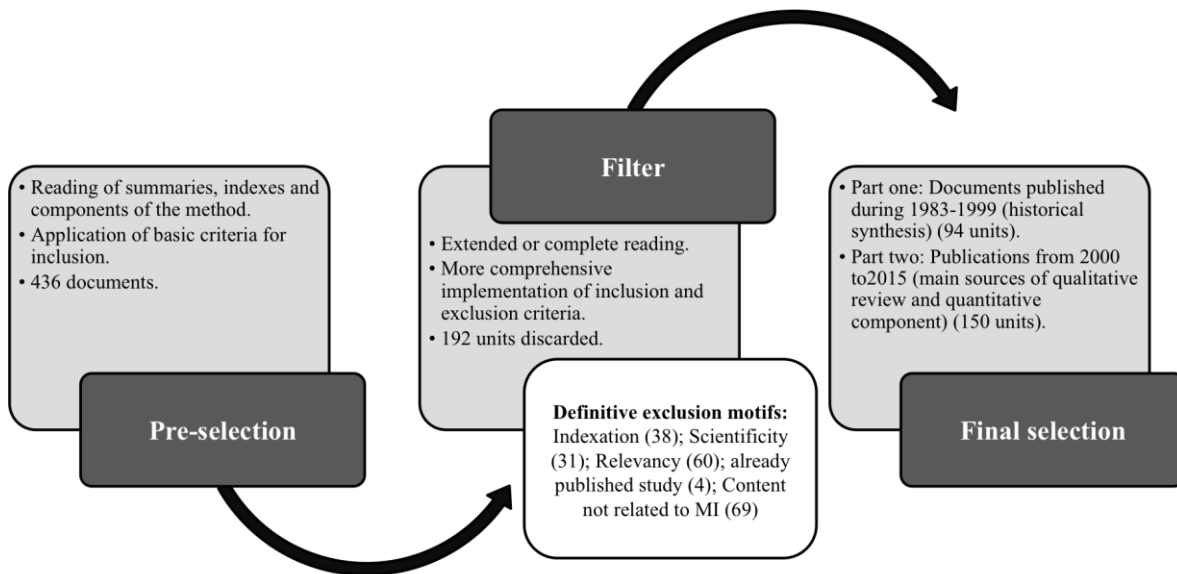


Figure 2. Stages for sample selection.

Publications made between 1983 and 1999 are contemplated as historical synthesis, and from 2000 to 2015, as the main source of the review (current criteria). Out of these, there are 150 publications, which are the input of the quantitative indicators for the original study, taking here the ones with most qualitative contribution.

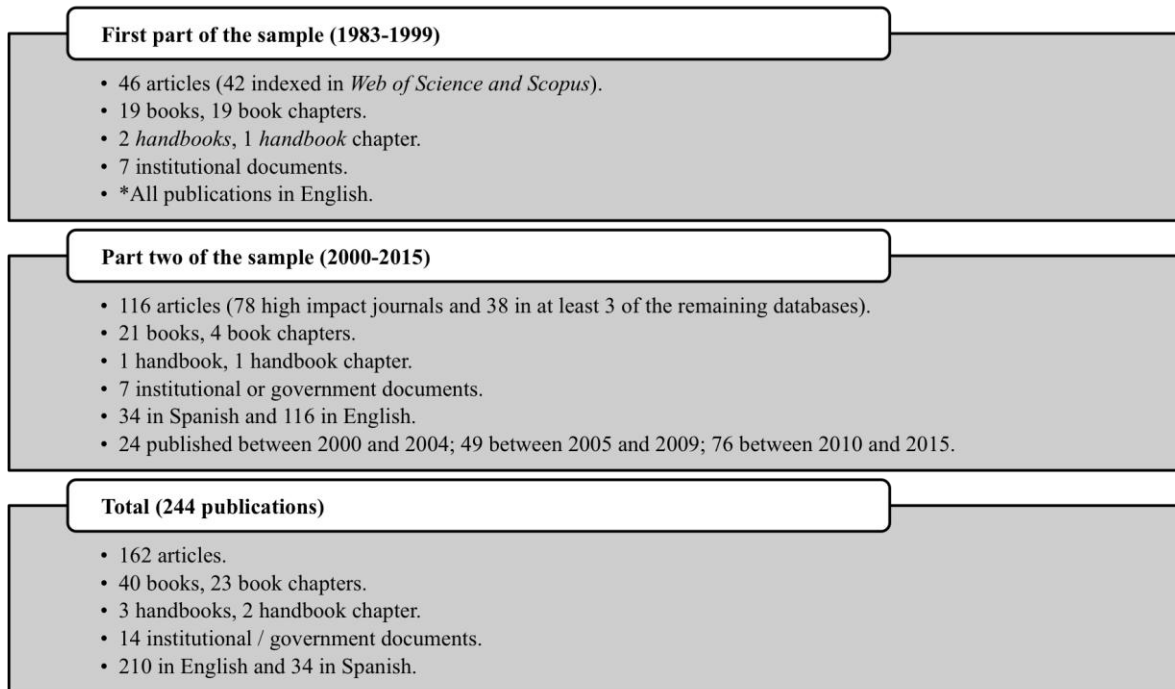


Figure 3. Characteristics of the final sample.

Procedure

Stages

The research was conducted through the stages and actions that are described in Figure 4.

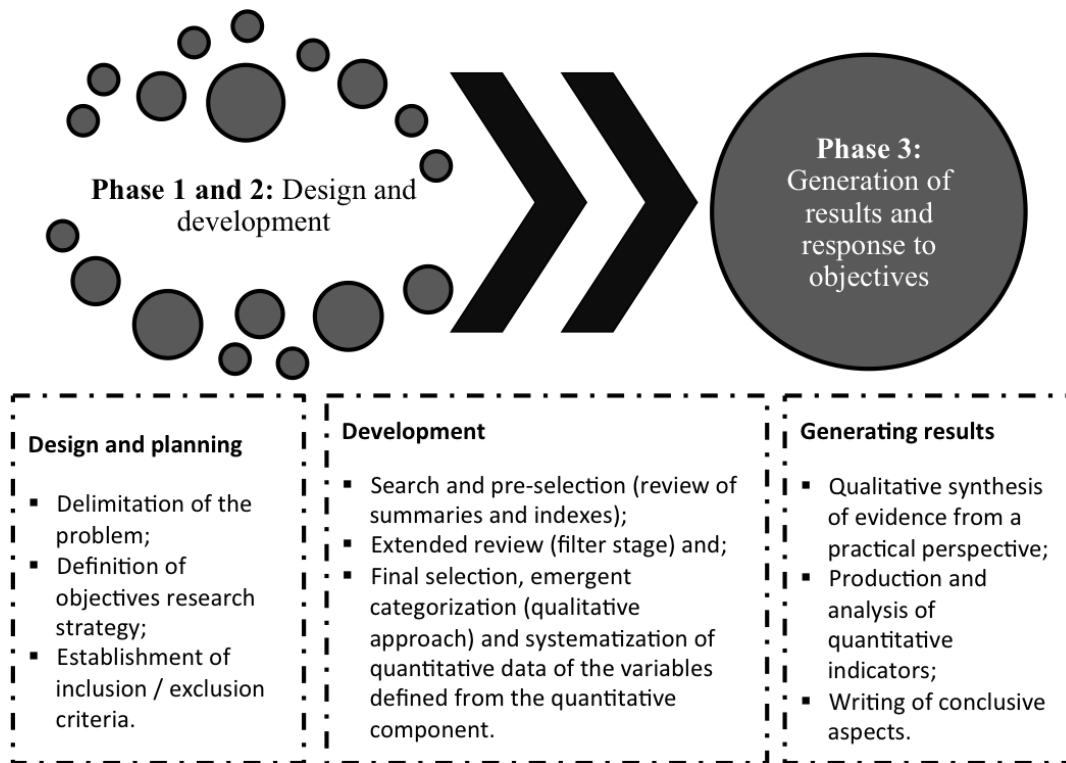


Figure 4. Procedure.

Search strategy and selection criteria

Figure 5 discloses the search process as well as the contemplated inclusion/exclusion criteria. A snowball bibliographical exploration technique was utilized by making use of descriptors (keywords) and logical operators (and, &, or, not) in the databases. The search resources comprehended the access to printed documentation sources and digital media, more specifically to specialized databases (giving priority those with high impact magazines such as *Web of Science* and *Scopus* but also using others with international recognition).

Data analysis

The process involved a qualitative and a quantitative component. In this article, only the qualitative results that were obtained are exposed based upon the categories that emerged *a priori* (presented in Figure 6), whose data was analyzed with the support of the *Atlas.ti* software (v. 7).

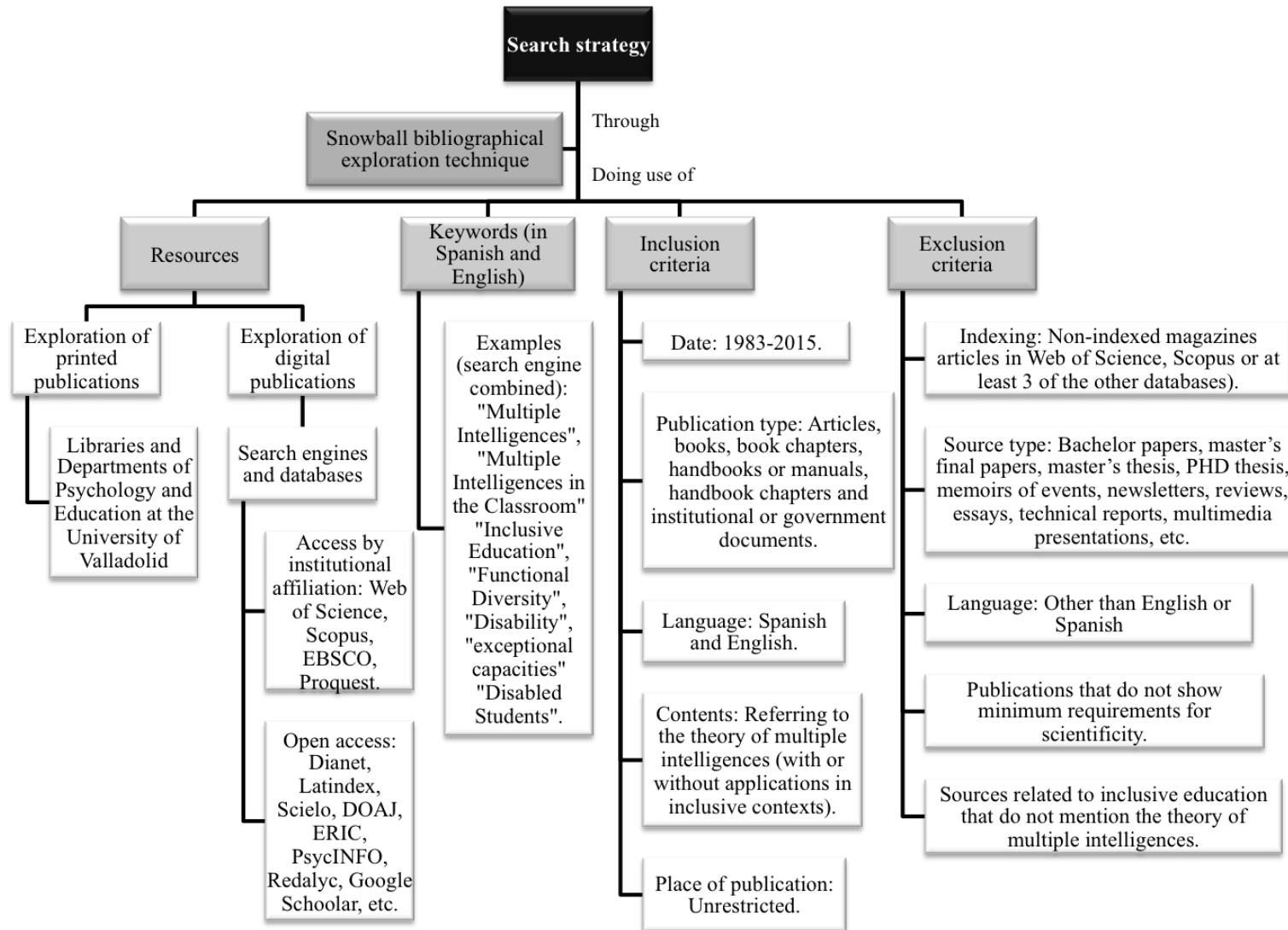


Figure 5. Search strategy implemented.

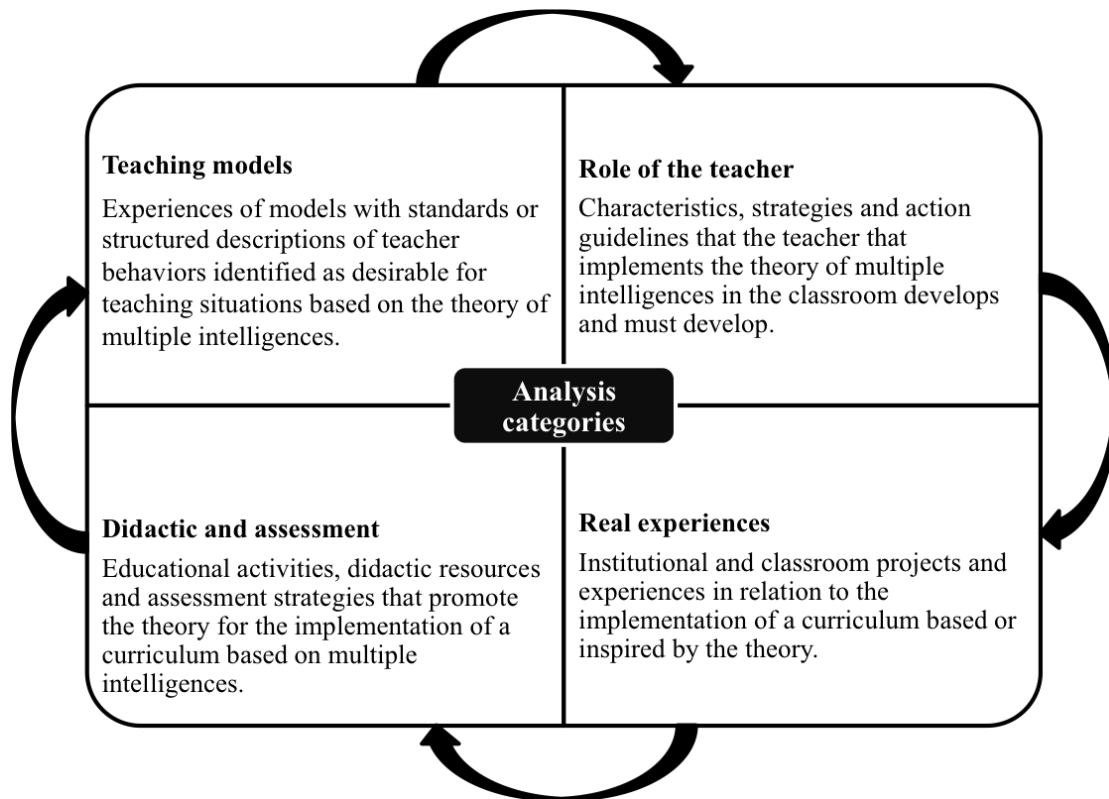


Figure 6. Categories and their definitions.

Results

Since the initial formulation of its ideas, the theory began to generate a series of scientific developments. Figure 7 offers a historical context, taking the period between 1983 and 1999, so –later on- describe the content corresponding to each analysis category, but linking more up-to-date sources. It is noteworthy that the authors mentioned in the figure are exalted in an informative way but its mention does not refer to quotations in this article and, therefore, do not appear in the list of references.

Category 1: Teaching models based on the theory

Three teaching models have been found based on IM, whose synthesis is exposed through Figure 8. Now well, these are of great contribution and their construction is based on methodologically rigorous processes, a striking aspect is that none is quoted in the studies reviewed in this investigation, to which one should ask about the promotion of the application and compilation of empirical evidence as to its effectiveness.

In the case of the Pathways model, this provides evidence of its use in educational settings but described by the author in the original document. Therefore, although this doesn't make the models less valid or relevant, the necessity to detect their presence in other research fields is highlighted.

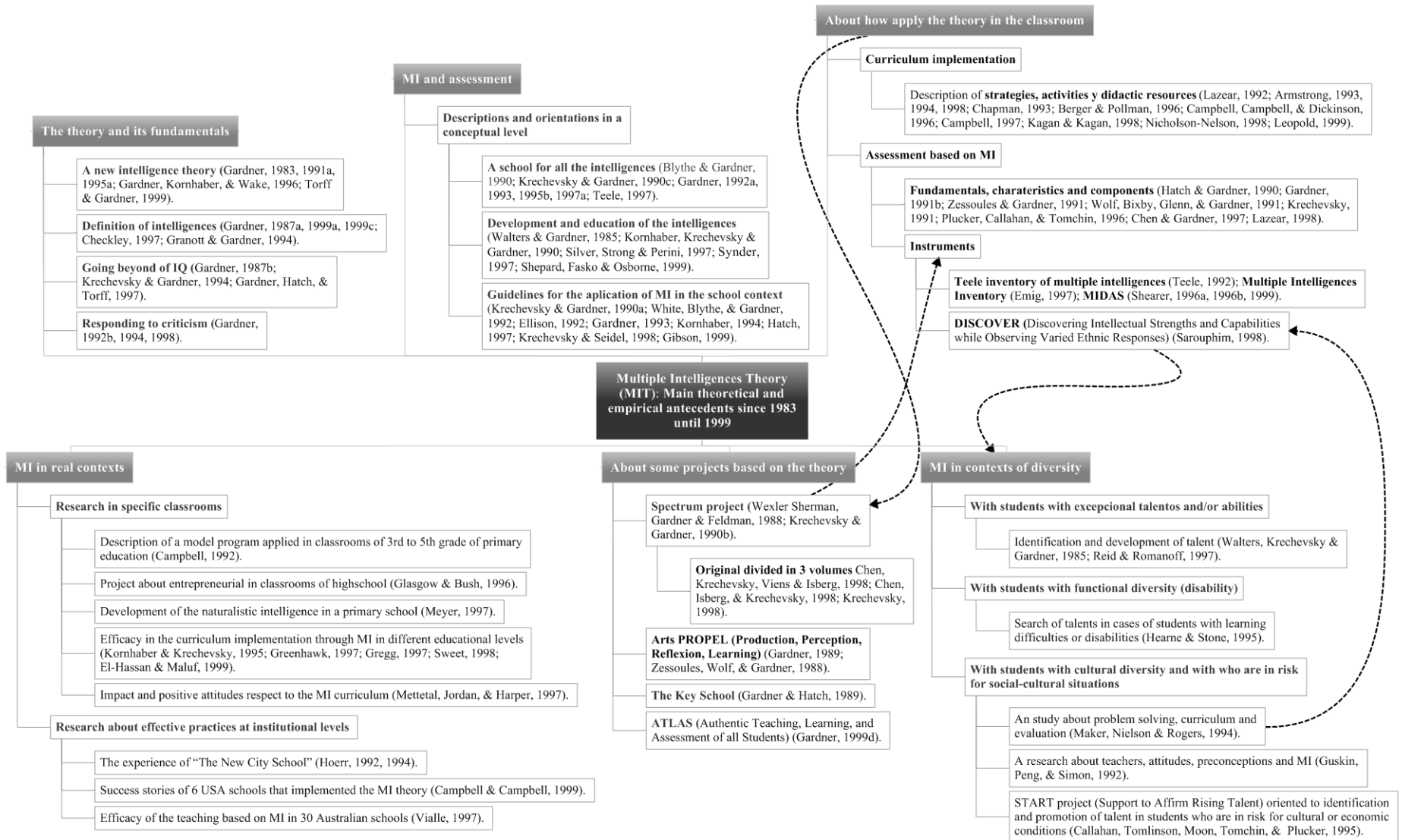


Figure 7. Synthesis of publications between 1983 and 1999.

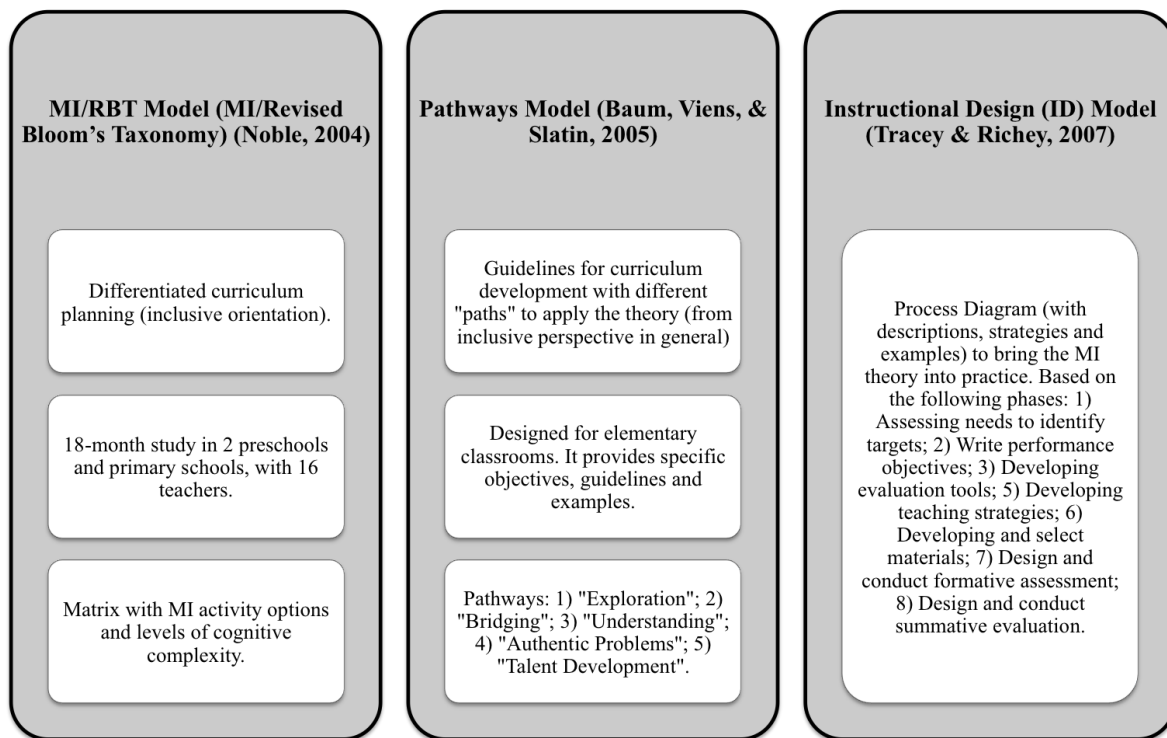


Figure 8. Main features of the found models.

Category 2: Role of teachers

Within this category, different theoretical and empirical productions propose a variety of alternatives to put in practice effective and meaningful teaching processes. From this perspective, some of the traits that were found as characteristics of the teacher who bases his teaching on this are presented in Figure 9. In addition to what's being mentioned in here, it was found the he makes use of specific strategies such as those shown in Figure 10.

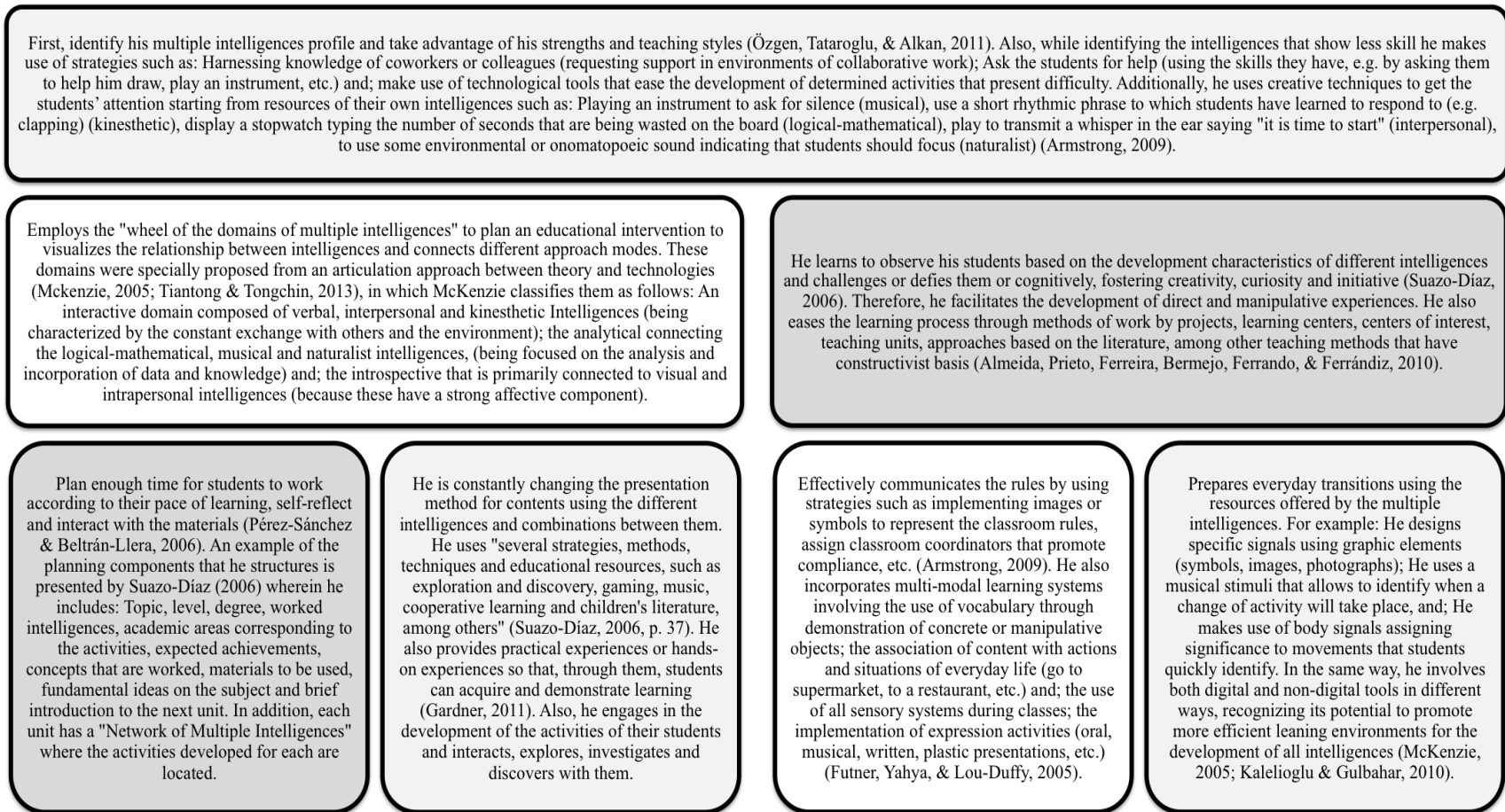


Figure 9. Actions carried out by a teacher based on MI.

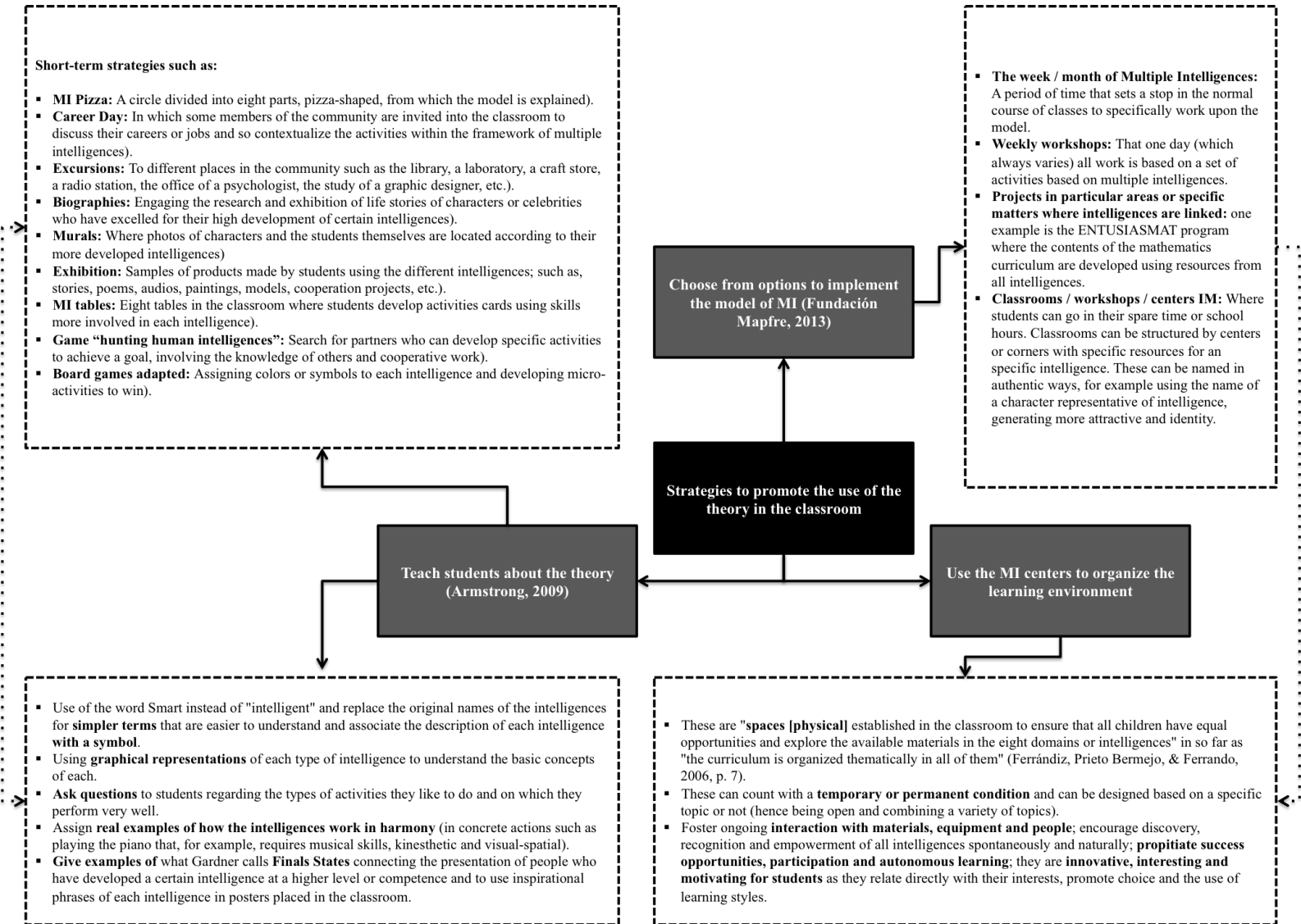


Figure 10. Examples of specific strategies for the classroom.

Category 3: Didactic and assessment

According to what the literature reports, one advantage of the variety of resources offered from the theory is flexibility in its application, which invites to its leveraging from a transversal look. This means that, in a math class, a variety of activities and teaching resources can be used from all intelligences to achieve the goals of the class.

Precisely, in Figure 11 examples of activities and materials are exposed whose use is promoted from the theory for each intelligence but can be combined among themselves. These ideas were taken from publications by authors such as McKenzie (2005); Armstrong, (2009); Phipps (2010); Kalelioglu and Gulbahar (2010); Suárez, Maiz, and Meza (2010); Moore and Hansen (2012); Calik and Birgili (2013); Del-Moral-Pérez, Guzmán-Duque, and Fernández (2014); and Kivunja (2015).

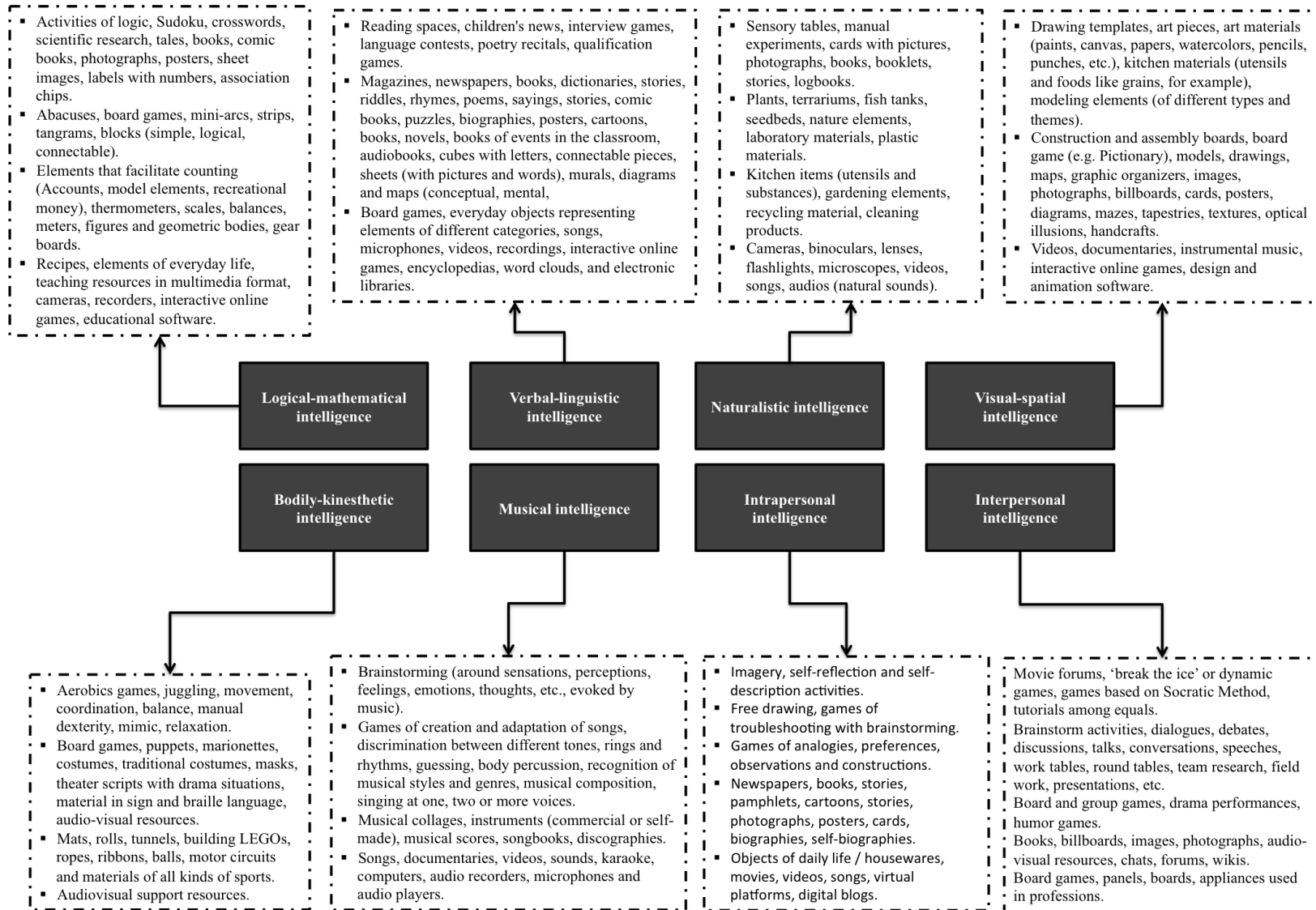


Figure 11. Examples of teaching resources by intelligence.

Meanwhile, in Figure 12 are exposed the principles, benefits, and most relevant processes and resources of a MI-based assessment. As a result, Chen and Gardner (2012) highlight that the key elements for the assessment and profiling of intelligences are: (1) To explore intellectual capacities in a wide range of domains; (2) To use appropriate means based on each domain; (3) Choose significant materials for students; (4) To address the ecological validity of contexts; and (5) Capture intellectual profiles completely in order to support learning and teaching.

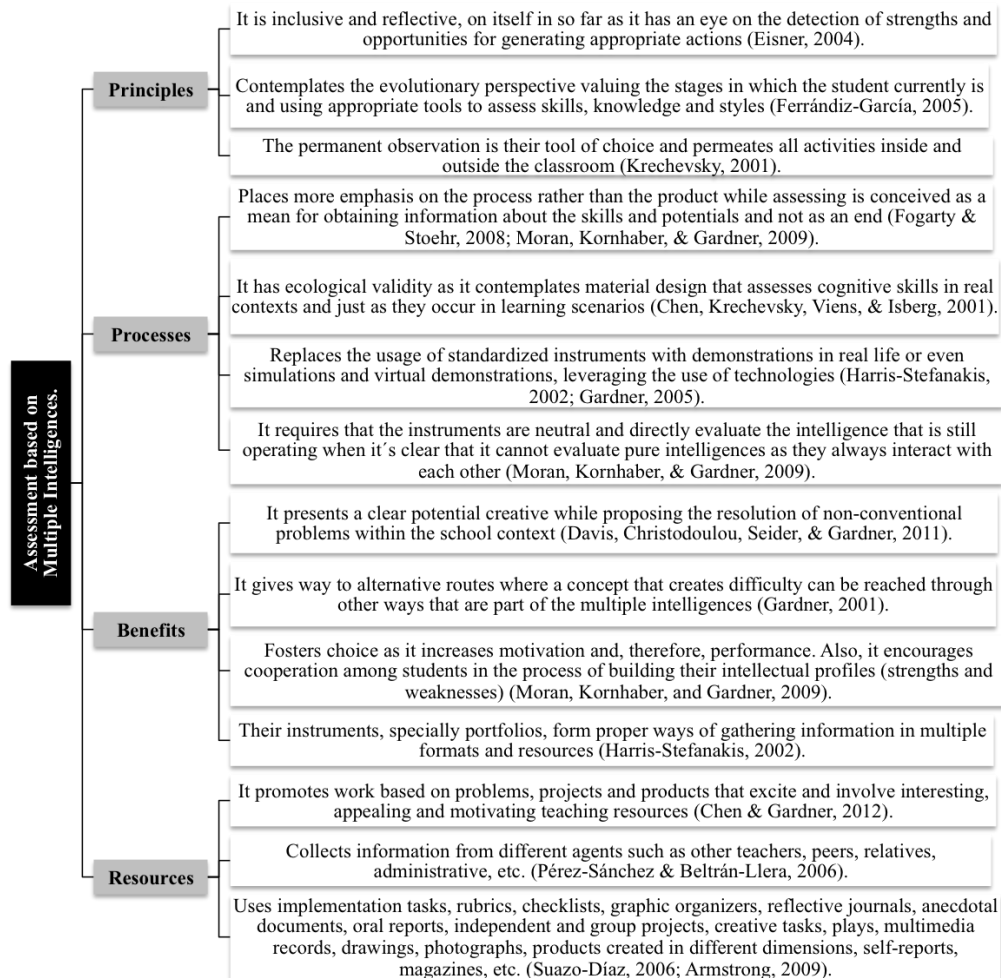


Figure 12. Characteristics of MI-based assessment.

Finally, and even though the very foundations of the theory do not promoted the use of standardized tests from themselves, a count of instruments of measuring / assessment is performed for the identification of intelligences and establishment of cognitive profiles. This, considering that what does guarantee are the efforts to create structured tools that

facilitate the observation and identification of these profiles complemented with other instruments (Chen & Gardner, 2012).

Among the instruments created, and most widely used and spread are: *Spectrum Battery* (Battery Activity Spectrum Project), *The Multiple Intelligences Development Assessment Scales - MIDAS of Shearer*, *McKenzie's Multiple Intelligences Inventory*, *MI Inventory for Adults*, and *Multiple intelligences Checklist for Students* proposed by Armstrong.

Additionally, other instruments with similar characteristics were found, mostly inspired in structure and contents by the above. These are: *The Teele Inventory of Multiple Intelligences*, *Student Multiple Intelligence Profile*, *MI Resources Availability Checklist*, *The Multiple Intelligences Profiling Questionnaire VII*, *Formal Multiple Intelligences Assessment Instruments for 4-6 Years Old Children*, *The Inventory of Class Activities Done in Line With The Intelligence Areas* and *Self-Efficacy Inventory Revised for Multiple Intelligences (MISEI-R)*, which has been validated on several occasions with Argentine students.

Nevertheless, from all of the above, as recognized Chen and Gardner (2012), the MIDAS scales represent the first and largest effort that has been developed from the psychometric field and Gardner endorses its quality as an instrument with evidence of rigor, multidimensionality, transcultural and practical utility.

According to Shearer (2012), the set of scales includes the versions: *MIDAS for KIDS: My Young Child* (completed by parents of children aged 4 to 8 years), *MIDAS for KIDS: My View* (children 8 to 9 years), *MIDAS for KIDS: All about me* (students between 10 and 14 years), *MIDAS for TEENS* (teenagers between 15 and 19 years), *MIDAS for adults* (over 20 years).

Category 4: Real experiences

Projects. Through Figure 13 general aspects of initiatives that have been implemented and count with international recognition are described. The vast majority is from the United States and helps to reveal the benefits that generate building teaching-learning environments based on the theory.

Experiences from institutions. In addition to the projects described, which have been promoted in educational contexts, the literature reports successful experiences of specific institutions that are worth retaking. Their descriptions can be seen in Figure 14.

Spectrum project: It had its origins along with the theory, and from Project Zero at Harvard University. Being created by Gardner and his colleagues, it is the largest project that has been formulated based on the theory and is focused on the implementation of it in the curriculums of the first levels of education (preschool and early primary grades) by also using a context evaluation battery organized from guides based by domain and diverse activities. The applications of the Spectrum project have been documented, validated and replicated by a variety of researchers and educators plus counting with some applications in non-school contexts as well as children museums (reason why even Spectrum created the museum for children project) (Chen, Krechevsky, Viens, & Isberg, 2001).

SUMIT project: Focused on research regarding the various ways in which the theory is applied in schools as well as the assessment of the impacts that have been generated as a result of such applications. It worries about documenting initiatives and practices which demonstrate that the use of the theory is effective in improving the educational experiences of students, especially in contexts with inclusive orientation. It is based on Compass Point Practices, which are conceived as practices that reflect or demonstrate the application of the theory. These are: school culture, preparation or training for members of educational communities, tools, collaborative processes, curriculum choices and the involvement of arts (which play a significant role in schools) (Kornhaber, García-Fierros, & Veenema, 2004; García-Fierros, 2004).

DISCOVER: An assessment project created by Maker and his colleagues in 1987 and inspired by multiple intelligences but focused on the identification of talents. It is developed based on problem-solving strategies using recreational and appropriate material tools according to age (being able to apply in children and adults) in seven intellectual domains: Artistic-Spatial, Spatial-Analytical, Logical-Mathematical, Oral-Language, Written-linguistic, Interpersonal and Intrapersonal. While students perform the exercises, qualified researchers observe, document and assess the performances and behaviors that are used in each task with the aim of consolidating profiles of strengths emphasizing the use of problem-solving skills in each domain (Chen & Gardner, 2012).

Practical Intelligence for School (PIFS): Designed by a group of researchers including Gardner and Stenberg, which aims to provide solutions to everyday problems affecting students in schools. Examples of such problems include difficulty performing tasks and understanding concepts as well as the abandonment of subjects and school failure.

Therefore, strategies that promote the development of "practical intelligence" are promoted (as the ability to understand the environment and the use of that knowledge to find alternatives to achieve specific objectives) (Ferrándiz-García, 2005)

Arts PROPEL: The acronym PROPEL refers to Production, Reflection, Perception and Learning. This project aims to design, implement and validate programs and instruments of teaching and learning assessment of the arts in educational contexts in elementary and high school. It covers the arts from the musical, visual and creative writing fields and in relation to skills connected to production, perception and reflection. Since its inception, it includes an important promotion of the portfolio (called processfolio) as a highly effective assessment tool (Armstrong, 2009).

APPLE project: A research project, whose goal is to create and promote effective evaluation ways with emphasis on the implementation of portfolios in schools (Ferrándiz-García, 2005).

Multiple Intelligences for Adults: Based on the development of evaluation strategies that are proven to be innovative for adult students (Ferrándiz-García, 2005). This project was conceived from the need to foster more initiatives for the application of the theory in adults since, from its inception, it has been specially directed towards children and adolescent population.

EntusiasMAT: A didactic-pedagogical proposal created by Tekman Books and directed towards the learning of mathematics in children aged 3 to 12. Its usage is promoted, for example, at the Montserrat School of Barcelona or La Inmaculada at Bilbao, and is conceived as a way to effectively apply the principles of curricular flexibility that promotes the theory (Fundación Mapfre, 2013). This initiative incorporates the core competencies of multiple learning intelligences promoting learning situations of mathematical contents through resources propitiated from the eight intelligences (so that students can learn the same content from different perspectives).

Figure 13. Most known macro-projects.

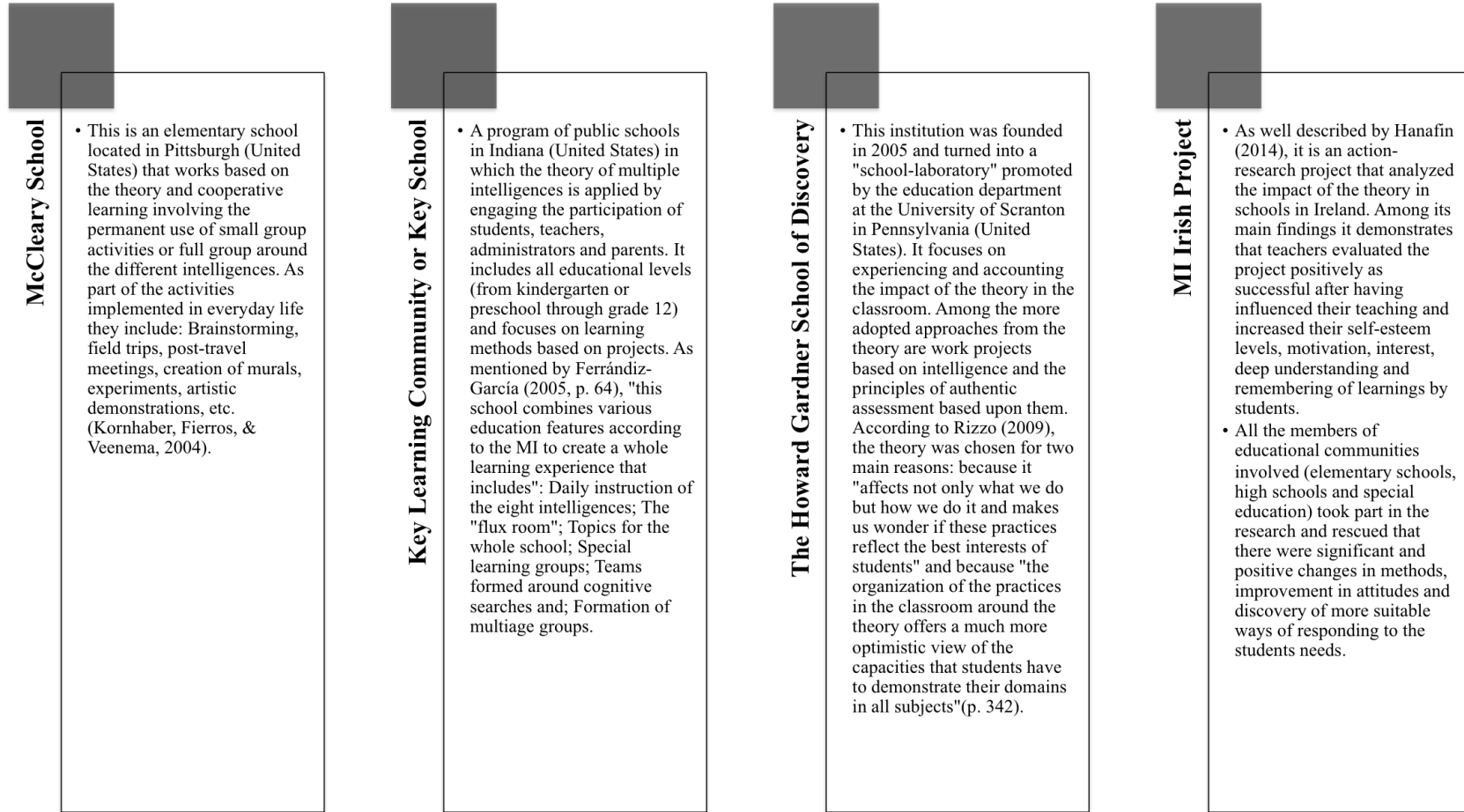


Figure 14. General aspects of institutions inspired by MI.

Classroom experiences. The theory has been applied in a variety of classrooms and counts with researches that evidence their effectiveness, either from all subjects at kindergarten level (Bulut-Pedük & Baran, 2009; Carlisle, 2001) and elementary school (Smigiel, McKersie, Kimber-Parent, & Geisel, 2004; Temiz & Kiraz, 2007; Tithi & Arafat, 2012; Varela-Calvo & Plasencia-Cruz, 2006), or from specific curriculum areas such as mathematics (Ferrándiz, Bermejo, Sainz, Ferrando, & Prieto, 2008; Temur, 2008), arts (Groff, 2013; Larenas-Parra, 2005), geography (Uzunöz, 2011); language (non-foreign) (Carrillo-García & López-López, 2014; Kayiran & Iflazoglu, 2007) and science (Abdi, Laei, & Ahmadyan, 2013; García-Hernández, 2006; Karamustafaoğlu, 2010; Kaya, 2008; Özdemir, Guneyisu, & Tekkaya, 2006; Saban, 2011; Santos-Rhodes, 2009; Ucak, Bag, & Usak, 2006). In all these cases, studies focus on demonstrating the effectiveness of educational interventions based on MI.

Regarding university environments, the approach has been mainly on the establishment of intelligence profiles of the students (Ekici, 2011), in the usage in the processes of career training / guidance (Shearer, Branton, & Luzzo, 2009) and, mostly, its usefulness for teaching English as a foreign language. As a result, the approaches can be grouped into studies that:

- Demonstrate an improvement in attitudes and academic performance from the use of teaching methods and tools based on MI (Bas & Beyhan, 2010; Dung & Tuan, 2011; Halley-Hall, 2004; Mirzaei, Jahandar, & Khodabandehlou, 2014; Pour-Mohammadi, Zainol-Abidin, & Bin- Yang-Ahmad, 2012; Soleimani, Moinzadeh, Kassaian, & Ketabi, 2012);
- Connect the intelligences with the effective use of learning strategies of a second language (Akbari & Hosseini, 2008; Hajhashemi, Shakarami, Anderson, Yazdi-Amirkhiz, & Zou, 2013; Mirzazadeh, 2012; Mirzaei, Domakani, & Heidari, 2014; Mohammad-Moheb, 2013; Panahandeh, Khoshkhoonejad, Mansourzadeh, & Heidari, 2015; Rahimi, Mirzaei, & Heidari, 2012);
- Inquire about relations between population variables (such as gender, parental education, etc.), types of intelligence and domain of foreign language skills (Hajhashemi, Akef, & Anderson, 2012; Jokar & Hesabi, 2014; Sarıcaoğlu & Arıkan, 2009; Zarei & Mohseni, 2012) and;
- Analyze the limited presence of MI in texts or schoolbooks (Abbasian & Khajavi, 2012; Al-Omari, Bataineh, & Smadi, 2015).

From the aforementioned, it can be inferred that most of the found studies demonstrate the effectiveness of interventions conducted in curriculum areas of science (basic and secondary education) and teaching English as a foreign language (in higher education). As for the latter, most are quantitative studies (quasi-experimental), developed in Iran and Turkey, demonstrating a trend towards the object of study, and in these places.

It should also be noted that the sources found for the last century were the ones previously mentioned, thus arises the need to further research in classrooms since the

number of publications is low in terms of what would be expected for the theoretical support that indicates the applicability of the theory in pedagogical contexts.

Discussion

Undoubtedly, the theory of multiple intelligences has many benefits and potential for the implementation of the curriculum. This is demonstrated by the results of the present research, from which the main components, contributions and practical implications of it were synthesized and represented, detecting specific pedagogical, didactic and instrumental experiences. These, responding to the objective in terms of identifying progress towards, in that order of ideas, propose trends and lines of work to be explored and strengthened.

This theory, among other things, is defined as an educational tool rather than a goal in itself, and has to do with what good teachers have always done in their teaching, which is to go beyond the text and the board to awaken the minds of his students (Armstrong, 2009).

To do so, it promotes the use of different materials, different methodologies and flexible educational models (Gardner, 2001; Stanford, 2003). This, noting that "the curriculum should be organized conceptually, providing an integrated education from prior knowledge of the needs and interests of students and their strong intelligences as well as develop critical thinking, emphasize the exploration, discovery and creativity" (Suazo-Díaz, 2006). Hence, in concrete terms, the main educational implications of the theory are associated with this:

- It proposes that various types of intelligence result in different forms of education, and that any considerable difficulty can be modified in order to present a concept or system of thought (Gardner, 2001). Thus, "having so many different ways of learning and teaching, the possibility of improving academic performance obviously multiplies" (Pérez-Sánchez & Beltrán-Llera, 2006, p. 152).
- Learning power; minimizes behavior problems; increases self-esteem; develops cooperation and leadership skills, and increases the interest and dedication of students (Suárez, Maiz, & Meza, 2010).
- According to Pérez-Sánchez and Beltrán-Llera (2006), it has a wide reach as so far as it connects observation, coping and systemic approach (which, in turn, includes access paths (intelligences), instructive analogies (based on material already understood) and an approach of styles used by teachers). They also consider that although "the teacher cannot accommodate to all the different learning styles", "it may itself show to each of their students how to use their more developed intelligences to better understand material which normally employs their weaker intelligences" (Pérez-Sánchez & Beltrán-Llera, 2006, p. 155).
- It does not imply to design eight different educational programs for each class, or to increase indefinitely the contents of the curriculum. On the contrary, it claims that those elements that are truly significant and that are addressed from different points of view are selected. The interest is always the depth against the extension, and understanding over mechanic memorization (Pérez-Sánchez & Beltrán-Llera, 2006).

- It represents a coherent and beneficial model for the development of skills in individuals (Escamilla, 2014) In fact, as noted by García-Retana (2012), "the educational model based on skills can be improved if you take into account the perspective of multiple intelligences, in a joint that contributes to the performance of the individual in a creative and enriching way, capable to know, interpret and transform reality, also taking advantage of the development of ICT" (p. 2).
- The role of teachers in classes based on the theory "differs in a very strong way from the teacher in the traditional classroom. In the traditional context, the teacher stands in front of the class, gives the lesson, writes on the blackboard, asks questions to students and expects them to complete their tasks. At the IM classroom, the teacher -far from following a straight exhibition script - constantly changes its method of presentation, from the musical language field, to the logical-mathematical, and so on with all the intelligences, combining them imaginatively" (Pérez-Sánchez & Beltrán-Llera, 2006, p. 156).

Research has shown that the theory has generated changes in the concept of curriculum; improvements in self-confidence of students and teachers; increased interest and enthusiasm towards participation; decreased absenteeism and lack of discipline; increase of school-environment relationships, which is reflected in the exchange of resources; increased involvement of parents and communities (Chen, Isberg, & Krechevsky, 2001).

Nevertheless, it is identified the necessity to create more teaching models as well as more empirical evidence related to objects of study different from the establishment of cognitive profiles, instrument validation and verification of the effectiveness of the theory for teaching foreign languages. What this mean is, it is observed that investigations performed around the application of the theory in the curriculum are reduced in proportion to what could be done. Therefore, validation of specific classroom experiences in the different curricular areas is recommended. This, in terms to demonstrate the reach of the theory and the applicability in different fields of knowledge and for several purposes.

On the other hand, this theory proposes a model that has to do with the ongoing assessment of the development of skills in different cultural environments and is based on an applicable structure to any educational situation, always being aimed at promoting chances of success (Chen, Moran, & Gardner, 2009). However, according to what has been found, more tools and instruments are required to ease the implementation of the theory, taking special advantage of its benefits for inclusive contexts (Stanford, 2003).

Although several of the instruments described make explicit that their applications are useful in the context of inclusion, it is noteworthy that none of the cases is specifically aimed to favoring adaptation processes or curricular flexibility for people with learning and participation barriers. In consequence, by example, the creation of tools with pedagogical projection and systematization of experiences connecting theory with the fundamentals of universal learning design is required.

It is clear that this is a high relevance approach as it encourages the foundation for the implementation of policies, curriculum and programs aimed at promoting the development

of the intelligences, where the most prominent abilities are used as means to acquire knowledge in any area (Eisner, 2004). Meanwhile, another possibility for innovation is the design and validation of MI-based models for teacher training, as well as the implementation of projects that combine its principles with other approaches and demonstrate more and less, efficient and effective joints. In addition, it is necessary to conduct a research on the subject outside the United States; it is to disseminate experiences carried out in countries and settings in which the theory has not been widely explored.

From the above, the invitation is to use these results as a tool for improving teaching, regular and inclusive processes, for the generation of alternatives and the implementation of the contents here synthesized. From the methodological perspective, in the case of systematic reviews, it is important to consider the limitations that appeared in this case; especially due to the exclusion of sources that could have been complemented or expanded the findings, and the language criteria for the inclusion of the documents (which was restricted to English and Spanish). In the same way, even though the considered sample was large, the invitation is to add a larger amount of sources in future studies as well as to contemplate other criteria or variables for analysis.

Finally, an invitation is being made to researchers in terms of develop and strengthen this and other associated lines of research. Also, to connect different objects of study as well as other methodological designs to continue to create knowledge around a theory of great relevance and projection in education: The theory of multiple intelligences.

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