



FACULTAD DE EDUCACIÓN DE PALENCIA  
UNIVERSIDAD DE VALLADOLID

## Is it the Nile the longest river just because the textbook said so?

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Activity design framework to create critical thinkers.

(¿Es el Nilo el río más largo solo porque lo dice el libro de texto? - Marco de diseño de actividades para formar pensadores críticos.)

**TRABAJO FIN DE GRADO**  
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*Thanks*

*To my family, especially to my parents, for their unconditional support and for teaching me how to 'think' my way through life.*

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*And to my friends, that taught me that with positive energy and great people around even the hardest goal is reachable.*



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## **Abstract**

When they finish school, every child knows that the Nile is the longest river in the world. But, how do they know that? Have they been there, measure the river until the further source? No, they have acquired this information from the textbooks or the teachers and they have just accepted it as the truth. This is a silly example but reflects a very common and dangerous attitude in adults nowadays, exposed to a vast amount of information and consuming and trusting it without looking for evidence. This conduces to the spread of misinformation, propaganda, scams, etc.

We need then an “ability to analyse and evaluate information”, to “raise vital questions and problems, formulate them clearly, gather and assess relevant information, use abstract ideas, think open-mindedly, and communicate effectively with others” (Duron, Limbach, & Waugh, 2006, p. 160). This ability is the critical thinking.

The current essay presents a framework for the design of activities that enhances critical thinking in school. This framework is based on proved premises as the use of questioning and problem solving techniques, the necessity of making thinking explicit and important or the use of assessment for learning; all with the determination of creating critical thinking citizens, competent in managing information, taking reasoned decisions, solving problems creatively and persistently, remaining flexible and open-minded when facing new ideas and being aware of their own process of thinking.

As Halpern (2013, p. XVI) said, we need people that “never stop questioning; never stop thinking. Our future depends on it”

**Key Terms:** Critical Thinking, Experiential Learning, Questioning/Problem Solving Teaching, Visible Thinking, Assessment for Learning

## Resumen

Cuando terminan la escuela, todos los niños saben que el Nilo es el río más largo del mundo. Pero, ¿cómo saben eso? ¿Han estado allí?, ¿han medido el río hasta la fuente más lejana? No, han adquirido esta información de los libros de texto o sus docentes y lo han aceptado como la verdad. Este es un ejemplo tonto, pero refleja una actitud muy común y peligrosa en los adultos de hoy en día, expuestos a una gran cantidad de información que consumen y en la que confían sin buscar pruebas. Esto conduce a la propagación de la desinformación, la propaganda, estafas, etc.

Necesitamos entonces lo que Duron, Limbach, & Waugh (2006) definieron como la capacidad de analizar y evaluar la información, de plantear interrogantes y problemas vitales, formularlos con claridad, reunir y evaluar la información relevante, utilizar ideas abstractas, tener una mente abierta, y comunicarse eficazmente con los demás. Esta capacidad es el pensamiento crítico.

Este trabajo presenta un marco para el diseño de actividades que mejoren el pensamiento crítico en la escuela. Este marco se basa en premisas probadas como el uso de enseñanza en base a preguntas y resolución de problemas, la necesidad de hacer visible y dar importancia al pensamiento o el uso de una evaluación para el aprendizaje; todo con la determinación de crear ciudadanos con pensamiento crítico, competentes en la gestión de la información, la toma de decisiones razonadas y la resolución de problemas de manera creativa y persistente; que se enfrenten a nuevas ideas con flexibilidad y mente abierta y que sean conscientes de su propio proceso de pensamiento.

Y es que, como Halpern (2013) dijo, necesitamos gente que nunca deje de cuestionar; nunca deje de pensar. Nuestro futuro depende de ello.

Términos clave: Pensamiento Crítico, Aprendizaje Experiencial, Enseñanza basada en Preguntas y Solución de Problemas, Pensamiento Visible, Evaluación para el Aprendizaje



# INTRODUCTION

Let's imagine ourselves entering to a 5<sup>th</sup> grade class and make the following question: 'Which is the longest river in the world?' We could guess that all or nearly all the pupils would answer that the longest river in the world is the Nile. This is a common knowledge at this age but none of these children has been in the Nile, much less travel through and measured it. They just accept this as the true because the teacher said so. A typical student won't question the fact and how we know it, who made the expeditions through the river to measure it, what methods did they use, the reliability of both explorers and methods used, or even the open debates that could change and even deny this whole fact.<sup>1</sup>

I know the example is quite unrealistic as we can't expect school students to get through methods and debates that don't present agreement even among experts on the field, but it surely illustrates what Tunstad (2014) characterized as a new type of 'ignorance'. It is, paradoxically, a result of a higher and better education, where people have a lot of knowledge but lack knowledge about this knowledge itself. Halpern (2013, p. 3) defines it as the "danger of having all of the answers, but still not knowing what they mean". Also Alec Bourne quoted it as the possibility of storing "the mind with a million facts and still be entirely uneducated". This is an 'ignorance' that may result in citizens that swallow just with every information they consume, not going beyond the appearances nor scrutinizing what's behind the ideas, theories, social practices, etc. we can find around us (Mejía Delgadillo, Orduz Valderrama, & Peralta Guachetá, 2006).

Even more, it can't be denied that every day we are exposed to more and more information, with a steadily growing amount of digital information showed by some reports, e.g. (Pew Research Center, 2006); and other ones (Gantz & Reinsel, 2012) predicting a growth of digital data created by a factor of 300. Internet made it really easy to publish information, but it's also easy to manipulate this information. The work of Graham & Metaxas (2003, p. 72) presents four "particular areas of misinformation: advertising claims, government misinformation, lobby group propaganda, and scams".

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<sup>1</sup> Some expeditions in the last decade claim to have discovered new sources for both Nile and Amazon rivers, being the first 106km longer than the previously established length (ELPAIS.ES / EFE, 2006), and the second one 284 longer (Roach, 2007), what would imply that the Amazon is the longest river in the world.

This same research (whose name, “Of course it's true; I saw it on the Internet!”, reveals a common attitude nowadays) shows that students turn to the internet as their main source of information but they present difficulties when double-checking information and analysing, evaluating and recognizing the trustworthiness of the sources (Graham & Metaxas, 2003, p. 75). It's clear then that with this increasing vulnerability to digital information, students and all information consumers need the skill to assess information properly (Eshet-Alkalai & Geri, 2007).

This ability to decide which information we accept and take and which we mistrust is the critical thinking.

## **Purpose and structure of the project**

The target of this project is the design of a framework to create activities that improve critical thinking. First we will inquire about the necessity of critical thinking in our society, why there's lack of critical thinking and the problems that result from this fact. Then it will be exposed the relation between experiential learning and the enhancement of thinking, especially when the experiences take place in the outdoors.

The next point is a summary to critical thinking references in the official curriculum. After that, and including everything mentioned before, you will find the main objectives that this work pursues.

Then there is the main part of this essay with the design of the framework and its main characteristics.

After that some existing experiences involving thinking improvement will be shown. These experiences have been proved as successful and will be used to discover the strong point of this idea as well as those to improve/expand.

The last epigraph contains the conclusions about the fulfilment of the objectives of the project as well as the achievement of the competences expected in this final project for a CLIL teacher. Some of these competences pursued are (Bertaux, Coonan, Frigols-Martín, & Mehisto, 2010):

- Using cognitive academic language proficiency.
- Designing a course.
- Merging content, language and learning skills into an integrated approach.
- Lesson Planning.
- Fostering outcome attainment.
- Taking into account the affective side of learning.
- Having knowledge and awareness of cognition and metacognition in the CLIL environment.
- Knowing about and applying assessment and evaluation procedures and tools.

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# Why should we develop critical thinking

## Critical Thinking

Critical Thinking could be defined as the way of thinking that prevent us to take decisions poorly based, not founded on scientific evidence but on anecdotes, rumours, superstitions, non-contrasted news, etc. (Tunstad, 2014). Halpern (2013, p. 11) considered it “an antidote to the kind of mind control that worried Orwell” in his novel 1984, helping us recognizing propaganda and analysing and refusing statements not based on evidences.

Considering the vast amount of literature about critical thinking we can find several definitions of this term. Mejia Delgadillo (2006) considers it the ability of taking responsible decisions about how to believe and act having considered all the alternatives, consequences and implications. Other researches also related this thinking with the decisions about acts and beliefs, how we react to what we perceive using systematic evaluations and reasoning above other dimensions of thinking; and marked its purpose as the recognition of what is truth and fair as the characteristics of the rational human thinking (Browne & Keeley, 1981; Ennis, 1985).

Other authors consider the psychological perspective of critical thinking as a complex thinking ability, involving itself other abilities (comprehension, deduction, judgement making, etc.), being critical thinking added to creative thinking the main components of the High-Order thinking (López Aymes, 2012, pp. 42-43). López Aymes (2012, p. 43) also considered the self-regulatory and reflexive nature of critical thinking as it is an activity that analyses our own reflections as well as the ones other people make.<sup>2</sup>

One more important feature we find in different definitions is the relation of critical thinking with problem solving. Thus we can find interpretations of this type of thought that describe critical thinking ability as the one that enable people students “to deal effectively with social, scientific, and practical problems” (Shakirova, 2007, p. 42),

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<sup>2</sup> “el pensamiento crítico es una actividad reflexiva porque analiza [...] los resultados de su propia reflexión como los de la reflexión ajena”. Translated by the author.

or in other words, people “who are able to think critically are able to solve problems effectively” (Snyder & Snyder, 2008, p. 90).

To sum up, we can consider critical thinking as the ability to consider and analyse evidence, take responsible and reasoned decisions and reflect about the way we think, all in order to solve efficiently problems in our daily life. A good summary of all these ideas is provided by Duron, Limbach, & Waugh (2006, p. 160): “Critical thinking is, very simply stated, the ability to analyse and evaluate information. Critical thinkers raise vital questions and problems, formulate them clearly, gather and assess relevant information, use abstract ideas, think open-mindedly, and communicate effectively with others.”

### **The need of critical thinking**

There are several examples that show the necessity of critical thinking in our society and our own daily life.

Some of them can be inoffensive like the numerous times we can find false news on the net, for example those about famous people having died. This news, called ‘hoaxes’, can rapidly spread through the internet with hundreds of people recalling this information and sharing unstated evidences, most of the times not even considering double-checking the fact. Other types of hoaxes can refer to UFO sightings, conspiracy theories, urban legends, April Fools’ Day jokes, etc.

The last example describes a spread attitude nowadays, not necessarily dangerous for people or society but quite worrying as it displays how easy is to convince a large portion of the population with very few evidence. It’s especially worrying when it affects our lives in a negative way. We know hundreds of stories about scams designed to deceive people and take their money, usually performed so the victim has to make decisions with very little time to think. We can consider here some cases of advertising that, although legal, are clearly designed to convince people of some benefits with little evidence, like dishwasher detergents that makes you save money or yogurt that improves your intelligence.

One remarkable case of fake publicity is the one performed by the creators of the famous plastic wristbands that became famous from 2009 under the promise of benefits in balance, flexibility, strength, overall welfare, etc. These promises and the fact that some celebrities and professional athletes used them were enough for millions of people around the world to buy this product although there was not real scientific evidence and numerous studies proved them soon to be ineffective, fact that was admitted some years later by a company representative (Radford, 2011).

Talking about politics, critical thinking also appears as a needed skill. It is typical in political campaigns that all candidates ‘forget’ about the current society problems and become a kind of ‘almighty saviour’ with the power to end with unemployment, disparity, poverty, corruption, crime, drug consumption, and a large etc. As Halpern (2013, p. 12) notes, all these promises “are inevitably followed with loud cheering and applause” by voters who don’t “ask them to be more explicit about their goals, how they would accomplish them, and where the money would come from to finance political plans”.

But the lack of critical thinking not only affects our social or economic life; it can affect even our health. In the last decade it has appear a growing belief that vaccinating children increases the chances of having autism or other diseases. This idea is spread through some internet groups where some individual cases are taken as scientific evidence<sup>3</sup>. Although this relation between autism and vaccines has been studied for many years with several researches showing no relationship between vaccines and autism<sup>4</sup>, there are still a lot of parents (and even doctors) against vaccines for children, sometimes with horrible consequences<sup>5</sup>.

### **Why we lack critical thinking?**

You should have by now a pretty clear idea of the importance of this skill for the present and the future. Since the beginning of mass education the basic need for the workforce was considered having proficiency in reading, writing and arithmetic (Halpern, 2013), but nowadays employers have higher expectations. 21<sup>st</sup> century

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<sup>3</sup> (Has anyone regretted their decision not to vaccinate?, 2013)

<sup>4</sup> You can find a lot of studies in (Autism and Vaccines, 2015)

<sup>5</sup> (Mom Whose Child Died After Catching Chicken Pox Advocates for Vaccines, 2014)

employees are expected to adapt to the fast changing business world; to “think critically, solve problems, innovate, collaborate, and communicate more effectively—at every level within the organization” (American Management Association, 2010, p. 1).

But we humans are not able to think critically just naturally, and all our learning experience after birth and in our first years (learn to walk, talk, play, etc.) don’t require us any critical thinking ability (Snyder & Snyder, 2008). On the other hand, it’s mistakenly assumed that when we become adults, after attending school, we already know how to think by ourselves (Halpern, 2013). In classroom students have to face problems, evaluate possibilities, make decisions, etc. but they are never taught how to do so. On the contrary, memorization is still a major teaching technique (although it’s too often a temporary knowledge). The sad truth is that some investigations about the impact of schooling on the development of thinking skills show that the influence of school is minimal (López Aymes, 2012; Snyder & Snyder, 2008).

According to Snyder (2008, pp. 92-93) there are four main barriers that impede a proper development of critical thinking at schools:

- Teachers are rarely trained in methodology about critical thinking training.
- Critical thinking resources are hardly offered in classroom materials.
- Some teachers have a bad preconception about critical thinking and some skills as being open-minded or inquisitive, preferring obedient and quiet students.
- Time constraints. “Instructors often have a great deal of content to cover within a short time period. When the focus is on content rather than student learning, shortcuts such as lectures and objective tests become the norm. Lecturing is faster and easier than integrating project-based learning opportunities. Objective tests are faster to take (and grade) than subjective assessments.” (p. 93).

Therefore, we can’t expect critical thinking to be enhanced just by mere teaching of concepts. The improvement of thinking comes from explicit instruction of thinking abilities, from learning experiences where students open their minds and get aware of their own reasoning through true life examples (Halpern, 2013; López Aymes, 2012).



## **Critical thinking through experiential learning**

What is the point of learning how to develop thinking abilities if they are “are only used in the classroom or only on problems that are very similar to those presented in class” (Halpern, 2013, p. 17). The whole intention of learning thinking skills is the possibility of recognizing and resisting misinformation (I talked before about the danger of false advertising, scams, politic promises, propaganda, etc.), cyclic reasoning, unprovable estimations of success in an action, etc. These abilities should allow us, either in the present or in a distant future, “to solve or offer reasonable solutions to real world problems, whether it is the problem of nuclear war or how to set up a new computer” (Halpern, 2013, p. 18)

If we design class situations in which students have to deeply question some circumstances and develop clear and coherent positions about them, it will be more plausible that the same attitude comes about in out-of-class situations even in other contexts and related to other topics (Mejía Delgadillo, Orduz Valderrama, & Peralta Guachetá, 2006). Then, we must consider when conceiving these situations that we can't put aside the specificity of each context students can meet (Pring, 2004).

These methods that encourage students to solve real life problems by understanding its characteristics, discovering different possibilities and trying and assessing possible solutions (Snyder & Snyder, 2008) can be contained in a specific kind of education: the experiential education.

Experiential learning is the outcome of the work of many 20<sup>th</sup> century scholars who changed the paradigm of education, placing the learner and all its experiences in the centre of the educative process (Kolb & Kolb, 2012). This is well illustrated in the definition of experiential education given by Carver (1996):

Experiential education is education (the leading of students through a process of learning) that makes conscious application of the students' experiences by integrating them into the curriculum. Experience involves any combination of senses, emotions (e.g., pleasure, excitement, anxiety, fear, hurt, empathy, attachment), physical condition (e.g., temperature, strength, energy level), and cognition (e.g., constructing knowledge, establishing beliefs, solving problems). (pp. 9-10)

As you can see in the definition above, experiential learning activities are not only related to movement (as it may be the first picture that comes to your brain) but also with social abilities, creativity, group work, life skills, scientific investigation, etc. Carver (1996, p. 3) includes the following projects as examples of different types of experiential learning:

- Wilderness-based travels.
- Job-training internships and apprenticeships.
- Survival training.
- Service programs.
- Art education and production
- Media production (newspapers, television, radio)
- Community-based support programs (with a primary goal of providing youth with a safe environment and stable support system for day-to-day living; life skills)
- T-groups (training groups; interpersonal dynamics workshops)

Other examples could be scientific investigations/observations, role playing, game strategies learning, etc.

Can we affirm then that experience and education are straightly related to each other? As the influent American philosopher John Dewey (1938, p. 13) wrote this relation is false “for some experiences are mis-educative” and have “the effect of arresting or distorting the growth of further experience”. We have to insist on the need of educative experiences but always depending on the quality of this experience. On the first hand we have to make sure that the proposed experiences are appealing and invite students to participate. On the other hand, we have to make sure that it is related with a knowledge that will be significant for the student, changing the learner’s ability level and promoting desirable future attitudes towards upcoming problems (Dewey, 1938).

Carver (1996, p. 11) recognizes four main features that integrate the principles of a good experiential educative situation:

- Authenticity: Activities and consequences are understood by participants as relevant to their lives. Students can identify reasons for participating in activities.
- Active learning: Students are physically and/or mentally engaged in the active process of learning. requires students to internalize the thought processes necessary for problem solving—searching for explanations, figuring out ways of understanding, using imagination and being creative
- Drawing on student experience: Educators create activities that provide opportunities for students to experience what it is like to interact with specific situations. They draw both on experiences students bring with them to a program and those that are shared by participants in the program.
- Providing mechanisms for connecting experience to future opportunity: Students develop habits, memories, skills, and knowledge that will be useful to them in the future.

Dewey (1938) recaps these desired features of an educative experience in two principles: continuity and interaction.

Continuity refers to the effect that every action we take part on has on further experiences, for better, developing a preference towards them so it is easier for us to act according a concrete end; or for worse, setting up an aversion. All experiences are influent and are able to grow in us attitudes and desires allowing us to safety confront even the unknown future. Its value then depends on where the experiences lead us into and towards. (Dewey, 1938, p. 30). One example could be a person who learns a new language, acquiring new desires and abilities but also expanding the possibilities of further learning. Other example could be recent parents that becomes more aware of certain conditions related to the baby but unaffected by other things that could have get their attention in other case.

The other principle is the interaction that always takes place between the person having an experience and the present conditions of the experience. These conditions or environment can refer to a person whom we are having a conversation or talking about, to a toy or a book (which can take us to infinite different environments, for example Feudal Japan). We can consider even our imagined experiences. These conditions that interact with our necessities, attitudes and competences related to the present experience expand or contract when we pass through different experiences. (Dewey, 1938, pp. 41-42) A clear example could be how technology creates instruments that become essential for some people while useless for others who are lost in that kind of environment.

As we can see experiential education is not about planless improvisation but about educators able to influence others' experiences. It is the task of the teachers to design experiences matching the abilities and necessities of their student and with an appropriate environment so they become useful and constructive experiences for the future.

Among all the possibilities that experiential learning offers, and always thinking in the main goal of developing critical thinking in our students, the recommendation of this essay is to focus, when possible, on experiences based on outdoor nature activities.

## **Outdoor Nature-based Education**

Nowadays, most kids in occidental societies live in urbanized areas, where access to nature can be difficult or even restricted. But it wasn't the same in the past, when children were surrounded by nature in different forms (cultivated land, farms, forests...), and it was this nature that children used to choose as their main playground. (White, 2004, p. 2).

As we can see in numerous studies, natural environments offer benefits for children. In this list of benefits we can find not only improvements in physical abilities such as balance and coordination (Fjørtoft, 2001) but also prevent obesity and other illnesses (Tucker & Gilliland, 2007) as well as presenting perks on other several aspects like creativity and critical thinking (Dyment, 2005, p. 28), long-term memory, social skills (Mygind, 2007, p. 163), concentration, discipline, etc. (White, 2004, pp. 4-5).

Furthermore, according to Piaget's theory of cognitive development (Ginsburg & Oppenheimer, 1988), children in school age (6-12 years) pass from the pre-operational stage, where the thinking is egocentric and based on what the child is able to touch or see; to the concrete operational stage, where logical thinking appears. In this stage the hypothetical thinking and inductive reasoning are developed, but the existence of a concrete object is still necessary (Piaget's theory of cognitive development, 2015). This necessity is what makes contact with nature a perfect tool for children development. Natural environments present nearly infinite possibilities to improve children thinking through observation, experimentation and discussion of the many different elements that surround them.

In spite of all these benefits, there are several studies showing that outdoor activities, and especially those concerning contact with nature, are getting lost due to several aspects as the nearness or facility to access to natural areas, the lack of the equipment or facilities, (Humpel, Owen, & Leslie, 2002, p. 192) fear of violence or lack of time (Herrington, 1998, p. 204).

One of these aspects that is determinant in outdoor activities is the related with the season and the weather (Humpel, Owen, & Leslie, 2002, p. 194), being these activities influenced by attributes as "amount of daylight, extreme temperatures and precipitation levels" (Tucker & Gilliland, 2007, p. 909). This result in a decrease of activity levels during the winter as poor weather, rain and snowfall becomes a barrier while the raise of temperatures has the opposite effect (Bélanger, Gray-Donald, O'loughlin, Paradis, & Hanley, 2009, p. 180). During the adolescence, physical activities decrease every winter more than the increase we can find in summer, what may help explaining the general decrease of physical activity resulting in a growing overweight in adult population, related to bigger risk of heart diseases, diabetes, depression, some types of cancer, etc. (Bélanger, Gray-Donald, O'loughlin, Paradis, & Hanley, 2009, p. 185).

Taking all this into account along with some studies showing that a vast majority of primary education children only participate in physical activities at school (RD 126/2014, 2014, p. 19406), it seems pretty clear that outdoor activities should be especially promoted at school/ high school.

### **Considerations as a teacher for outdoor activities**

Apart from the usual considerations (activity planning, project aims, assessment, etc.), outdoor activities require other certain considerations to be taken into account.

#### **Respect for Nature**

Human nature activities (especially tourism) are a growing phenomenon that may produce an increased stress over some natural areas (Patthey, Wirthner, Signorell, & Arlettaz, 2008, p. 1704). This may produce a negative impact on some species due to different factors: “habitat destruction or alteration”, “deposition of food remains, which may enhance predator density”, “increase of direct disturbance by humans inducing higher stress levels”, etc. (Patthey, Wirthner, Signorell, & Arlettaz, 2008, p. 1709). This can be even worse during winter, already a tough season by itself, or during the breeding season.

One of the basic aims for every outdoor activity must be the respect for the surrounding environment, trying always to leave the visited places the way it was before, and putting special attention when entering a protected area.

#### **Security**

One of the main concerns is the temperature and the weather. A correct outdoor dressing should be correctly anticipated according to the trip, especially in cold weather, being hands, neck and head the most important areas to cover as they are the “most involved in determining the blood pressure response to cold” (Donaldson, Rintamäki, & Näyhä, 2001, p. 50). But a heavy dressing is also not desirable, as an excessive temperature produces more sweat, elevating the humidity; and raises the metabolic rate (Morabito, et al., 2011).

Another factor that has to be taken into account (and not always is) is the protection against the sun. Some factors as high elevation, clear skies, reflection from snow or dry air increase ultraviolet radiation exposure (Andersen, et al., 2009) (Walkosz, et al., 2008). To avoid sunburns it’s important to use sunscreen on those parts of our body that are not covered and use correct sunglasses.

Other security circumstances to bear in mind can be the related with snow, orientation, games, campfires, instructions about the use of specific materials, etc.

# LEGAL JUSTIFICATION

This epigraph contains all those statements that justify the instruction of critical thinking abilities according to the official curriculum in Spain (RD 126/2014, 2014) as well as the present allegations supporting experiential learning and the presence of outdoor education as an illustration of it. Accordingly, nearly all the following content in this epigraph will be literal or non-literal translations of parts of this document. Exceptions will be correspondingly referenced.

## Of Critical Thinking

One of the main terms in the curriculum is that referring to the competences. They involve a ‘know how to do’ relevant in academic, social and professional contexts. To maximize the learning of these competences a teacher has to design tasks or learning situations that connect with problem solving, the implementation of the knowledge already obtained and the promotion of learning by doing (RD 126/2014, 2014, p. 19350).

Among the seven competences of the official curriculum there are two directly related to Critical Thinking, the competence on ‘Learning to learn’ and the competence on ‘Sense of initiative and entrepreneurship’. According to the Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning (2006/962/EC) these competences can be defined by:

- Learning to learn: “the ability to pursue and persist in learning, to organise one's own learning, including through effective management of time and information” [...] “includes awareness of one's learning process and needs, identifying available opportunities, and the ability to overcome obstacles in order to learn successfully” [...] “engages learners to build on prior learning and life experiences in order to use and apply knowledge and skills in a variety of contexts” (p. 16).

- Sense of initiative and entrepreneurship: “refers to an individual's ability to turn ideas into action. It includes creativity, innovation and risk-taking, as well as the ability to plan and manage projects in order to achieve objectives” (p. 17). Involves some skills as “the ability to plan, organise, manage, lead and delegate, analyse, communicate, de-brief, evaluate and record” (p. 18).

There are also references showing the necessity of critical thinking for the development of other competences. In this way we can see that the Digital competence “involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication” (2006/962/EC, 2006, p. 15) or how the competence on Communication in the mother tongue helps us to “to express and interpret concepts, thoughts, feelings, facts and opinions in both oral and written form” (2006/962/EC, 2006, p. 14).

Going back to the official curriculum (RD 126/2014, 2014), we find more examples of critical thinking abilities in the objectives for Primary Education (p. 19353-19354):

- b) Develop attitudes as self-confidence, critical sense, personal initiative, curiosity and creativity.
- c) Acquire abilities that allow an autonomous performance in different contexts like the family environment or other different social groups.
- e) Know and use properly the official language.
- i) Start using Information and Communication Technologies for learning, developing a critical sense for the received and elaborated messages.

As you can see, these objectives are directly related to the competences discussed above.

In the article number 10 of the law (RD 126/2014, 2014, p. 19356) they are cited the elements that must be present in all subjects, some of which have already been mentioned (expression and comprehension through language, CIT's, entrepreneurship, etc.). There are some explicit references to risky situations derived from the use of ICT's as well as the promotion of initiative, creativity, autonomy, group work, self-confidence and critical sense.



Finally, here you can find some allusions to critical thinking and thinking abilities in concrete subject from the curriculum:

- Natural Sciences (RD 126/2014, 2014, p. 19365).

All students need the foundation of a scientific training that helps them develop the competences needed in a changing reality, more and more scientifically and technological.

Children need to cultivate the main strategies of the scientific methodology as the ability to ask questions, identify the problem, formulate hypotheses, plan and implement activities to observe, collect and organize relevant information, organize and analyse results, draw conclusions and communicate, work cooperatively and use materials and tools properly.

They have to develop attitudes towards the problems they face at present, raising awareness, participating and taking reasoned decisions.

- Spanish Language and Literature (RD 126/2014, 2014, p. 19378).

The structure of human thought takes place through language, hence the ability to interpret messages and express oneself is the best and the most effective learning tool.

Reflection through reading, understanding and deciphering texts stimulate abilities as creativity and critical thinking and enrich our experience of the world and the knowledge of oneself.

The acquisition of these communication skills should be adjusted to the changing reality of an individual who is immersed in a digital society and is able to find information immediately through the information and communications technology. The students should be able to rebuild the explicit and implicit ideas in the text in order to make their own critical and creative thinking.

- Mathematics (RD 126/2014, 2014, p. 19386).

Mathematics help us deal with open situations, with no closed unique solution; they allow us to analyse the phenomena and situations that occur in reality, to obtain information and conclusions which were not explicit and act, speculate, get models and identify present relationships and structures.

- Physical Education (RD 126/2014, 2014, p. 19406).

Physical education offers varied situations in which students have to respond to external stimulus in a correct way. They need to correctly interpret the surrounding conditions so they can act accordingly, measuring the risks and their own personal capacities.

## **Of Experiential Learning**

When focusing on Experiential Learning (and on Outdoor Activities as a type of Experiential Learning) we can insist in the importance given to the competences in the curriculum. As we saw before, these competences involve a ‘know how to do’ in different context so the learning situations must lean on problems solving and on learning by doing (RD 126/2014, 2014, p. 19350).

There’s also a key competence directly related to this term, the basic competences in science and technology (stated in the curriculum as just one competence along with the mathematic competence). In (2006/962/EC, 2006) we can read that this competence “refers to the ability and willingness to use the body of knowledge and methodology employed to explain the natural world, in order to identify questions and to draw evidence-based conclusions”; and also “include the ability to use and handle technological tools and machines as well as scientific data to achieve a goal or to reach an evidence-based decision or conclusion” (p. 15). People with this competence have likewise an “attitude of critical appreciation and curiosity, an interest in ethical issues and respect for both safety and sustainability” (p. 15).

In the main objectives for Primary Education in the curriculum (RD 126/2014, 2014, pp. p. 19353-19354) we can see some targets affordable through Outdoor Education:

- h) Know the basic features of Natural Sciences, Social Sciences, Geography, History and Culture.
- k) Value hygiene and health, accept our own body and others, respect the differences and use physical education and sport as means to favour a personal and social development.
- l) Know and appreciate the animals most related to humans and embrace behaviours that help their care and conservation.

In the article number 10 (RD 126/2014, 2014, p. 19356) about cross-curriculum elements it is exposed the necessity of elements related to sustainable development and environment as well as the protection against emergencies and catastrophes. Additionally, there is an explicit reference about the requirement of including physical activity and a balanced diet in children life style, so schools have to promote the presence of sport and exercise within school hours as a mean to get to a healthy, active and autonomous life.

The last part of this epigraph will be as well the recall of the allusions and or references related to outdoor activities and experiential learning in specific subjects from the official curriculum.

- Natural Sciences (RD 126/2014, 2014, p. 19365).

Science is an essential medium to understand to world around us and its changes, as well as an agent to develop responsible attitudes towards all the aspects related to living beings, resources and the environment.

It is a help on the students way to an abstract thought towards the end of the stage, taking into account the concretion of their thinking, their cognitive possibilities and their interest and need of interact with their peers and with the environment.

- Social Sciences (RD 126/2014, 2014, p. 19372).

It includes contents as: the Universe, the Earth, orientation in space, water and responsible consumption, climate and climate change, landscape and its elements, human changes in the nature, etc.

In this subject students develop the capacity to value and respect the natural, cultural and artistic heritage, as well as the readiness to assume the responsibilities of its preservation.

- Physical Education (RD 126/2014, 2014, p. 19406).

This subject has to offer students different situations and contexts where they have to learn not only how to control their own movements and know their own possibilities, but also adapt to changing or unknown characteristics, arranging and adapting their behaviour to the environment variations.

The related activities are easily connected to the rest of areas of knowledge, enabling the reinforcement in several topics while increasing

values related to nature conservation. These individual or group (opposition or collaboration) activities include hiking or biking, camping, orientation activities, nature games, skiing or climbing among others.

We have to take into account that most of the children only have physical activities in school so sport and physical exercise must have an important presence in order to prevent inactivity some illness related to lack of physical activity and a sedentary lifestyle.

## **Of Foreign Language**

Although this essay will not focus in the relation of language and thinking, this connection is obvious. As the present project is oriented to demonstrate CLIL teacher competences, this epigraph will explore the references of (critical) thinking in the official curriculum concentrating on English as a Foreign Language, although the use of a foreign language is possible in other areas what will be an interesting field to explore.

The first reference we can find in the official curriculum (RD 126/2014, 2014) is the main objectives for the stage where it's stated the necessity of acquiring the communicative competence to cope with everyday situations.

In the point about the study of a foreign language (RD 126/2014, 2014, p. 19394) it's pointed out the necessity of foreign languages in a fast changing and more connected world.

The use of the foreign language in the classroom should be connected to the context of the students, with real situations and group task so language becomes also a way of socialization.

Finally, both in the curriculum and in the European Council document (2006/962/EC, 2006) we can find a clear reference to critical thinking as the necessity of obtaining information and using the ICT in a critical and systematic way as well as producing information creatively and innovatively.

# OBJECTIVES OF THE PROJECT

The main/general goal of this paper is to achieve a correct formation of critical thinking in school, using for it outdoor activities based upon experiential learning premises. With this we expect to stimulate and improve in students all the skills and attitudes that help them knowing how to discover knowledge about our world and how to identify which methods to use to distinguish between the good and the bad knowledge (Tunstad, 2014).

The specific knowledge, capacities and attitudes that we hope to promote in students are:

- To collect information in an efficient way. They need the capacity of clarifying the information (manipulate multiple symbols and ideas at the same time, ask questions, define the main terms, distinguish between the different elements, identify the main problem, etc.), judging the reliability of such information (recognize semantic slanting ,discern the credibility of the informer, identify the assumptions, check the logic of the argumentation, seek out contradictory evidence, etc.) and valuing the information (get proper conclusions, infer, make hypothesis, argue with the information, etc.) (Facione, Facione, & Sanchez, 1994; Facione & Facione, Holistic critical thinking scoring rubric, 1994; Halpern, 2013; López Aymes, 2012; RD 126/2014, 2014).
- To select among various possible actions using a method based on reasoned arguments. They should have a good disposition to plan their actions, how to think and act orderly; take coherent positions according to the plan and also be able to explain their reasons for the chosen path. Besides, they must anticipate the consequences of the actions, seeking those that lead towards the desired goal and those that may not work (Ennis, 1985; Facione, Facione, & Sanchez, 1994; Facione & Facione, Holistic critical thinking scoring rubric, 1994; Halpern, 2013; López Aymes, 2012; Mejía Delgado, Orduz Valderrama, & Peralta Guachetá, 2006; RD 126/2014, 2014).

- To solve problems persistently, keeping at a task even if it is a difficult one. It also includes engaging in an arduous duty not giving up with the first difficulty. For this students need to be confident in their own capacities of reasoning (Facione, Facione, & Sanchez, 1994; Facione P. A., 1990; Halpern, 2013).
- To be flexible when facing new ideas, recognising the need of this flexibility in a world that is continuously changing. They have to keep an open mind when considering alternative opinions/points of view, thinking on all the ways that are valuable and accepting that a problem may be resolved through several solutions, even those based on ideas that are divergent to their own previous ones (Dennis & Wal, 2010; Facione, Facione, & Sanchez, 1994; Facione P. A., 1990; Halpern, 2013; RD 126/2014, 2014).
- To search always the truth, the best knowledge, even if the facts are contrary or undermine our previous ideas, points of view or interests. Students also have to admit the mistakes they make and be willing to correct and learn from these errors as part of a problem solving process, avoiding and understanding when they take irrational positions (Facione, Facione, & Sanchez, 1994; Facione P. A., 1990; Halpern, 2013).
- To be aware of the process of thinking and of the results of their own thoughts. Students must learn how and when to use different learning strategies, how to recognise the quality of their own thinking and how to improve it, even when the practicality of this knowledge is not directly discernible. They also have to perceive when their thinking is influenced by attitudes as prejudices, stereotypes or egocentrism (Facione, Facione, & Sanchez, 1994; Facione P. A., 1990; Halpern, 2013; RD 126/2014, 2014).
- To seek consensus among other group members, not just accepting the majority ideas or imposing their own to others. They have to listen to others opinion and understand and analyse these points of view with impartiality, accepting all the positions that are right or favourable. For this, students need good language skills, using appropriate rhetoric strategies (style, amount of detail, vocabulary, etc.) when presenting reasons for choices, considering the receiver of the information, their

feelings, knowledge and beliefs. But they also need good skills to find agreements, being aware of the problems that they have to overcome to find an agreement even with a good reasoning (Ennis, 1985; Facione P. A., 1990; Halpern, 2013; RD 126/2014, 2014)

### **Specific Objectives of Experiential Learning**

As we saw before, not every experience is educative and brings positive effects in further experiences (Dewey, 1938). In the current case, designed educative experiences that choose outdoor as the main context will be subordinated to the main goal: the formation of critical thinkers.

This does not detract that we can pursue other desired consequences arising from the use of outdoor experiences in school. Some of these outcomes we expect to see in our students are:

- To be able to transfer the learnings acquired with these experiences to other situations in their life out of class, under other circumstances and in different contexts (Mejía Delgadillo, Orduz Valderrama, & Peralta Guachetá, 2006).
- To offer possible reasonable solutions to real life problems. They have to analyse the problem's characteristics, identify different answers and prove or evaluate the validity of these solutions. Imagination and creativity have an important role in this objective as they should be able to adapt their behaviour when facing an unknown or changing environment (Carver, 1996; Halpern, 2013; RD 126/2014, 2014; Snyder & Snyder, 2008).
- To participate actively and show curiosity and interest in the proposed activities, alone or in groups (collaboration or opposition). They have to be aware of the connection of the activity with other areas of knowledge, being aware of the surrounding elements, accepting the rules and advice given, and taking part in the investigations and discussions (Dewey, 1938; RD 126/2014, 2014; White, 2004; 2006/962/EC, 2006).

- To be competent in the use of different tools, machines and materials when carrying an investigation or when looking for a well based conclusion/solution to a problem. These utensils include from simple tools as knives, axes, nets, bottles or a compass, to technological gadgets as smartphones with internet connection, telescopes, microscopes or electronic probes (RD 126/2014, 2014; 2006/962/EC, 2006)
- To improve their physical abilities, as balance, resistance, coordination or movement control, accepting physical exercise as a healthy practice for personal and social development. They also have to know their own possibilities, accepting their own body as well as respecting the differences with others (Fjørtoft, 2001; RD 126/2014, 2014)
- To appreciate and frequently take part in outdoor activities in their leisure time, being able to adapt to the season and the weather. They should know how to anticipate the conditions of a future trip, as the rain forecast, the duration of the trip, the amount of sunlight or the available facilities; and consequently, they have to learn how to prepare themselves properly, the correct choice of clothes, maps, tools, protection against sun exposure, etc. (Andersen, et al., 2009; Donaldson, Rintamäki, & Näyhä, 2001; Humpel, Owen, & Leslie, 2002; Morabito, et al., 2011; Tucker & Gilliland, 2007; Walkosz, et al., 2008).
- To prevent and avoid security threats. They must learn the basic security rules when engaging an activity as in different displacements (through forest, over snow, in a city, etc.), using different tools and materials, orienteering, in games, making campfires or barbeques, etc. They also have to know how to act and protect themselves against emergencies and accidents (RD 126/2014, 2014; White, 2004).
- To raise an environmental responsiveness, avoiding nature activities that have a negative impact on animal or plants like the alteration of habitats, garbage disposition or the perturbation of some species during breeding seasons. They also have to adopt behaviours towards the care and conservation of the local nature areas, as well as the plants and animals present in these zones (Patthey, Wirthner, Signorell, & Arlettaz, 2008; RD 126/2014, 2014; 2006/962/EC, 2006) .



# Theoretical Activities Design Framework

## Determine learning goals “looking forward”

The first task of a teacher would include the identification of the key learning objectives. For that the teacher should think in the future and start at the “end”, the time after the activity, unit, course or even school is ended. Then the teacher has to look backwards and ask how to impact the future development of the students, what behaviours are needed and expected in the students, what knowledge, abilities and attitudes should they exhibit when facing different situations (Duron, Limbach, & Waugh, 2006; Fink, 2003).

That means that, when pursuing a development of critical thinking we can't just formulate the goals with explicit references of critical thinking abilities but in terms of acquiring competences that allow students to take part critically in social activities in their context (Ten Dam & Volman, 2004). So it involves going beyond the bare thinking strategies to discover the principles behind them: Efficient collection of information, reasoned selection of answers, persistent problem solving, flexibility and open-mindedness when facing new ideas and seeking consensus, awareness of our own thinking, etc.

Another factor to be taken into account is that, as referred in Duron, Limbach, & Waugh (2006, p. 161), when we want “to make critical thinking happen, these learning objectives, as well as the activities and assessments, must include those tied to the higher levels of Bloom's (1956) taxonomy”. This taxonomy of educational objectives (Bloom, 1956; obtained from Duron, Limbach, & Waugh, 2006, p. 164) distinguishes between:

- Knowledge focused on remembering and reciting information.
- Comprehension focused on relating and organizing previously learned information.
- Application focused on applying information according to a rule or principle in a specific situation.
- Analysis was defined as critical thinking focused on parts and their functionality in the whole.

- Synthesis was defined as critical thinking focused on putting parts together to form a new and original whole.
- Evaluation was defined as critical thinking focused upon valuing and making judgments based upon information.

Once one level of the taxonomy has been chosen, the corresponding objectives should connect with a suitable behaviour. For example, for the Knowledge level we should expect students to recall or describe facts, or for Comprehension, a good ability to understand and explain information. Application refers to the possibility of using the previous knowledge in new situations, Analysis relates to the capacity of seeing and classifying the parts of an information, while Synthesis consist in situations where students have to build something original with knowledge from different areas. The last one, Evaluation, is the highest level of the taxonomy and the most related to critical thinking. The expected behaviours of this type would include the judgement of statements, facts, evidences, predictions, etc. measuring the validity and coherence of the arguments (Duron, Limbach, & Waugh, 2006).

### **Teach through questioning**

If the first step for a teacher is to look forward to prepare students to show adequate behaviours for certain situations, the next step is to reproduce those circumstances. What we pretend with that is to link the development of thinking skills to everyday situations, to design a problem or a question that reflects the expected context in the most genuine way and promote the abilities to deal with it properly (Fink, 2003; López Aymes, 2012).

Although it is not the only valid method, there are several authors positing that questions made by the teacher impact student thinking most than any other strategy. So if we want to improve students' performance, attitudes and critical thinking skills we have to use questions and questioning techniques rather than just activities that require them to memorize and repeat information; with an approach that demands the use of higher thinking abilities (Analysis, Synthesis and Evaluation) to solve obstacles and make decisions (CCEA, A Thinking Classroom, 2015; Duron, Limbach, & Waugh, 2006; Snyder & Snyder, 2008).

Good questions help improving and widening our pupils learning, but not any question is suitable. Some studies state that the level of the questions made in class is proportional with the level of the answers and subsequently, with the level of thinking used (CCEA, *A Thinking Classroom*, 2015; Duron, Limbach, & Waugh, 2006). It's important then to know which kind of questions are more adequate for the type of learning pursued; to analyse and design the interactions between teacher and pupils and the topics involved in a way that help students relate their own previous knowledge and experiences, formulate their own questions, plan their next steps, etc. (López Aymes, 2012; Mejía Delgadillo, Orduz Valderrama, & Peralta Guachetá, 2006). Later, proven experiences that are based on questioning will be presented as the thinking routines of Visible Thinking (Ritchhart & Perkins, 2008) or the Thinking Cards from the Council for the Curriculum, Examinations and Assessment of Northern Ireland (CCEA, *Thinking Cards*, 2015).

Broadbear (2012, p. 4) distinguish between three types of questions: factual questions, that seek just a unique correct answer; preference questions, that have no exact answer as they rely upon personal preferences; and reasoning questions, those that require reasoning and have no correct answer but worse or better ones. Duron, Limbach, & Waugh (2006, p. 162) simplified it with just two categories: convergent questions, that “seek one or more very specific correct answers”; and divergent questions, seeking “a wide variety of correct answers”.

It's pretty clear then that, when pursuing the development of critical thinking the adequate type of questions would be the reasoning/divergent questions. These questions or problems with no correct answer demand students to persevere, reason and judge until reflected conclusions are obtained (Broadbear, 2012; Snyder & Snyder, 2008). With open-ended and not totally structured problems the process is centred on student reflection and discussion; there is no right or wrong answer as long as students base their responses to the problem on the analysis of the situation and an evaluation of the possible choices while being open-minded to new information that could change their conclusions (Broadbear, 2012; Duron, Limbach, & Waugh, 2006; Fink, 2003; Snyder & Snyder, 2008).

Therefore, students have to develop a questioning attitude that allows them to delimit a problem, puzzle out its characteristics, identify the possible conclusions and choose the most suitable solution/answer (Browne & Keeley, 1981; Snyder & Snyder,

2008). One example is the 5-Step Critical Thinking Problem Solving and Decision Making Process, or “IDEAS”, designed by Falcione (2011, p. 25):

- I → Identify the Problem and Set Priorities
- D → Deepen Understanding and Gather Relevant Information
- E → Enumerate Options and Anticipate Consequences
- A → Assess Situation and Make a Preliminary Decision
- S → Scrutinize the Process and Self-Correct As Needed

Adapting the analysis of IDEAS made by Snyder (2008, p. 96) the process would advance through the following questions:

- I → What is the real question we are facing?
- D → What are the facts and circumstances that frame this problem?
- E → What are the (most) plausible options?
- A → What (and why) is our best course of action?
- S → What did we miss?

It is also important that students have the opportunity to follow this process from the outside, for example in peer coaching techniques. When tutoring another student process they learn how to question other people reasoning, how to recognize the arguments behind the statements and also if the support to the conclusions is a good one or lies upon weak or false reasoning (Browne & Keeley, 1981; Ladyshevsky, 2006; Snyder & Snyder, 2008).

As a conclusion, a teacher pursuing critical thinking in his/her students should become a good questioner, what requires certain skills (Black, Harrison, Lee, Marshall, & Wiliam, 2004; CCEA, A Thinking Classroom, 2015; Duron, Limbach, & Waugh, 2006; López Aymes, 2012; Snyder & Snyder, 2008):

- To be able to raise brief and precise questions and also to reformulate them if necessary.
- To use different techniques to get the answers and to encourage the students to hunt for additional responses.
- To allow sufficient time for students to get a reply. Questions based on memory require speed while high level questions get better answers with time and patience enough to think properly. This is very important as some research (Rowe, 1974) shows that teacher waiting time for an answer tends

to be lower than a second, passing then to another question or answering it themselves.

- To support students' self-esteem. A teacher should favour and promote everybody's participation in a secure environment where they can share, work and develop their skills and where all contributions are valued.
- To redirect the answers and pose new questions towards a desired response.
- To give enough feedback and reinforcement avoiding the repetition of responses.
- To review the responses given explaining the best ones and making explicit the thinking process to get to them.

### **Make thinking important and explicit**

As we have seen in the last point, when designing strategies to improve critical thinking it is very important to make students aware of their own thinking process and to raise a disposition to reflect on their own thinking. As stated before, using questions and problems we can promote reflexive skills that go further than the mere resolution of the implemented situation but also about the outcome process, about the knowledge acquired, the knowledge missing, the steps taken, the decisions made, the reasons for those decisions, the consequences, etc. (Broadbear, 2012; Duron, Limbach, & Waugh, 2006; López Aymes, 2012; Snyder & Snyder, 2008).

The idea of using questioning techniques to involve students within their own thinking process has been stated in others and various studies. For example in Browne & Kelley (1981) we can see the value of some questions that at first sight don't seem important for a problem solution as (obtained from Snyder, p.95):

- What do you think about this?
- Why do you think that?
- What is your knowledge based upon?
- What does it imply and presuppose?
- What explains it, connects to it, leads from it?
- How are you viewing it?
- Should it be viewed differently?

This way, students are required not only to get a valid response but also to judge the efficiency and precision of their reasoning, to question if their thought process is deep enough, if they have considered other alternatives, if they have preconceptions that may interfere with the responses, if the content is relevant for them, etc. (Mejía Delgadillo, Orduz Valderrama, & Peralta Guachetá, 2006; Snyder & Snyder, 2008).

A lot of people make mistakes not because they are not able to think critically, but because they just don't use those abilities. It's our duty then not only to teach thinking strategies but also to create a classroom where reasoning is promoted, where a strong inclination and good attitude towards critical thinking is enhanced. It's also important to make thinking visible, to allow students to observe good thinking process so they can imitate and incorporate these good practices (CCEA, A Thinking Classroom, 2015; Halpern, 2013).

A classroom where critical thinking is promoted has to be environment where this kind of thinking easily manifests, a small society where values as the truth, empathy, open-mindedness, autonomy, rationality or self-criticism are treasured. A space where students can think effectively and reflect about small or big problems, share opinions, explore their own beliefs, analyse other points of view, etc. With the teacher as a mediator, the classroom will become a territory where students learn to believe in its own mind (López Aymes, 2012; Mejía Delgadillo, Orduz Valderrama, & Peralta Guachetá, 2006).

Consequently, when designing new lessons (or remodelling old ones) a teacher should take into account the inclusion of different thinking strategies, making them explicit. This should be done in an active way, in activities that are based in the principles of experiential learning (Duron, Limbach, & Waugh, 2006; López Aymes, 2012). Teaching thinking activities in a passive way would be a complete nonsense itself. Some examples of activities where a more active/experiential learning is promoted could be some of the ones that we have referred along this essay (problem solving, debates, role-plays, reflective journaling, etc.) (Duron, Limbach, & Waugh, 2006; Fink, 2003; López Aymes, 2012).

One good example of activity where thinking is made explicit and important is found in the work by Halpern (2013, p. 27). The activity just require students to debate and take a position in a debate and find arguments and proof that support that position. Then they have to think on arguments and counter-proof that refute the decision they took. With this they concentrate on the quality of their reasons and arguments, realizing the strength of their thinking and the weak points in their reasoning. It also helps students discovering how their beliefs and the others' can affect our judgement.

Another good example found in the literacy research carried out is based on Browne & Keeley's *Asking the right questions* (1981). The principle defining this example would be the observation and review of other people's reasoning. When studying the arguments exposed by other person a student is not only confronted to different opinions and points of view, but also to the necessity of checking the validity of those arguments and the quality of the reasoning behind them. These kind of exercises helps developing a critical thinking through the reflection about other people thinking process, scrutinizing the validity and solidity of the evidence provided and also looking for personal values or preconceptions and contexts characteristics that influenced the information received.

To end this point we have to consider also the importance of the assessment when pursuing a boost in the importance and visibility of thinking in our classes. It's important that the students know the expected skills and attitudes as well as the criteria to evaluate when these abilities are used correctly (Broadbear, 2012; CCEA, A Thinking Classroom, 2015).

### **Assess for learning and promote peer/self-assessment**

Teaching that pursues an improvement in student's thinking must take care also of the way of assessing. After targeting a specific conduct and make a series of exercises to practice these behaviours, the purpose of the assessment is to check the display of the desired response. But we have to avoid and go beyond assessment that just satisfies purposes of accountancy, an audit of records, grades, rankings, etc. (Black, Harrison, Lee, Marshall, & Wiliam, 2004; Duron, Limbach, & Waugh, 2006; Fink, 2003). The fact is that, as Black & Wiliam (2012, p. 11) defended, "Assessment in education must, first and foremost, serve the purpose of supporting learning".

The last phrase is beyond question but it takes special importance when targeting an enhancement of thinking capabilities. This type of assessment, defined by many authors as Assessment for Learning (from now on we will use AfL as in (Hernández, 2010)) is considered as fundamental in the process of learning and teaching (Hernández, 2010). With AfL students get more involved in the learning process, taking care of what they are doing and why, getting more feedback and becoming more responsible of their achievements and failures. Taking charge of their own learning process and needs helps them achieving a more autonomous and independent thinking (Broadbear, 2012; Fink, 2003).

The first feature that characterizes AfL involves sharing the learning goals, making students aware and responsible of the aims followed. Students need to know why they are doing something and also that it matters and has a purpose. Knowing the intention and the reasons behind an activity makes students to feel a sense of ownership of the process and will make them more likely to work in the requested direction. It's a way also to help teachers guide the process and remind students what they are aiming for (Fink, 2003; Hernández, 2010).

But knowing the learning goals is not enough when assessing for learning. Students must be aware also of the criteria for assessment, the standards they are aiming for. That means that, apart for knowing the expected behaviours they should recognize the expected level of achievement of performance. As a result of this students become more autonomous and capable of assessing themselves or/and even other students (Fink, 2003; Hernández, 2010).

This ability of performing self-assessment or peer-assessment is also a feature of AfL. Once the students know the criteria for assessment they can regulate their own performance independently just comparing the expected standards with their outcomes. Self-assessment is vital to thinking development as it implies the completion of an aim by the understanding of that aim and the evaluation of the process followed to hit it. (Black & Wiliam, 2012; Hernández, 2010).



It's easily seen how the same ideas can be transferred to assess other students work. Furthermore, explaining something they know to someone else is also a learning experience, especially concerning communication and social skills. The use of a natural language for them in their interchanges helps also a better understanding of the criteria of the peers, thus improving the other student self-assessment skills (Black & Wiliam, 2012; Internationals Network for Public Schools, 2014).

These techniques are difficult to implement as students find it hard to develop the required skills, so it is important that they frequently have the opportunity to participate in self-assessment activities, first in big groups where the ideas can emerge more easily and then individually, ensuring that the criteria is very clear (Fink, 2003; Hernández, 2010).

Another characterizing factor of AfL is the necessity of providing feedback. Related to the last point, it's a good way to share the criteria for assessment , helping also the creation of a framework students can use in the future to recognise the steps they need for their own assessment (Duron, Limbach, & Waugh, 2006; Hernández, 2010; Snyder & Snyder, 2008).

Classroom dialogue, with the use of a large amount of feedback, has shown better results in the enhance of critical thinking than the mere grading of students responses, reinforcing at the same time the quality of their learning and achievements (Black & Wiliam, 2012; Duron, Limbach, & Waugh, 2006; Ten Dam & Volman, 2004).

Teachers have to learn how to provide quality feedback, characterized by Fink (2003, p. 14) as "FIDeLity" feedback:

- Frequent: Give feedback daily, weekly, or as frequently as possible.
- Immediate: Get the feedback to students as soon as possible.
- Discriminating: Make clear what the difference is between poor, acceptable, and exceptional work.
- Loving: Be empathetic in the way you deliver your feedback.

But a teacher should also be able to use feedback, to review and reflect on the data retrieved during his/her practice. This way, with the information provided by students and collected by the teacher, the rightness of the tasks made, as well as the level of achievement of the aims, the effectiveness of the activities and the changes or steps to take in the future will come to light. A teacher diary reflecting the grade of participation, the activities made and the outcomes may help this purpose (Duron, Limbach, & Waugh, 2006; Hernández, 2010).

The importance of giving feedback involves also the way of giving this feedback. It has been usually made by the giving of marks or grades to the students' outcomes sometimes accompanied by comments about their performance with weak and strong point. The problem is that when marking or grading students, they tend to ignore the teacher's observations, being deprived of the benefits of feedback we have just explained. The same happens when providing marks to parents that keeps their attention from the learning issues to just the results (Black, Harrison, Lee, Marshall, & Wiliam, 2004; Black & Wiliam, 2012).

Marks have other undesired effects, especially the comparisons it provides between students. It may seem that activities are competitions where the high achievers will effort just to succeed while those whose performance is lower will find little incentive to even try, so none of them will truly see an improvement in their learning (Black, Harrison, Lee, Marshall, & Wiliam, 2004; Hernández, 2010).

On the other hand, when given comments students see it as a help towards the completion of a task. With the belief that they (especially the low achievers) are capable of accomplishing the desired goals the motivation is raised and with it their overall performance and learning. In case of the necessity of using grades they should be used in a way that shows success and the improvements attained instead of mere classifications, and they should include suggestions and examples to help the improvement of the student performance (Black, Harrison, Lee, Marshall, & Wiliam, 2004; Hernández, 2010).

### **Assessment strategies**

According to Hernandez (2010), AfL involves not only standardized tests to get information about the process of learning but multiple ways of taking data concerning teachers and students as well. The same author (about minute 5:00 in the video) listed a series of means of taking data for assessment:

- Draw and write
- Creating diagrams
- Make a chart
- Fill a table
- Tell the class
- Tell another class
- Make a model
- Make a display
- Keep a diary
- Act it out
- Write a report
- Make a tape
- Keep a record as it is being done
- Turn it into an assembly
- Tell an adult audience
- Make a poster
- Ask questions and record the answers
- Take photographs
- Use ICT

Other ideas include activities involving self and peer-assessment, like showing good and bad examples of other students work to make clear the criteria of assessment; or the own labelling of a work to show the confidence in their results that can lead to a correction in groups/pairs (Black & Wiliam, 2012; Broadbear, 2012).

Standardised tests can be useful for AfL purposes as Black & Wiliam (2012, p. 19) showed. Involving students in its preparation, highlighting the key words/topics that should appear and making them create, answer and grade their own exams they are compelled to think about the aim of the questions and about the standards they have to reach. It's also a good way to make teachers aware of the understanding of their students about the learning goals and the criteria they should apply in their own evaluations.

# Analisis of existing critical thinking experiences

## Visible Thinking

This is an initiative that explores the use of “thinking routines and documentation as classroom learning tools” as well as develops “framework for pursuing cultural transformation in classrooms and schools” (Ritchhart & Perkins, 2008, p. 57). It has been proved in schools in the United States, Europe and Australia from elementary schools to university classes.

The initiative lays on six key principles (Ritchhart & Perkins, 2008, p. 58):

- Learning is a consequence of thinking
  - With the improvement and use of thinking the understanding of concepts is improved. This improvement increase when team work offers possibilities to support and assemble on each other’s different knowledge.
- Good thinking is not only a matter of skills, but also a matter of dispositions
  - “Open-mindedness, curiosity, attention to evidence, scepticism, and imaginativeness [...] all concern not so much a person's abilities as how the person invests those abilities. Children and adults often greatly underutilize their thinking capabilities” (p. 58). Education should encourage these attitudes towards thinking.
- The development of thinking is a social endeavour
  - The social structure in the classroom should promote interchanges within the group where everybody learns from each other.
- Fostering thinking requires making thinking visible
  - Thinking is in our minds, invisible to the rest. To make it visible is necessary the use of different means like speeches, conversations, documentations, plays, etc.

- Classroom culture sets the tone for learning and shapes what is learned
  - Daily routines, language used, expectations, time restraints, etc. should be taken into consideration as they greatly influence the pace of reflective schooling.
- Schools must be cultures of thinking for teachers
  - Teachers should share their experiences and they should be provided the time and means necessary to discuss about teaching, learning and thinking.

The positive effects that have been observed with the use of Visible Thinking include (Ritchhart & Perkins, 2008, p. 60):

- Students who previously believed they lacked a voice or that their ideas weren't valued, including students with learning disabilities, participate more actively and confidently.
- Students' awareness of thinking strategies dramatically increases at all grade levels.
- Making thinking visible enables teachers to more accurately assess students' understanding.
- Thinking routines helped students structure their thinking before they began writing essays.
- Student scores have significantly increased on state and district tests in reading, writing, and social studies.

Routine Example 1: Think Puzzle Explore<sup>6</sup>

1. What do you think you know about this topic?
2. What questions or puzzles do you have?
3. How can you explore this topic?

A routine designed to begin a topic and collect the previous knowledge of the students as well as raising their curiosity and preparing them to investigate independently.

It may require train with the students so they can recognize better questions/puzzles. Making a record of their ideas could help them see which things are more interesting to them.

Routine Example 2: What Makes You Say That<sup>7</sup>

1. What's going on?
2. What do you see that makes you say that?

With the use of this routine students internalize the use and search of evidence when analysing an interpretation. Sharing their reasoning, students will also raise an awareness of the existence of different points of view and alternatives.

It is a flexible routine that can be used when describing an object, an idea, an event, a fact, etc. It can be used also at the beginning of a topic to collect student previous ideas or concepts.

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<sup>6</sup> Available (17/6/2015) in:

[http://www.visiblethinkingpz.org/VisibleThinking\\_html\\_files/03\\_ThinkingRoutines/03\\_d\\_UnderstandingRoutines/ThinkPuzzleExplore/ThinkPuzzleExplore\\_Routine.html](http://www.visiblethinkingpz.org/VisibleThinking_html_files/03_ThinkingRoutines/03_d_UnderstandingRoutines/ThinkPuzzleExplore/ThinkPuzzleExplore_Routine.html)

<sup>7</sup> Available (17/6/2015) in:

[http://www.visiblethinkingpz.org/VisibleThinking\\_html\\_files/03\\_ThinkingRoutines/03\\_d\\_UnderstandingRoutines/WhatMakes/WhatMakes\\_Routine.html](http://www.visiblethinkingpz.org/VisibleThinking_html_files/03_ThinkingRoutines/03_d_UnderstandingRoutines/WhatMakes/WhatMakes_Routine.html)

## Edutopia: Brain Based Learning

A teacher that knows the inside performance of the brain can influence more in their students. For example, scaffolding new topics on previous knowledge activates and creates links in the brain network, or using song and dances we are using the kinaesthetic and musical intelligences for our purposes (Edutopia, 2011).

Edutopia (2011) presents six tips designed to help teachers develop activities towards Brain-Based Learning:

- Create a safe climate for learning
  - Teachers should avoid stress and create environments where students are engaged to learn and social connections and emotions are supported.
- Encourage a growth mind-set
  - Students should know that the brain is a ‘muscle’ that can be trained and strengthen if it is trained. The expectation of an improvement raises student’s willingness towards challenges.
- Emphasize Feedback
  - Encouraging feedback that drives towards improvement is necessary and much better than simply providing a grade or a comment stating if the task or answers are good or bad.
- Get bodies and brains in gear
  - *Mens sana in corpore sano*. The brain is part of our body and depends on it. Including physical activity in school helps raising the flow of blood to the brains while increasing the ability to concentrate.
- Start early
  - Children brains change very fast in their first years. Parents should have information about how to prepare their kids so they are prepared and keen to learn when they start school
- Embrace the power of novelty
  - Repetition is not a good strategy and makes the brain look for other stimuli. To grab the attention of student, teachers should introduce changes in class. New information, routines, contexts, etc. are strategies that get the brain excited and focused.

## Thinking cards

Thinking Cards (CCEA, Thinking Cards, 2015) is a resource created by the Council for the Curriculum, Examinations and Assessment to support thinking skills and personal capabilities of students from any educational stage.

The cards are divided in five main strands:

- Managing information
- Working with others
- Self-management
- Being creative
- Thinking, Problem-Solving and Decision-Making

The title of the card gives a clue of the situation it may help with. On the back of each card there are questions or prompts to scaffold the students thinking and guide them through their tasks.

There are three set of cards, being the number 3 the one with more complex language and involving high-order thinking capabilities. Set 1 and 2 guide students in a more lineal way while set number three encourages students to think creatively and develop their own responses.

When planning activities you can use Thinking Cards when introducing a new topic or activity, or when you want to reinforce or help them with something. Then you can locate a card related to the problem or situations your students will have to achieve. Finally you can structure the activity into parts with the use of the questions/prompts.

When students are more used to the cards you can introduce more cards in each activity. For example a theatre play could include the cards 1.22 'Choosing an idea' and 1.25 'Making ideas real' and 1.40 'What worked well?'

Another possibility in this point is letting the students select a strand and a card according to the activity they are doing. It's also a way to assess different aspects as if the students are able to recognise their needs according to an aim and justify the choice of a card or if they can select useful ideas and confidently refuse others that are not useful for them.



# Conclusion

The first conclusion is that, in general the main objectives are all fulfilled. The designed framework helps promoting abilities in students that will make them able to collect information efficiently, look for evidence that support that information and take reasoned decisions. Furthermore, if we compare it with the existing experiences it's clear that most of their foundations match the ones exposed here (use questions/problems, make think visible and important assess for learning).

The desired attitudes are also raised with some of the methods that characterize this framework as the use of questions or peer-assessment that can lead to the consideration of other points of view even if they are contrary to our beliefs, improving the flexibility and open-mindedness and the consensus seeking; or the fact of making thinking visible and using feedback what boost student's confidence in their capacities towards problem solving and make them persistent and responsible when following the aims proposed.

Although the framework doesn't contain specific references to outdoor education, is easily seen how nature can be a valuable source of experiences, where questions and problem solving situations come out continuously, and also how critical thinking training can develop the desired attitudes as an awareness of the environment and the raise of curiosity. The design of a more specific framework or activities concerning outdoor activities and critical thinking training is one of the extension possibilities of this project.

Other possible topics to enhance/extend this project could be the influence of the classroom management in critical thinking training or the improvement of critical thinking in the area of Physical Education (both ideas present in Edutopia, 2011).

## **CLIL teacher's competences achieved**

Although the use of language and more specifically a foreign language is not present in this project, the connection between language and thinking is very obvious (we use the language to think) and I consider that this framework can easily include activities accord to my speciality in English as a Foreign Language teaching. So, despite this absence of specific references, I consider that this project demonstrates I have achieved some of the competences of a CLIL teacher as (Bertaux, Coonan, Frigols-Martín, & Mehisto, 2010):

- Can read subject material and theoretical texts.
- Can use appropriate subject-specific terminology and syntactic structures
- Can plan for the incorporation of other CLIL core features and driving principles into course outlines and into lesson planning, including:
  - learner autonomy
  - fostering critical and creative thinking
- Can select learning materials, structuring them or otherwise adapting them as needed.
- Can guide students in maintaining a multiple focus on content, language, learning skills and critical thinking.
- Can design tasks that involve students using several learning styles.
- Can create opportunities for and support students in researching topics independently and through cooperation with peers.
- Can help students develop meta-cognitive awareness
- Can engage students in an assessment-for-learning culture including:
  - making connections between planned outcomes, learning skills and processes, actual outcomes, planning and negotiating strategies for future learning
  - using self and peer-assessment tools
- Etc.

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