El modelo Flipped Learning y el desarrollo del talento en la escuela

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Abstract

Education systems and, therefore, schools, have essentially been based on the criterion of grouping students by age. However, this approach makes it difficult for teachers to cater for each student's unique, individual needs, which need to be addressed in order to maximise personal development.

The further the students are either above or below the «standard» age group profile, the more serious this situation becomes. Such is the case of the more able students, whose specific cognitive and non-cognitive abilities are brought to light through differentiated attention, with particular mention of precociousness and pace of learning.

The analysis of the development of more able students is conducted from a developmental approach. The students' most relevant characteristics are presented and a study is made of the possibilities of a teaching and learning model that puts students back in the driver's seat so that they really own their own learning. This opens up the possibility of learner development that is in line with each student's specific pace and depth of learning and which allows, at least in theory, each student to work through the curriculum at the pace permitted by his/her ability and level of mastery. This paper considers the Flipped Classroom model in detail and assesses the data for the effectiveness of this model, provided

by the most recent research work, whilst also making a comparison between other related models such as blended learning and universal design for learning. All these models are clearly focussed and designed for personalised learning. Finally, an analysis is made of the talent development possibilities offered by this model, not only with regard to the more able students but to students in general.

Resumen

Los sistemas educativos y, por tanto, la escuela, se han basado fundamentalmente en el criterio de la edad para agrupar a sus alumnos, lo que tiene un efecto indeseado en la atención a las diferencias singulares de los estudiantes que son relevantes para atender a su desarrollo personal.Este hecho es particularmente grave cuanto más se apartan los alumnos de las características "típicas" de su grupo de edad, ya sea por defecto o por exceso. Tal es el caso de los alumnos más capaces, cuyas peculiaridades, particularmente las cognitivas, se presentan a la luz de una atención diferencial. Entre ellas se destacan la precocidad y la velocidad de aprendizaje.El análisis del desarrollo de los alumnos más capaces se lleva a cabo desde una concepción evolutiva, se presentan sus características más relevantes y se estudian las posibilidades de un modelo de enseñanza y aprendizaje que recupera para el alumno un papel central convirtiéndolo en protagonista de su propio aprendizaje, de manera que se abre la posibilidad a un desarrollo de los aprendices que respeta su ritmo y profundidad de aprendizaje y les permite, al menos teóricamente, desplazarse por el currículo a la velocidad que su capacidad y nivel de dominio les permite. El modelo de aprendizaje inverso o *flipped classroom* se analiza con detalle y se valoran los datos de la eficacia del mismo aportados por la investigación más reciente, al tiempo que se relaciona con otros modelos vinculados, como el aprendizaje mixto y el diseño universal de aprendizaje. Todos ellos con una concepción y orientación clara hacia la personalización del aprendizaje. Se analizan, finalmente, las posibilidades de este modelo para el desarrollo del talento, no solo de los más capaces sino de todos los alumnos.

Introduction

The age in which we live is marked by major changes which, although perhaps more technological than pedagogical, are affecting education,

schools and the methodological models used. Our present-day society has been called the knowledge society, information society and digital society (Tourón, 2001). There is no doubt that digital technology is exerting a decisive influence on our lives and on the educational world in particular. Periodic reports from European bodies and foundations all highlight the rapid progress towards the digitalisation of society (Cf. e.g. Fundación Telefónica; Fundación Europea para la sociedad de la Información; CDE, 2013).

Education and schools are inextricably linked to these changes. As Tourón indicated (2014a,b), if learning is mobilised, then so is education. In fact, what is known as *mobile learning* has now become a reality that is evident in many school children. The figures for the incorporation of technology into the educational world are rising steadily, although it is not altogether certain whether the pedagogical model can actually keep pace with technological progress and adapt to the new possibilities offered, often being a mere substitute for analog technology.

As we recently indicated, technology should be considered as a tool, not as a learning result (Tourón, Santiago and Díez, 2014). What we need to ask ourselves is: which school model do we actually want or need? And then, how can this model be promoted and which technologies can help to do so?

The fact that the current school model is excessively based on teaching and not on learning is something that does not go unnoticed. The model that we have become accustomed to from time immemorial is a reproduction model in which there is little place for individual needs or differences.

It is remarkable that a model of this nature has prevailed for so long and with scarcely any changes or adaptations, whilst the data available demonstrate its low effectiveness. A well-known study conducted at the University of Columbia and presented by Blackboard at the *BBWorld conference* in 2012 shows that a teacher speaks some 200 words per minute whilst students take in just 100 words; students retain 70% of what is said during the first 10 minutes of class, but only 20% of what is said during the last 10 minutes; and, what is even worse, according to this study, students are attentive for just 40% of class time.

A school based on a teacher-centred lecture model does not facilitate the effective involvement of students in their own learning process, whilst no-one can do the learning for them.

A school model in which all students are taught the same content, at the same level and with the same objective, at the same pace, cannot meet the differentiated needs of each student. To put it another way, a grade-based school, as conceived today, must give way to a student-centred school (Tourón, 2010), which promotes the competencies that students must achieve in an entirely different environment from the one we know today.

Naturally, there is no question of using technology simply because that is what the contemporary world demands, but rather it is a matter of considering how technology can be placed at the service of an instructional strategy that promotes a way of learning that is in line with the contemporary needs of society and education.

In our opinion, these include the characteristics of Deeper Learning, with particular mention of the following:

- mastery of core academic content;
- critical thinking and problem solving, involving finding, assessing and synthesising information in order to construct arguments, put forward solutions to complex problems;
- the ability to collaborate by sharing different points of view in order to achieve a common goal;
- effective written and oral communication, knowing how to significantly organise information, how to listen and construct messages for specific audiences;
- self-directed learning, knowing how to set personal goals, reflecting on one's own progress and areas for improvement and, finally,
- an academic mindset that leads students to strongly believe in themselves, to trust in their own capabilities and to believe that their hard work will bear its fruit, allowing them to persevere in order to overcome obstacles. Students also learn from others and provide mutual support. They see the relevance of their schoolwork with the real world and their own future success (Cf. Hewlett Foundation, 2014).

Figure I summarises some of the essential factors of a flexible, differentiated learning environment in which the student is considered to play a key part in his/her learning process whilst teachers should provide help, support and guidance.

All foresight studies on learning and classroom needs in the 21st century agree that, in order to be in a position to meet contemporary

educational needs, schools need to change radically. By way of example, Saxena (2013) indicates that classrooms in the 21st century should be student-centred in which the use of digital devices is the norm, promoting active and adaptive learning, in which students take responsibility for their own learning and where assessment is based on performance (not simply on exams or tests) and where learning is collaborative.

FIGURE I. Elements of a traditional classroom vs. a student-centered model
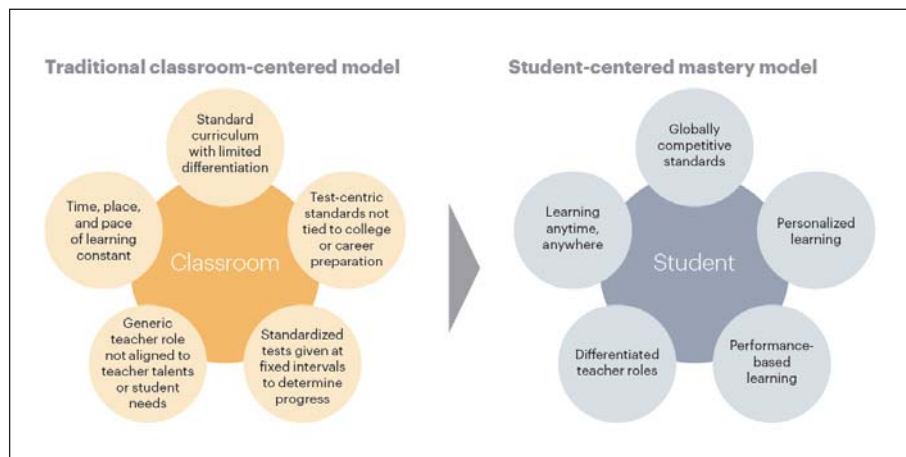
Patrick (2013) lists the trends driving the future of education as follows:

- A shift towards competency education, away from education based on *«sitting at a desk»*. Competency education is key to enabling personalised learning strategies, requiring students to demonstrate mastery before progressing to the following lesson or level.
- The personalisation of learning strategies so that these are tailored to each student's strengths, needs and interests -including the student's voice and choice as to what, how, when and where he/she learns- in order to provide flexibility and supports to ensure mastery of the highest standards possible.

- Personalised learning maps offering illustrative portfolios of a student's academic, social and emotional competencies, throughout his/her learning trajectory and up to graduation. This provides meaningful evidence of their acquisition of skills and knowledge, offering an accurate picture of what a student can do.
- Blended learning in which online tools will help teachers to implement personalised learning pathways, in order to achieve individualised instruction and data-driven immediate intervention (every minute, day), in order to enable differentiated instruction.
- A «learning GPS» system offering instant feedback on «time to destination» with regard to learning, pathways, points of interest and guidance to ensure that students are given immediate alerts when «off track» from the set goals. Teachers, students, parents and administrators shall have control panels to provide accurate information on progress towards the set goals.
- The implementation of anytime, anywhere learning is possible through mobile devices that combine the best traditional, online and blended learning experiences with ongoing student services and resources (24/7).
- The awarding of credits to students after demonstrating the acquisition of competencies, which will end up challenging the traditional A-F grading system, which in effect allows us to judge learning as students progress (even with As, Bs and Cs), with large gaps in their knowledge (90%, 80% 70%), from lesson to lesson across a subject. This is the tyranny of «sitting at a desk time» enabling increasingly larger knowledge gaps over time.
- Bridging formal and informal learning, focussing on ensuring that all students demonstrate that they have achieved the standards, at high levels of rigour.
- Adaptive learning platforms and content, so that teachers are empowered with the possibility of offering instant feedback, incorporating formative assessments, to support differentiation for every learner and access to tools and other resources to expand the curriculum, based on the specific needs and interests of each student.
- Interconnecting community resources and also the services available around the school, as a services provider, in order to meet the individual needs of each student.

From what has been said, it is easy to observe the shift from a teacher to a student centred school. A school in which, as well as a set curriculum, there is room for personal learning, interests and motivation, so that, as we recently pointed out, text books, classrooms, courses or grades and the closed curriculum, are set to become a thing of the past (Tourón, Santiago and Díez, 2014).

Table 1 summarises what should be considered «in» and «out» in contemporary education.

Talent development in schools

As is evident in this monograph, the construct which has been and still is referred to as giftedness does not exist as something physical or mental, as a certain state of being which is possessed by some and not by others, neither is it solely equivalent to a certain IQ, with established cut-off points, nor is it spontaneously developed simply from the coming together of intellectual variables (Cf. Pfeiffer, Subotnik, Olszewski-Kubilius and Worrell, Gagné, Renzulli or Brody in this monograph). Most authors understand ability as potential for development, as a matter of grade which demands, together with the presence of a good number of cognitive variables, that of many other non-intellectual variables (delay of gratification, deliberate practice, motivation, effort, grit, tenacity, etc.), personal and environmental catalysts, in the terminology of Gagné, in order to allow it to develop adequately.

Talents emerge and evolve, whilst, in the case of some students, they are never brought to light at all due to the lack of adequate stimulation at school and home. For this reason, it is imperative that everyone working with young people should consider talents and potentialities as something educable and emerging, and not something fixed and unchangeable (Treffinger and Feldhusen, 1996).

If, therefore, talent is understood to be potential that is transformed into competency, it is clear that the traditional age-based school, in which «one size fits all», where the curriculum has the same challenge level, regardless of the learner's ability, cannot adequately respond to the development of talent or, in other words, to the projection of ability in the various domains of curriculum knowledge (in the specific case of schools).

In contrast, a school based on the specific needs of each learner, is an environment focussed on the development of talent. In fact, with regard to the many typical characteristics of the more able students (Cf. an excellent compilation can be found in Cooper, 2014), we would like to highlight some referring to the cognitive environment and which are now pertinent to this present study on schools and their talent development possibilities (a detailed analysis can be found in Tourón 2010). Although, like any other student, the more able students are unique, and their profiles may vary considerably, it is also true that they generally have some of the characteristics listed below. They:

- have varied interests and exhibit strong curiosity; they ask questions about everything; are inquisitive.
- demonstrate a high level of language development and verbal ability; have extensive vocabulary; are early or avid readers.
- have an unusual ability to process information.
- have a great ability to think and to process information quickly; learn rapidly.
- comprehensively synthesize problems; reason well.
- have a heightened ability to recognise diverse relationships and to integrate ideas across disciplines; reason things out, understand meanings and make logical associations.
- use differential patterns in thought processing.
- are keen observers; they are alert.

This set of characteristics is supported by a number of classical studies on the subject, such as Bloom (1982); Clark, (2002); Gross,(1993); Renzulli, Smith, White, Callahan, Hartman & Westberg (2002); Rogers (1986); Silverman (1997-2004); Terman & Oden (1951, 1959); Witty (1958).

TABLE I. What would be in and out in education

Education Ins	Education Outs
Learner as the center of instruction	Content as the center of instruction
Educator as a coach, mentor, guide, resource, and lead learner	Teacher as the expert and deliverer of content, tests, assignments, discipline
Use of the internet to get a pluralistic, broad perspective of a topic	Use of a single textbook to teach a subject
Failure and mistakes are seen as part of the learning process.	Perfection is explicitly and implicitly expected by and for both students and teachers.
Differentiated and personalized curriculum	One-size-fits-all curriculum
Ongoing, formative assessments for and by students to increase learning	Summative assessments for accountability of teachers and the school
Learning is multi-sensory, hands-on, authentic, and relevant	Learning is typically only focused with only with the brain in mind, sometimes not seen as relevant by the students
Learners produce as well as consume content	Students spend most of their time consuming content created by others
Learners doing more talking and working than the educator during class time	Teachers do most of the work and talking during class time
Technology seamlessly integrated into the curriculum	Technology as an add-on, specialty, or afterthought.
Misbehavior is viewed as an opportunity for growth & often resolved through group effort	Misbehavior is disciplined by the teacher
Social emotional learning seen as an integral to educating the whole child	Social emotional learning minimally or not integrated into learning

Source: http://usergeneratededucation.wordpress.com/2014/01/10/whats-in-and-whats-out-in-education/

Table II summarises a list of characteristics offered by Webb, Gore, Amend & DeVries (2007) and adapted by Tourón (2012). Obviously, the phenotypic presentation of these characteristics is distinctive and unique to each student. Moreover, these characteristics are all the more evident the greater the student's ability, but always *sui juris*, given the fact that each student has his/her own circumstances and personality which is unique and inimitable.

If all these characteristics were to be summarised, we would highlight two: the pace of learning and precociousness which, on occasions, can reach several academic years (Benbow,1992; Benbow & Lubinski, 1997,

2006) and, as other authors have pointed out, this leads them to gain knowledge, particularly in the area of mathematics, which they have not been formally taught.

Based on the above, it appears evident that these students are not sufficiently stimulated at school and, therefore, their potential is underdeveloped.

As indicated by some of the principles of the Talent Search model (Cf. Tourón, 2005; Brody & Stanley, 2005), the idea is to promote competence over age, as the criterion for determining who has access to a curriculum at the appropriate grade, and the right moment to do so.

"Essentially, SMPY promotes competence over age as the criterion to be used in determining who obtains access to certain curricula and experiences and at what time" (Benbow & Lubinski, 1997, p.159).

TABLE II. A few relevant characteristics of the more able students (adapted from Webb, Gore, Amend and DeVries, 2007)

In general, more able students show some of the characteristics listed below:

- Unusual alertness even in childhood
- Rapid learner, ability to quickly relate ideas
- Ability to retain a great deal of information, they generally have a good memory.
- Unusually large vocabulary, and use of complex sentence structures for their age.
- Advanced understanding of word nuances, metaphors and abstract ideas.
- They enjoy problem solving involving numbers and puzzles.
- They are often self-taught, they already read and write at pre-school age.
- Unusual emotional depth, intense feelings and highly sensitive reactions
- Thinking is abstract, complex, logical and insightful
- Idealism and a sense of justice appear at an early age
- A great concern for social and political issues and for injustice
- Longer attention span, intense concentration and persistence whilst performing activities.
- Preoccupied with their own thoughts, they daydream.
- They are impatient with themselves and with the incompetence or slowness of others.
- Ability to learn basic skills very quickly and with little practice
- They ask probing questions, going beyond what they are taught
- They have a wide range of interests (although at times they have a particular interest in one specific area)
- Highly developed curiosity; endless questions
- A great interest for experimenting and doing things differently.
- Tendency to relate ideas or things in ways that are not typical or obvious (divergent thought)
- Sharp, and sometimes unusual sense of humour, particularly with puns.

Spanish students in the international performance studies

Another way of addressing the likely underdevelopment of the potential of Spanish students could be to consider the performance results of international studies such as PISA, TIMMS or PIRLS. Some excellent expert analyses have been made such as the one conducted by Gaviria (2003), or those included in the secondary analysis reports commissioned by the INEE (National Institute of Educational Evaluation) and conducted by groups of Spanish researchers, accessible on the INEE website under the international study section.

There is a common denominator in all these studies, namely the inordinate number of students with a low performance and the low number of students with a high performance, particularly in comparison with other countries. A detailed analysis of the Spanish situation can be found in Tourón (2013).

In a recent PISA study, the OECD analysed the percentage of top performing students in all three subjects assessed. Such students are termed *all-rounders,* and the study confirmed the remarkable differences from one country to another.

Thus, the PISA in Focus No. 31 report (INEE 2013) looks at the percentage of top-performing students (proficiency levels 5 and 6) in the three subjects assessed, clearly showing that some countries are more successful than others in developing the academic talent of their students. Only 4.1% of 15-year old students are top performers in all three subjects. Between 8% and 10% of 15-year old students in Australia, Finland, Hong Kong-China, Japan and New Zealand are all-rounders; whilst the percentages are even higher in Shanghai-China (14.6%) and Singapore (12.3%). In contrast, fewer than 1% of students are all-rounders in Chile, Mexico and Turkey and 21 other countries and economies. The results for Spain are clearly below the OECD average.

We do not consider it necessary to elaborate further on this point, suffice it to say that «what matters is the capacity of the system to «pump» students up to top performance levels. "The greater the «pumping» force, the greater the difference between those who have not yet benefited from the system and those who have already done so. In this context, when a country has many students at top performance levels, then this serves to indicate that the system is functioning well, whilst the fact that there are

still students at lower levels does not necessarily mean that the system is malfunctioning, but may simply be due to the effect of high social and demographic mobility in that country. For this reason, it is not a cause for concern that Spain has students at lower performance levels, however it is worrying that there are very few top performers, as this reveals a system with little social «pumping» capacity. And the consequence of this could be that the lower performance levels always includes individuals coming from the same families. And that really is unfair». (Gaviria, 2003, p. 53).

Having said all this, how can we achieve a school system that tends to focus on individualised learning, that adapts the students' progress through the curriculum according to their proven ability and not to age? How will it be possible to get schools to swap their role of knowledge transmitters for one of student talent developers?

To take a paragraph from one of our recently published works: «We are convinced that a new era is opening up for schools. It is no longer sufficient to confine oneself to a self-contained subject in a printed book. There is a need to widen the focus and to allow each student to go as far, as quickly and as deeply as permitted by his/her ability and level of mastery, so that schools provide an enabling environment for the development of the talent of each and every student. Therefore, students will need to be accompanied by a teacher who, rather than acting as a transmitter of knowledge, shall provide guidance, advice and help in their joint learning adventure. Teachers, today your role is more important than ever. In the conclusions of a recent symposium on mobile technology which we organised in Córdoba, we formulated the concept in the following words: 'It is of paramount importance to understand that teachers are more essential than ever in an education system that needs to develop the students' problem solving abilities, creative thinking, team work and many other concepts that are set to be requirements of the world in which our students will be moving, many of whom will be in professions that do not yet exist'». (Tourón, Santiago and Díez, 2014, prologue).

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[1] We will use the terms *flipped classroom* and *flipped learning* interchangeably, although the latter covers a much wider set of factors than the former (please refer to http://www.thedailyriff.com/articles/the-flipped-class-manifest-823.php)

We shall now go on to look at all the possibilities offered by the flipped classroom model for developing the talent of all students and, in particular, that of the more able ones, a key objective of this work.

The Flipped Classroom model[1]: concept and characteristics

The *Flipped Classroom* or *Flipped Learning (FC)* is a pedagogical approach that shifts the work of certain learning processes out-of-class whilst it uses the in-class time, supported by the teacher's experience, to facilitate and promote other acquisition processes and to practice the knowledge acquired, within the classroom (Bergmann and Sams, 2012).

However, «flipping» a classroom is much more than making and distributing a video or any other type of multimedia content. This is a holistic approach that combines direct instruction with constructive methods, steps to commit and involve students in the course contents and improvement of their conceptual understanding (Tourón and Santiago 2013). This is a holistic approach which, when successfully applied, will support all stages of a learning cycle, as suggested by Bloom's own taxonomy (Santiago, 2014a; Anderson & Krathwohl, 2001; Bloom & Krathwohl, 1956).

When teachers design and publish on-line, there is more in-class time to facilitate the engagement of students in active learning, through questions, debates and applied activities that promote the exploration, interrelation and application of ideas.

Bergmann and Sams (2012), who were then chemistry teachers at Woodland Park (Colorado), coined the term "*Flipped Classroom*" with the same meaning defined above. Aware that some students frequently missed classes for a number of reasons beyond their control, they made an effort to help these students by recording and distributing videos. They soon recognised that the model had tremendous pedagogical potential to individually meet the learning needs of each and every student.

When using the term "*Flipped Classroom*" we need to bear in mind that there are many other similar instruction models which have been developed with other names. For example, *Peer Instruction* (PI) developed by Mazur (1996), which includes a technique called "*just-in-time teaching*" as a complementary aspect of the FC model. This teaching technique allows teachers to receive student feedback on the day prior to the class, to enable him/her to prepare strategies and activities

personally adapted to the students' needs for improved understanding of the content. The Mazur model (1996) is largely focussed on conceptual understanding and, although this is not a necessary component of FC, it has some clear and close connotations. Other models related to the FC are problem, project, challenge and discovery-based learning (a detailed description, not included here for reasons of space, can be found in Santiago 2014b).

Innovation and the potential improvement of the quality of education represented by this model, provides the following benefits, amongst others:

- It enables teachers to dedicate more time to attending to individual differences.
- It represents an opportunity for teachers to share information and knowledge amongst themselves, with students, the families and the community.
- It provides students with the possibility of accessing, as many times as is necessary, the improvements contained, generated or provided by their teachers.
- It creates a collaborative learning environment in the classroom.
- It involves the families, right from the outset of the learning process.

FIGURE II. A description of the Flipped Classroom model

Source: http://ctl.utexas.edu/sites/default/files/flippedflowmodel.png
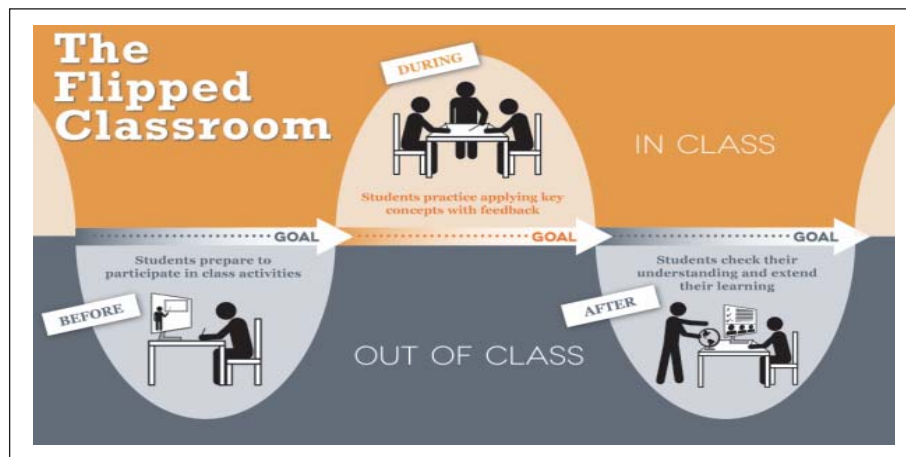
Lectures do not necessarily have to be a «bad thing» (if they really are lectures) and can be an effective way of helping students to acquire new knowledge (Hattie, 2008; Schwerdt & Wupperman, 2010). The problem with classes of this type is often a matter of pace. For some students, the information may be either delivered too slowly or deal with matters that they are already familiar with; other students may have problems assimilating the information at the required pace, or they may lack the prior knowledge required to understand the concepts presented; in either case, lectures simply slow down the student learning process. Although lectures serve their purpose, it is infeasible to consider that they can be used as an exclusive teaching method to achieve any objective whatsoever and, as indicated above, the teaching and needs of contemporary learning require student participation which goes beyond that of listening to a verbal message and taking a few notes, which is the main activity of students during a lecture (Cf. Tourón, 1989). Therefore, it is not a matter of contrasting a flipped model with a lecture model, but rather of studying the possibilities of the former in order to achieve a more effective way of developing students' abilities.

Some teachers are already applying the flipped model, or some of its features, through common sense, designing classes and activities based on FC concepts, by recording their videos and posting them on the Internet, for example. Students watch classes at home, where they can quickly accelerate through those contents that they already understand or stop to repeat those parts that they have not fully grasped. Students also have the possibility of studying any contents lost during the initial explanation given by the teacher. Materials of this type can easily incorporate visual displays, such as interactive graphs, videos or graphic images, exams with feedback, etc.

The FC model has some clear connections with other pedagogical models and approaches, based on the key role played by the learner, and therefore focussed on increased personalised learning. In the following sections we will review briefly two of these relationships with the FC model: blended learning; and Universal Design for Learning.

Connections between the Flipped Classroom and Blended Learning models

Blended Learning can be understood as the most «mature» flipped learning model, involving a combination of on-line tools and classroom

teaching. This method is in contrast to models solely based on on-line learning (through virtual schools and on-line courses) and to models which include no digital technology at all.

Bearing in mind the tremendous possibilities of technologies and the high level of mastery by students, teachers should ask themselves whether part of the curriculum could not be adapted to a BL model. Our students are already living their lives in a combination of digital and real spaces.

An increasing number of schools are endeavouring to incorporate models focussed on student learning as a driver of their activities. Many teachers have been able to successfully include on-line teaching tools (for example, Khan, Knowmia, Learn Zillion, TED-Ed, etc.) directed at improving the basic skills and competencies of students. Based on all this, listed below is a simplified summary of the various elements and systems that have progressively been included in classrooms adopting these models:

- Classroom management tools:
  - Classroom management system
  - Classification system
  - Project management system
- Learning tools
  - Personal learning networks
  - Study tools
  - LMS (learning management systems)
  - Digital Portfolios

As we have already pointed out, Blended Learning is a method of teaching which combines «traditional» classroom instruction with multi-media teaching based on digital resources. Under the Blended Learning Model, teachers are able to distribute content to students whenever they want and wherever they are and, for their part, students can access these contents through their own internet connection, at home through their PCs or laptops, mobile devices etc. at set times before/during/after school or at variable times. The most interesting part of Blended Learning is the time freed from giving direct explanations in the classroom, allowing teachers to involve students in class debates, laboratory practices, and even on problem solving projects, challenges, etc.

In table III, we have provided a summary, adapted from the original source indicated, analysing the activities of teachers and students before class, at the beginning of class, during class and after class during tutorials, comparing this model with traditional lecture-based teaching in which the teacher «teaches directly».

TABLE III. The roles of teachers and students in the Flipped Learning model

	OLD (Before the Flip)	NEW After the Flip)
Before Class	Students assigned something to read	Students guided through learning module that asks and collects questions.
	Instructor prepares lecture.	Instructor prepares learning opportunities.
Beginning of Class	Students have limited information about what to expect.	Students have specific questions in mind to guide their learning.
	Instructor makes general assumption about what is helpful.	Instructor can anticipate where students need the most help.
During Class	Students try to follow along.	Students practice performing the skills they are expected to learn.
	Instructor tries to get through all the material.	Instructor guides the process with feedback and mini-lectures.
After Class	Students attempt the homework, usually with delayed feedback.	Students continue applying their knowledge skills after clarificationa and feedback.
	Instructor grades past work.	Instructor posts any additional explanations and resources as necessary and grades higher quality work.
Office Hours	Students want confirmation about what to study.	Students are equipped to seek help where they know they need it.
	Instructor often repeats what was in lecture.	Instructor continues guiding students toward deeper understanding.

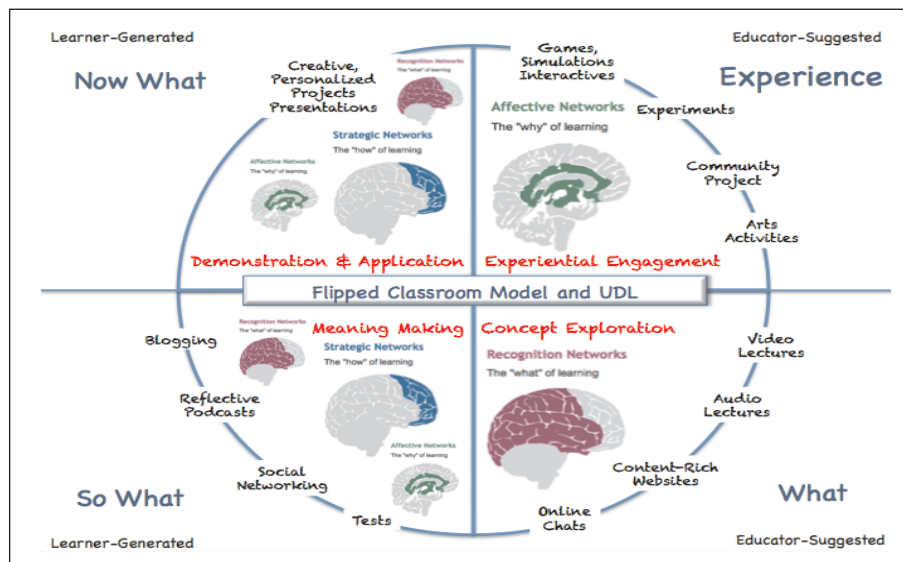Source: http://ctl.utexas.edu/teaching/flipping-a-class/different

Connections between the Flipped Classroom model and the Universal Design for Learning model (UDL)

Figure III depicts the cycle of student involvement in the learning process, ranging from a position that is closer to the traditional model, although now with the clear active involvement of the student, up to an approach in which the activities are generated by the learner him/herself, based on personal needs and aspirations. This is explained with some detail below.

Starting at the top of the figure. The learning cycle generally begins with an experimental activity suggested by the teacher. This is a really practical activity aimed at fully engaging students in the learning process. According to McCarthy (1996), students become involved through their personal connection with the experience or activity proposed, and the desire to create meaning in relation to that experience. The teacher is therefore responsible for structuring and organising activities that exert a positive influence on the future learning experiences of each and every one of his/her students.

FIGURE III. Relationships between Universal Design for Learning and Flipped Classroom

Source: http://usergeneratededucation.wordpress.com/2012/05/29/udl-and-the-flipped-classroom-the-full-picture/

These "*Experiential Engagement*" activities can include practical learning tasks such as science and laboratory experiments simulations, artistic games and activities, designed to be conducted during class time and which often occur in a collaborative type of environment. We can also consider «transferring» some of these activities to homework, such as, for example, working with a simulation to be completed by students during a synchronous webinar session through Adobe Connect, Google Hangout or Elluminate. Other options could be: problem solving in teams (Wilderdom, 2014, Teampedia, 2014); science experiments (Steve Spangler Science 2013, Kitchen Science Experiments, 2013), interactive science simulations (virtual library of Utah); experimental activities with mobile devices (Gerstein, 2014); arts (in general) (Artsedge, 2014). Other options may be: virtual trips with an educational content such as Google Earth Tours and Google Art Project.

It may initially be complicated to promote experimental activities, particularly for those students who have never conducted activities of this nature. The guide by Chapman (2013) and the paper from Lower (2014) include guidelines and advice as to how to start.

All this tremendous set of resources ensure that students are «exposed» and, in some way, committed to deepening their knowledge and exploring what the experts have to say on each specific subject.

In the case of teachers following the flipped learning model in their classes, this is the key moment in the cycle in which the students watch videos proposed by their teachers with a rich content, such as the material to be found at the Khan Academy, Neo K12 or other video services used to help students learn the abstract contents related to the subject being worked on. Santiago (2014c) on the Spanish flipped learning model web, directed and coordinated by the authors, offers a list of 30 of the most-visited educational web sites. One option for improving the student's attention and understanding when viewing the video, as well as enabling the teacher to check «who» and «what» has been seen, is to introduce relevant questions into the video itself (Santiago, 2014d).

Let's look now at what happens when the student starts to take a certain control over the proposals made by the teacher.

The bottom right-hand corner of Figure III shows that, when students are provided with on-line resources that are often downloadable, they can start to select personalised content in contrast to the situation in which the teacher selects generic material, the same for everyone, as

generally occurs in an actual, synchronous environment. Students can be asked to locate videos, podcasts and websites supporting the lesson focus and contents. These means can be shared with other students and it is possible to generate a certain debate on the relevance, rigour and suitability of each of the means.

Part of this phase can include a chat, forum or blog to ask and address questions on the contents presented through the videos, podcasts and website proposals. This type of online collaboration zone enables students to ask questions and to receive replies from their classmates, teachers and even experts from other countries.
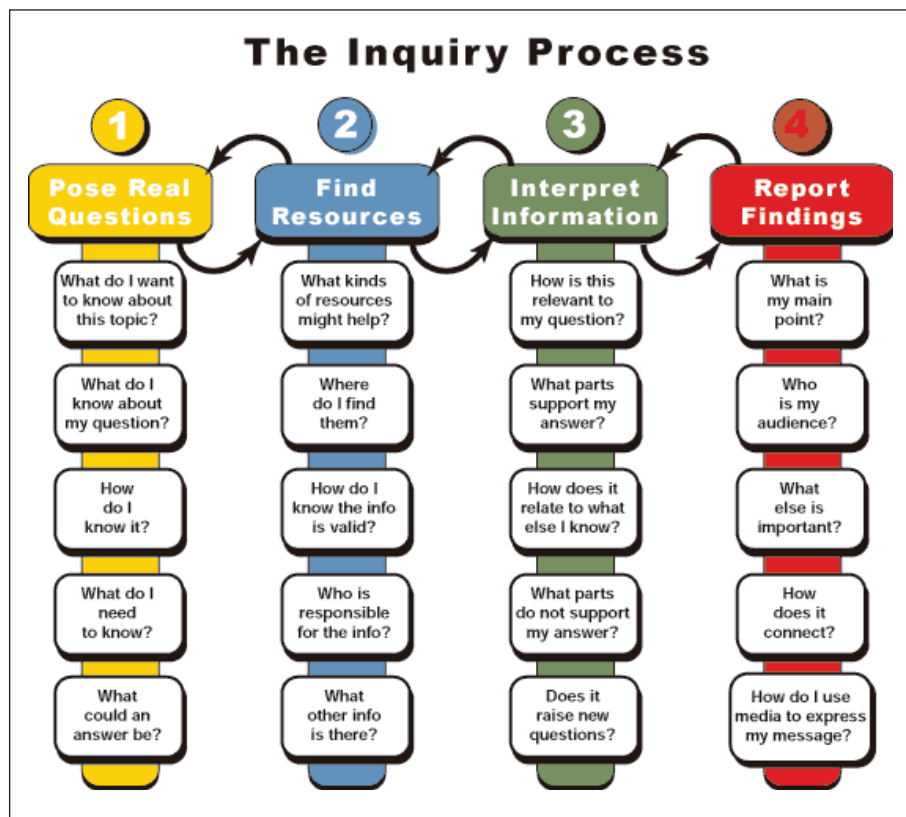
Obviously, in a face-to-face environment, students can ask and reply in «real time», which makes it more immediate but sometimes less reflexive. In other words, students have the opportunity for personalised access and interaction with these materials, which can be viewed in an adequate learning environment and students can access and review the information found to be of particular interest or which they do not understand. For online questions and answers and also for video embedded questions, or those made in a synchronous classroom environment, there is a need to consider the quality and relevance of the same. The following diagram makes it possible to distinguish different types of questions, based on the student's learning stage. Specifically, points 1 and 2 would be the most suitable for the «why» and the «what».

The third step in this process, which relates flipped learning with the Universal design for learning, can be seen in the bottom left-hand corner of figure III: «creating meaning».

Students reflect in depth on the level of understanding of what they have studied in previous stages, and have the possibility of coordinating and constructing their understanding of the contents or topic dealt with through written blogs or audio or video recordings (podcasts, vidcats, video-blogs, social networks, etc.). Within the «traditional» school system, this would be the stage at which students are tested on their level of understanding of the contents. If this were the case, we would recommend the tests pointing towards the highest levels of Bloom's taxonomy: evaluation, application and synthesis.

If possible, students should have the opportunity to reflect on and make sense of the content-related concepts, when they feel ready to satisfactorily do so.

FIGURE IV. The inquiry process

The Inquiry Process

1 Pose Real Questions	2 Find Resources	3 Interpret Information	4 Report Findings
What do I want to know about this topic?	What kinds of resources might help?	How is this relevant to my question?	What is my main point?
What do I know about my question?	Where do I find them?	What parts support my answer?	Who is my audience?
How do I know it?	How do I know the info is valid?	How does it relate to what else I know?	What else is important?
What do I need to know?	Who is responsible for the info?	What parts do not support my answer?	How does it connect?
What could an answer be?	What other info is there?	Does it raise new questions?	How do I use media to express my message?

Source: http://www.educatorstechnology.com/2013/11/the-inquiry-process-explained-visually.html

Finally, in the stage shown in the top upper left-hand corner of figure IV, the students demonstrate what they have learned and apply it in a way that makes sense to them. This is in line with the highest learning level within Bloom's revised taxonomy. Essentially, students become narrators.

This cycle stage is better when it takes place in the classroom, established within the class itself in a face-to-face context. There are two reasons for recommending this type of synchronous learning, on the one hand the educator can guide students towards the most suitable types of

projects and tools and, on the other hand, an audience of classmates and mentors increases motivation and provides opportunities for feedback. Obviously, an online course also gives students the opportunity to work on their projects and to present them to their colleagues and educators during an interactive online forum, however in-person activities provides features and factors that are hard to replicate in a virtual environment.

Efficiency of the Flipped Classroom model: some evidence

According to Goodwin and Miller (2014), there is still no definite evidence as to the success of the flipped classroom, although promising partial evidence does exist, such as the report prepared by Hamdan, McKnight, McKnight and Arfstrom (2013) or the Tomorrow Project report made in 2013, in which 403,000 students, parents, teachers and directors were interviewed on the use of the model.

Recently an addition to the review made by Hamdan et al. (2013) was published. This was prepared by Yarbro, Arfstrom, McKnight and McKnight (2014) and contains a number of case studies showing that, with the use of this model, classes from a range of educational levels from primary to university education, show increased performance and student and teacher satisfaction.

According to the *Flipped Learning* Network (2012), participation in its website increased from 2,500 teachers in 2011 to 9,000 teachers in 2012.

In a survey conducted amongst 453 teachers applying FC (*Flipped Learning* Network, 2012), 67% reported an increase in test scores, with particular benefits for classroom students and students with special educational needs; 80% reported an improvement in student attitude and 99% said that they would use the model again during the following academic year. In this respect, the Clintondale High School in Michigan saw how the failure rate for ninth grade maths students dropped from 44 to 13% after adopting the flipped classroom methodology (Finkel 2012).

One of the most recent studies was conducted by Kelly Walsh (2014) at the Westchester College. A number of teachers had been experimenting with the FC model, but there was still no clear idea as to what had been done to date. A small competitive grant was created in order to increase interest in conducting a study. Two grants of 1000$ each were budgeted.

A number of teachers submitted proposals for the «Flipped Class Competitive Grant», targeted at those to be teaching courses in the "*Winter*

Day 2014 Term". The proposals from Nwosis and Ferreira were accepted based on their merit and various criteria, including: the average grades in all the results of these courses in years 2012 and 2013; the completion rates for the respective courses (again using 2012 and 2013, the completion rates as the «baseline»).

Advocates of the FC model affirm that this practice promotes a better student-teacher interaction. For example, Bergamann and Sams (2012) point out that when teachers aren't standing in front of the classroom «simply talking» at students, they can circulate and talk with students, making it possible for them to better understand and respond to students' emotional and learning needs

Research makes a strong case for the benefits of such interaction. Studies have shown that, for academic development, it is very important for teachers to recognize and respond to students' social and emotional needs, and this is especially true for students with special educational needs (Hamre and Pianta, 2005).

Figure V graphically shows the results of a study on FC, revealing that teachers who adopt this model do not generally want to return to more traditional models, whilst their students improve their academic results and their satisfaction with the teaching received and their learning.

Advocates of FC also affirm that increased student-teacher interactions gives teachers greater opportunity to provide feedback to students. For example, a small pilot study funded by the Gates Foundation observed that, during a five week summer school program in which Students received instruction through the Khan Academy, together with support from a teacher, the teacher spent far more «one to one» time with students than was normally done in the classroom. The teacher was therefore able to provide more knowledge and inform the student of any errors and the way to correct these (Greenberg, Medlock, and Stephens, 2011).

The increased opportunities for feedback of this nature can improve student learning, due to the fact that formative feedback has a great effect on the teaching-learning processes, according to the meta-analyses conducted by Beesley and Apthorp (2010) and Hattie (2008).

Another alleged advantage of FC is that «it speaks the language of today's students, who are accustomed to turning to the web and social media for information and interaction» (Bergmann and Sams, 2012 p.20). There may also be another deeper argument: some investigations show that the novelty of any stimulus tends to disappear after some 10 minutes and, as a result, students «demand» new content after this short space of

time. Aside from the debate on the poor engagement of today's students, a circumstance that is frequently evident in our classrooms. It appears that our students need a change of stimulus, or an opportunity to step back and process what they're learning (Medina 2008). One benefit of using short videos or audio material, for example, is that it can break down direct, lengthy instruction into sequences that are shorter and, therefore, more «digestible».

FIGURE V. Summary of the research into the flipped classroom model
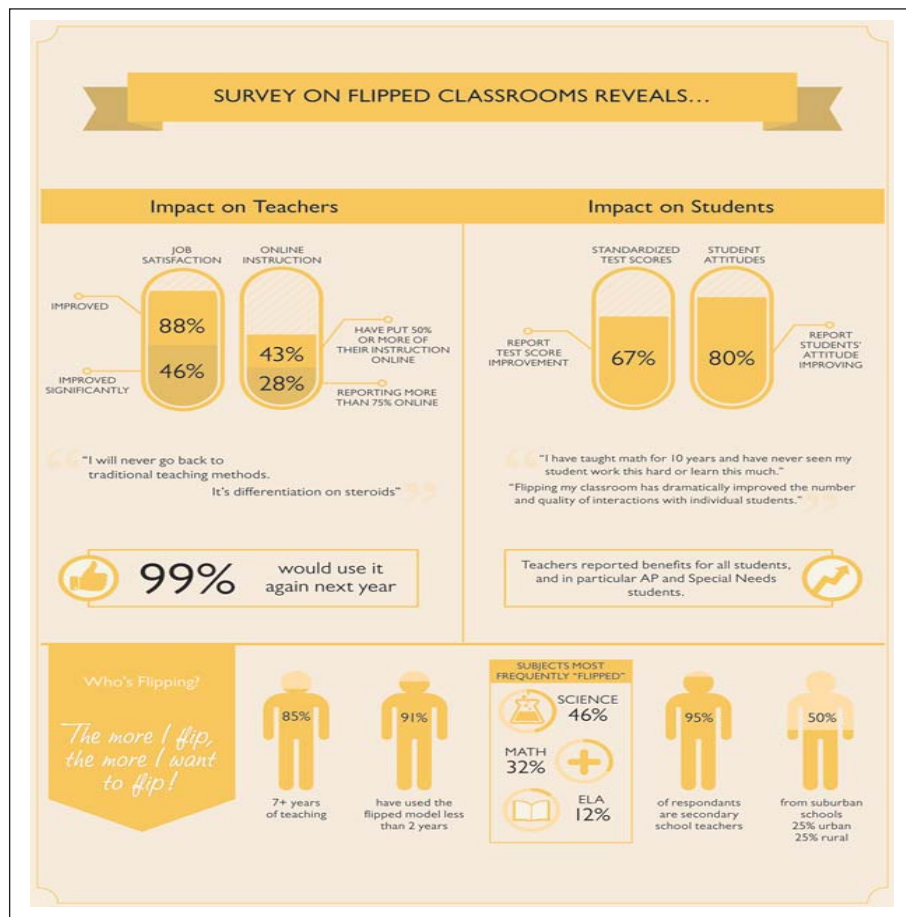
Source: http://www.avatargeneration.com/2012/12/flipped-learning-professional-development-courses/prettyPhoto/1/

As indicated above, the simple use of good quality teaching videos enables students to learn at their own pace and according to their needs. Potentially, an inverted classroom allows the teacher to set the content by weeks, months or an entire academic year, allowing students to accelerate their learning and complete the curriculum at a faster pace, if they are ready to do so. According to John Hattie's synthesis (2008) of 800 meta-analyses, this acceleration has one of the most important effects on the quality of learning.

Another apparent advantage of the flipped model is that it alters the nature of homework by getting students to practice and apply their learning in the classroom, under the watchful eye of the teacher (Bergmann and Sams 2012; Greenberg, Medlock and Stephens 2011). Current practice shows homework to be an ineffective activity. Beesley y Apthorp (2010) point out that in-class opportunities for students to practice their skills, with formative teacher feedback, is almost four times more effective than homework, in which teachers had few opportunities to supervise students during their work.

At the moment, and as we have already mentioned, more research is needed in order to definitively determine whether the FC model *directly* improves student learning. However, the «absence of evidence is not evidence of absence». All the arguments put forward are factors which directly improve the quality of learning and are either a cause or a consequence of applying the model.

The FC could serve as a lever for change, not only in our classrooms but also within the context of the entire paradigm of teaching. Moving away from a traditional model in which teachers are mere transmitters of knowledge and towards a model in which teachers act as facilitators, guides, catalysts, who carefully observe their students, identify their learning needs and guide them so that they can maximise their intellectual, affective and social potential. In this respect, we understand that a model of these characteristics is a suitable approach for promoting student talent, insofar as it centres on each student's needs, interests and difficulties.

Conclusions

We are rapidly moving from the information age that was characteristic of the 20th century towards what is known as the conceptual age,

characteristic of the 21st century (Pink 2005). Thanks to digital technology, we are in a position to recover some educational aspects that allow us to reinstate the centrality of the person in his/her own educational process in general, and learning process in particular. A *desideratum* of differentiated education has always been to meet the relevant aspects of the educational process and also the demands and needs of each student, as a unique human being. This is no easy task, and does not even appear remotely possible in a school based on grouping students by age, given the fact that this means accepting that all students of the same age have similar needs.

As described in detail at the beginning of this work, when considering the learning process, it is important to consider the diversity of each and every student. Abilities vary considerably, as do students' interests, motivation, ability to make an effort and work hard, deliberate practice, etc. Considering this, a school model that promotes a curriculum that is the same for everyone, with the same level of challenge and difficulty and the same pace of delivery, offers little opportunity for differentiation, particularly if school activity is centred on direct teaching by the teacher. With this approach, characteristic of a knowledge transfer model, it is not possible to cater for the unique needs of each specific student.

For this reason, we recently proposed returning to a school focussed on ability and on a student's work, in other words, a school that is conceived to be a place of learning and not teaching (Cf. Tourón y Santiago, 2014). However, two conditions are required to make this realistic and possible; a) the appropriate technology to act as a vehicle and b) instructional strategy focussed on giving priority to promoting the student's work.

The case of the more able students is particularly significant in Spain, a country which has been shown to be lacking in identifying and understanding the needs of this group, leading to particularly poor results in international studies. In this respect, we have already indicated that Spain is unable to place a considerable number of its students and is way below the OECD average and, of course, the level of leading countries.

The characteristics that we have indicated for the more able, talented students, demand a specific curriculum configuration and differentiated treatment. As we have pointed out, the pace of learning of these students and the level of challenge demanded are way above that of their classmates. It is therefore exceedingly important to consider ability as a

variable for talent development. Whilst it is also important to understand ability as a potential to be developed, as stated in the various works included in this monograph issue, particularly those by Renzulli, Gagné, Pfeiffer or Subotnik et al.

A model such as Flipped Learning, as described herein, makes students the true owners of their learning, whilst teachers are removed from their role of providing direct instruction to all students, to instead act as mentors, guides and learning facilitators, in order to meet the needs of each and every student in an enriched environment. This would not be possible in a model based on teacher-driven instruction.

We consider that a pedagogical approach, based on the precise level of challenge for each student, allowing them to work at their own pace (by themselves or in groups) whilst having the ongoing feedback and assistance of the teachers, is a true talent development model.

We see no need to elaborate further on this reasoning. The relationship between the development of the talent of all students and models such as Flipped Learning, puts us on the pathway towards a new school model that will promote, as a basic objective, personalised learning in order to ensure that each student is able to progress at the pace, depth and scope permitted by his/her intellectual, affective and emotional capacities. In short, a school model that will promote the optimal development of each and every student. This would make Eisner's statement (1999) a reality, when he indicated that "the good school, as I have suggested, does not diminish individual differences; it increases them. It raises the mean and increases the variance (p. 660).

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