



Erasmus+

Science and Global Education beyond the barriers
of learning difficulties 2015-1-IT02-KA201-014774





PROGRAMMA ERASMUS+ KA2 STRATEGIC PARTNERSHIP – School education area

Activity code: 2015-1-IT02-KA201-014774

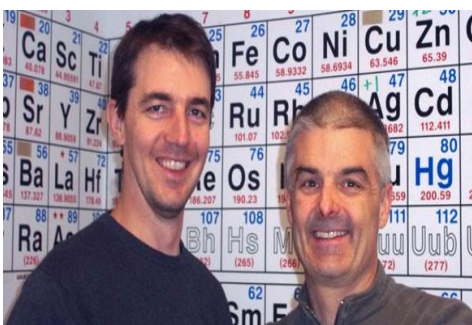
Project title: Science and Global Education beyond the barriers of learning difficulties

Guidelines : Why, and how, applying spaced learning and flipped classroom in the presence of SEN (Special Educational Needs)

By ADI

BRIEF INTRODUCTION; WHAT ARE FLIPPED CLASSROOM AND SPACED LEARNING?

FLIPPED CLASSROOM FLIPPED



As we all know, flipped classroom method has developed in the U.S. thanks to two chemistry teachers, in a rural area of Colorado, who were worried by the school absences of some students. These teachers are Jonathan Bergmann and Aaron Sams. In 2007 they started to produce some video recording using screencasting softwares to create lessons (complete with show-and-tell and notes) that could be followed by “deferred coverage”. The result was uploaded on the “newborn” You Tube. They also published a book on their work called “Flip your classroom: reach every student in every class” (Ed. Day Every, 2012). The two teachers have reported that, after flipping their class, the students began to interact more. Also, due to the fact that time at school could be used in a more flexible way, those students that showed some difficulty could get more attention in class while those more independent continued to make progress anyway.

In 2012, Sams and Bergmann launched the *Not-for-profit flipped Learning Network*™ (FLN) in order to provide knowledge, competence and resources to implement successfully the “Flipped” learning/teaching model. The FLN Ning site, is free for all teachers that flipped, or decide to flip, their classroom.

Just to give you an idea of the growing interest on the subject, we would point out that, in January 2012, 2500 teachers were registered on the website, while already in March 2013 that number grew to over 12.000 !!



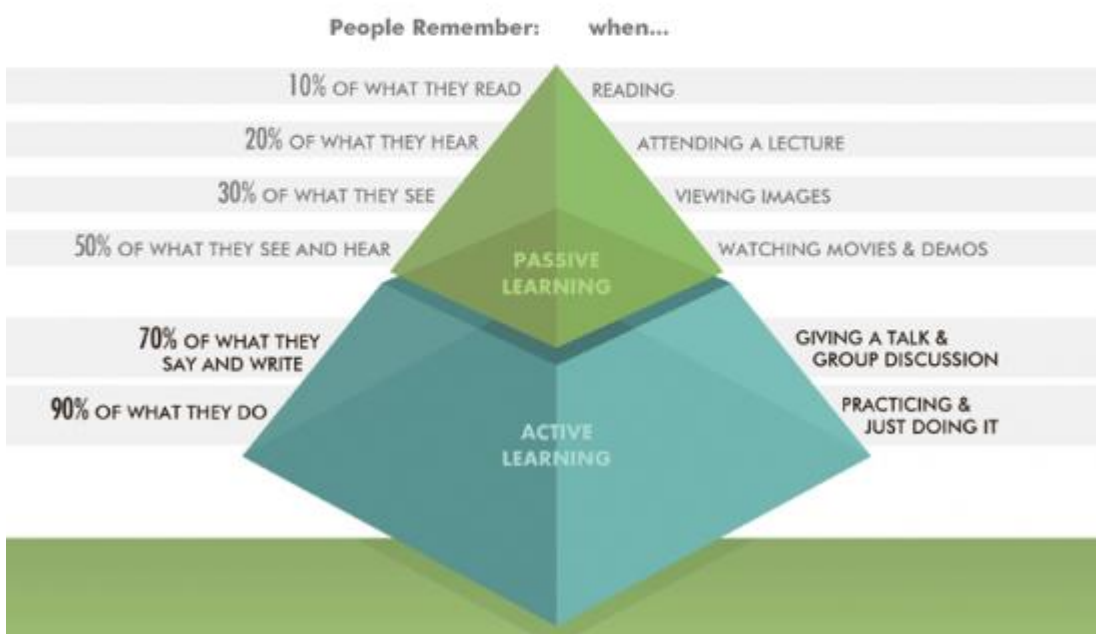
Spaced learning has been created by Paul Kelley, who tried to apply the theories of Douglas Fields, an american neuroscientist from the National Institute of Child health and Development, in teaching. He discovered that the brain cells “light up” and connect among themselves depending on how they are stimulated. Strangely, if the stimulation is prolonged, the cell doesn’t “light up”; Stimulations must be separated by intervals. Fields team has verified that an interruption of 10 minutes between stimulations is needed to activate the cell and establish the long-term memory’s construction path. A “Spaced” class so is structured by 3 inputs separated by 10 minutes breaks; These 3 inputs follow the sequence: to present, to remember, to understand. They are generally organized on a powerpoint file that can be displayed on an interactive board but also delivered to the students as a paper document or as a digital file. The first slides are used to follow the explanation of the teacher without taking notes, The second input generally consists of the same slides shown during the introduction but with some missing texts that the students are asked to remember; the third stimulation consists of different activities, all described on slides, aimed to a full comprehension of the subject discussed.



Three years ago, while *Flipped learning* and *Spaced learning* continued to create more and more interest, ADI (italian teachers association) finalised a European project (initials FLI-SPA 2020), on the use of these methodologies in different countries. The study continued, together with the schools Aldini, Valeriani and Siriani in Bologna, the municipality of Bologna, the municipality of Gdynia, a technical institute in Gdynia, and a turkish technical school in Izmir. It finally has led to the proposal, in 2015, of a european project aimed to plan, experiment and evaluate climate change classes using these two methodologies with SEN students (special education needs)

WHY WE SHOULD USE FLIPPED CLASSROOM AND SPACED LEARNING IN THE PRESENCE OF SEN

ACTIVE LEARNING & STUDENT PERFORMANCE



The possibility of increasing the active (in the class) learning opportunities is a fundamental, and common characteristic of Flipped Learning and Spaced Learning models; that is because theoretical video lessons are watched at home or, in the case of Spaced Learning, they are condensed in a maximum of 15 minutes.

Many active-learning strategy studies support the efficiency of this approach to improve all students learning and their wellbeing at school (For ex.see Prince, 2004). The active learning provides the students with the opportunity to elaborate the contents through reading, writing, listening, exposing, guided thinking and creating (University of Minnesota Center of Learning and Education, 2008).

The active learning improves the student's academic performance (Hake, 1998; Knight & Wood, 2005; Michael, 2006; Freeman et al., 2007; Chaplin, 2009); it increases the student's involvement and it improves critical thinking; it also improves the student's attitude and their ability to interact and cooperate (O'Dowd and Aguilar-Roca, 2009). (Akinoglu and Tandogan, 2006). Finally, it has been demonstrated that active learning in science has a positive influence on the future college student, it improves his disciplinary performance, his critical thinking and his behavior

Now we present some of the strengths of these two strategies and the reasons why they are considered especially useful in presence of SEN (special educational needs) students

1) **they create an inclusive environment**



Due to the fact that these methods allow a wider range of different learning, they force teachers towards a distinct change of mentality. They lead them to abandon their stiffness in favor of more flexibility regarding learning environments, methods, rules, work deadlines and evaluations deadlines.

While using Flipped Learning and Spaced Learning, the possibility to have a flexible environment, where students can choose and carry out different activities, becomes essential. Furthermore, teachers must accept the fact that the classroom will be rather chaotic and noisy compared to a quiet typical class of educated highschool students attending a taught lesson. Teachers are encouraged to become more flexible about their expectations, deadlines, and evaluating methods used. The Teachers, in fact, become guides that support, stimulate and help group work. They must monitor all groups, make sure that each student has its own "role" within the community where he works, help them overcome the difficulties, create the premises to establish an environment that is truly inclusive and where each student can find his "place".

2)these methods encourage teachers to plan carefully all learning experiences together with their colleagues



You will need a great deal of planning work before introducing these methods; you can't improvise such lessons. This encourages the teachers to work as a team, to take into consideration all students they work with, to consider their strengths and weaknesses and to search the methods that allow each one of them to integrate successfully in work groups.

Also, a big part of the lesson planning must be focused on the evaluation: when looking for an evaluation that has a “meaning”, It becomes essential to incorporate not only the disciplinary evaluations but also all the keys and transversal abilities that can (and must) be developed through effective teaching; abilities that are increasingly requested by the labour market. Not only the classic transversal skills (act in a responsible and independent way; learn to learn) will be valued, but also the student's skill to stimulate the group and his ability to create a positive and inclusive work-environment.

3) Flipped and spaced solve the irregular attendance problem and allow everyone to make progress at their own speed; They also help who monitors the students at home because they encourage teachers to file and post resources and contents ON LINE (Powerpoint or Video)



Flipped lessons (inverted lessons) as well as spaced lessons (lessons spaced in time) encourage teachers to create videos and powerpoint docs filed and sorted in Moodle, Edmodo classes, or of any different kind,.This allows the students, and also who monitors them, to view the content several times, according to their needs, using all the time they need to process it. Furthermore these contents are available to parents, or other figures that monitor the kids at home, and are accessible 24 hours a day.

Which students benefit from online content? All students benefit from it, however, it is a huge help in removing learning barriers to dyslexic and disabled students (See: www.skillsforaccess.org.uk/index.php). It also helps foreign students who, often, spend long periods of time in their countries of origin, extending the normal school holidays. The access to online resources, also, giving the option to work from anywhere, gives the students with walking difficulty a flexible access to school resources.

HOW TO USE THESE METHODS IN THE PRESENCE OF SEN : guidelines to use flipped classroom and spaced learning successfully in the presence of Special Educational Needs

1) The creation of an inclusive learning environment

1.1 The creation of working groups and roles



Both flipped classroom and spaced learning leave more time available in the classroom to be used for truly educational activities which should be carried out using cooperative learning.

When establishing a genuinely inclusive environment, the creation of working groups plays a strategic role that is fundamental. Let's see which are the main aspects to take into consideration

The dimension of the working group : It is always better to create SMALL GROUPS of 2 or 4 (avoid 3) however we want to remind that :

- the bigger the group, the greater the capacities, knowledge, skills and the number of available minds to acknowledge and process the information.

- the shorter the time, the smaller the group.

- the smaller the group, the greater the chance that the students don't contribute actively.

- the bigger the group, the bigger the skills of its members to deal with all the others. A common mistake, made by many teachers, is to create groups of 4 or 5 or 6, before the students acquired the skills to work in a competent way (2 interactions are managed in a couple; 6 interactions managed in a group of 3; 12 interactions managed in a group of 4).

Composition and co-operative targets : The group's composition (heterogeneous or consisting of students having similar level of competence), should be decided by the teacher. It is also

appropriate to define the roles within the groups to promote collaboration, task-interdependence and the achievement of the co-operative and disciplinary targets proposed.

Examples of co-operative targets: keep an appropriate tone of voice within the group, respect different points of view, mediate between different opinions, don't prevaricate your classmates, meet the deadlines (to this end, it is advisable to get the students to draw up a brief report, written or verbal, at the end of each meeting, that will help them to determine how much has been done and how much is still left to complete the task), take good care of the material generating and mediate the relationship between the group and the teacher.

Roles : once decided the cooperative and learning targets, we suggest to outline in detail the role that each member of the group will have to play.

One way to introduce the concept of role in a class is to use the analogy with team sport.

We can compile a list of different roles of a sport team (who is the halfback and what does he do, the quarterback etc...), then we can explain that we will divide the class in co-operative learning groups where each member will play a keyrole.

While planning the lesson we have to consider what are the necessary actions to maximise the learning of all students, with or without SEN. The roles define what the other members of the group expect from one student, and what that person has the right to expect from his team-mates.

The roles within co-operative teams often correspond to duties that promote the management and running of the team, stimulate it, and facilitate the students learning.

We should start with simple roles (team's management and running) Ex: watch the tone of voice, keep the noise down, respect the rounds of speech, explain ideas and procedures, write down the discussions and the decisions taken by the team, promote involvement, observe the members behaviour etc.. Each duty should be supported by a note/survey form

Interdependence and groups evaluation: Let us remember quickly what are the main interdependence structures within a group

There is a **positive interdependence** bound to the team's **goal** when the team members work together to reach a common achievement. To have a mutual goal bring the members to help each other because they would not be able to achieve the goal by themselves

We can talk of **interdependence of duty** when the members, despite having a sole purpose, divide the duty in parts to be carried out individually but aimed to the same common purpose. For example, when preparing a report, one will set up the, another one will lay out a written text on computer, and another one will take care of the oral presentation. Or, facing a history subject, one will examine the artistic events of the time, another one the social and philosophical culture, and a third one the city blueprints.

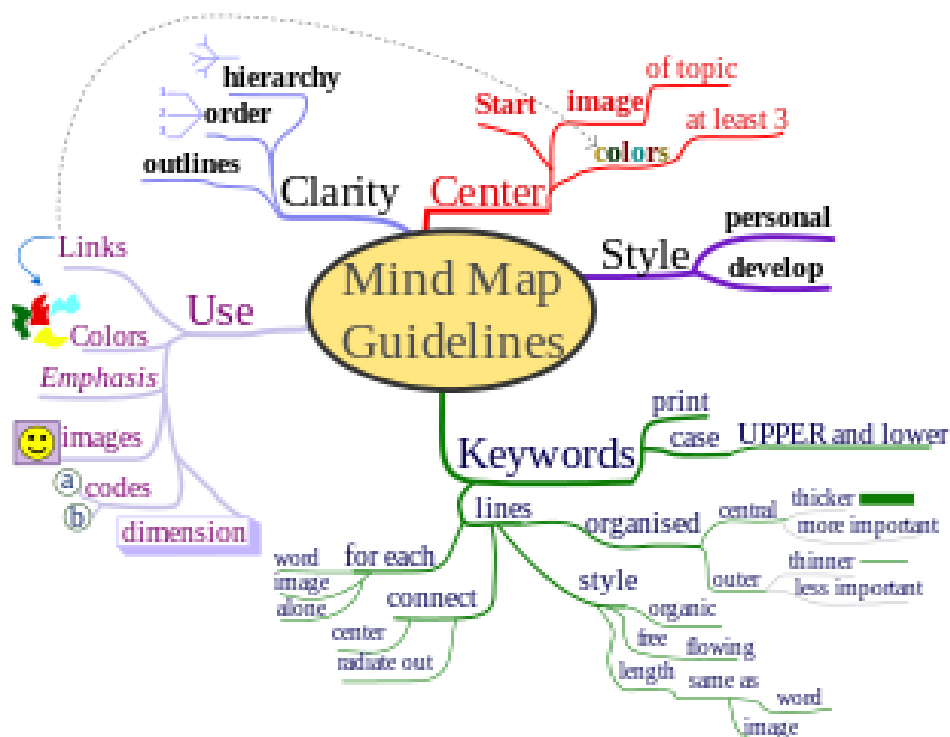
A team can achieve other levels of positive interdependence too, like the **RESOURCES** one. We find this kind of interdependence when members of a team depend from differentiated competence and skills, or depend from MATERIAL (consequent parts, interdependant to each, or unique).

We can talk of **interdependence EVALUATION** when, at the end of a task, the team gets an evaluation that is considered on the basis of results achieved by each of the members.

The teams evaluation will have to take account of the achievement of the team's target as a whole plus the work done by the single members. Obviously there will have to be some deadlines to meet to finish the tasks, but they don't have to be forcibly the same for all of them!

The essential element for the good functioning of the teams is individual responsibility and team responsibility. The team must be responsible of the achievement of his targets and each member must be responsible in contributing with his bit of work (this avoids labour exploitation). The team must define in a clear way the targets to achieve and must be able to measure both the progress made and the individual efforts of each member.

1.2 Take into consideration different ways of learning, favour the use and construction of conceptual maps, be careful when choosing the texts to propose



Considering that persons learn differently according by the ways and strategies with which one processes information, an education that takes into account the student's learning mode facilitates the achievement of educational targets. But how can we meet everybody's different need? Submitting the information in many different modes can be an efficient way; we can use, for example, many images, pictures, drawings, graphs, diagrams, concept maps, also explaining verbally or through podcast or screencast. Ultimately we can give the students access to all this material. We remind you that, for an effective use of videos or podcast, it is better if they are short, it's preferable to use several videos, each of few minutes, rather than one video that lasts 15 minutes

Despite the increasing importance that technology plays in support of SEN kids, we should evaluate the effective efficiency of using technological instruments in each individual case. For example, while running the project, we realized that in medium-sized groups (4 or 5 persons), the use of a PC, in fact, decreased the involvement to only two persons, while the use of big boards and markers promoted the involvement and interest of all .

Among the visual instruments available, map representation is extremely important. It is one of the most powerful compensative strategies available to students with SEN because it complements text communication with visual communication. This strategy, often, has a technological component but, as we said, we can create it on big cardboards using markers. Flipped and spaced, while increasing the time for activity in classroom, allow the team building of concept maps; That is an extremely important element. In the vast majority of cases, ready-made maps don't exist, so they must be built (better if by the user) and this takes time as well as competence. The problem of schoolwork efficiency for SEN kids is one of the most serious ones and most heartfelt, they want to do the same things their classmates do, but without taking the double of the time. Creating maps in the classroom, in well structured teams, with the expert guidance of a teacher, allow all kids to not feel different and, at the same time, decreases the risk of trivialising the contents, confusing synthesis with simplification, or the synthetic representation of knowledge with knowledge itself.

Concept maps are actually very useful to all students, but become particularly interesting and useful for the ones that have learning disorders because :

- Generally, having an autonomy in accessing and organizing the information is precisely where they struggle more.
- Maps represent an important compensatory resource since their reading is based mainly on graphical analysis. Even a dyslexic student, properly trained, can read it and understand it easily because the text decoding is reduced to label words only.

The use of maps is brilliant for all kids when preparing an argument, (either orally or in writing) because it helps tracking path and order of presentation. Furthermore, the map helps memorizing and understanding, this is due to the combination of logical links that connect concepts in a dynamic and flexible way. The more, and complex, the information to process and memorize, the bigger the advantages.

Regarding the choice of texts to read, study or revise, we have to remember that its graphic, structural or syntactic setting can facilitate or make difficult its comprehension. Certainly there are some important aspects to examine and evaluate. The text structural elements, section titles, captions, pictures, secondary (follow-up) boxes must all be easily recognisable. The following elements are also useful :

-A coloured background, but not uniform, to be able to identify possible sections

-An easy readable text, with clearly visible and contrasting colours; a sharp font, clustered and spaced in a way to facilitate perceptively its reading

- A simple language, both in its terminology and syntactic construction

-A generous amount of visual material

1.3 Make the classroom welcoming and cozy



The traditional structure of the classroom is off with either flipped or spaced learning, so how can we turn this environment in the most welcoming possible? To organize the classroom means making it cozy, a place where you feel fine and it's easy to learn. Everybody is more willing to enter a classroom where space is organized for them, or, even better, by them.

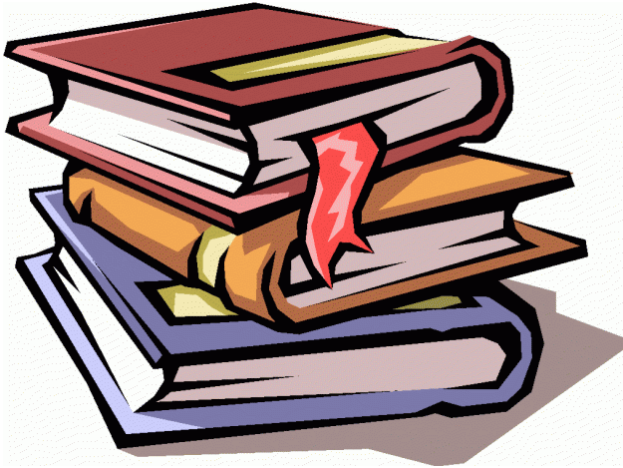
Let the walls speak, let them teach, support and suggest. Use cardboards, banners, boards; Whatever the space used, it is essential to write in a clear way, easy readable, even from faraway: few words, in big letters, clear and well spread. We can lay out the desks according to our needs, the planned activities, or the team-work partition.

During this project, small "coffee-break" moments have been organized, where students and teachers could have a coffee even out of scheduled recreation time; they could take it to their work station and taste some snacks from different countries prepared by the students. While having International meetings, coffee-break was organized in a specific area, different from the teaching area. When these lessons were reintroduced by the teachers in their own countries, coffeebreaks were organized in the same area where the lessons took place, due to space restrictions. This idea has been appreciated straightaway, at once it creates a convivial and relaxed atmosphere that doesn't interfere with the activity, quite the opposite, in fact! Many work teams chose to skip the recreation time and keep working, bringing their coffee to the work station.

Finally we suggest to keep a clock in the classroom, to define work and recreation timing. It is also advisable to encourage the students in measuring time and get them used to calculate how much time they need according to the quantity and difficulty of the work given.

2)Planning, implementing and surveying the lesson

2.1 Draw up the lesson plan



An efficient planning must include information that has to be

- significant : Sometimes, limited important information, properly written, is enough.

- realistic : Consider carefully the constraints ! For example avoid to plan too many activities, or too complicated, if the time available is short. All activities in the lesson-project must include a realistic estimate of the time needed to carry them out. Obviously the observation of the lesson will help to rectify the forecasted timings, but we should try to stick to them when possible. Concerning the times, it's important to calculate the time needed to give (and get) some feedbacks, also the time needed to introduce the subject and stimulate a debate; we should never calculate the time of the lesson alone

- coherent : avoid internal but also unjustified discrepancies between different activities within the lesson project

- concrete, observable and verifiable :A good project plan doesn't include vague and generic information, that can be interpreted freely; a good lesson project is one that allows different teachers to rerun the lesson as presented.

Finally, the lesson plan doesn't have to be a "static" document; In fact, it must be constantly monitored and improved.

Whatever the sequence of the activity to be proposed and the methods used, we should remember the following suggestions

- 1)The importance of introduction** : it is important, at the beginning of the lesson, to include a certain time, to inform the students about the subject that will be discussed : it is useful to recall pre-existing knowledge, but also to create expectations, asking for previews and hypothesis about the content: what the student knows, what he doesn't know, what he thinks to know, what he would like to understand, etc. A map can be very useful to this end: the teacher can draw it up on the board or handle a copy already made, or, to be completed by the students.

2) Activities and breaks: In a flipped lesson plan, activities scheduled must be divided in 1) homework activities and, 2) classroom activities. Homework activities will include the view of a footage and its link must be shown in the lesson plan but also in one, or several, tasks to be carried out after the vision of the footage. In class, just after the lesson's introduction, we will have to make sure that the footage has been viewed and the homework done.

In a spaced learning lesson plan, the three inputs (to present, to remember, to understand) are a must and define the activity's timing; but nothing stops us from articulating the third input, concerning the full understanding of the subject, with complex tasks and longer time, compared to the standard 15 minutes and with an articulated subdivision of the tasks that can be referred to IBL or BPL methods or learning scenario.

We must remember that complex tasks should be always subdivided in a range of minor tasks easier to understand. The subdivision in minor tasks is also useful to understand when to insert breaks. While carrying out the lessons abroad, it has been decided to insert a break every 90 minutes of work, at the most; this is because it is considered that studying can be efficient when carried out with an adequately clear head. Although this remainder applies to all students, it applies even more to students with learning difficulties which work less in an "automatic" way and get tired more.

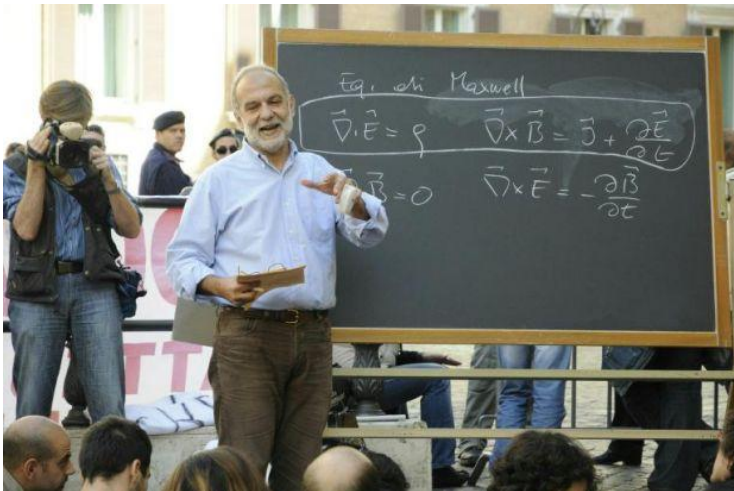
3)The importance of visual support: we have already seen the importance of visual support, an explanation supported by documentaries, videos, powerpoint presentations or with the use of an interactive board, appears more interesting, often funny, and, more importantly, easy to remember. That is why both spaced learning and flipped lessons result particularly efficient. Keeping some time to repropose the footage (that they should have already seen at home) in the classroom, can be a good idea, to be valued in each individual case. Another option can be proposing a different footage, focused on subjects that you believe to be more important.

With spaced learning, instead, always remember to attach the powerpoint document to the lesson, with the three input, and above all, to hand over the powerpoint document to the students before the beginning of the lesson. Furthermore, nobody stops us from integrating and enriching the powerpoint doc with video, online simulations or other material.

4)The importance of attended lesson and feedbacks: Activities must always be interactive, so we have to calculate longer times in the lesson project considering that a good lesson is the one where we constantly ask the kids to come up with hypothesis, and where we create cognitive conflicts based on the statements of students and teacher. Furthermore, basically, stimulate continuously feedbacks to ensure that homework has been understood, but also, to commend all the good work done and to better guide the group works; This also will take time. Regarding the lesson plan's drafting, we suggest to write some notes on how to stimulate the discussion or notes that remind us to give and get some feedbacks; Often, teachers forget to do it, especially in highly stressful situations, for example when external observers are present in the classroom.

5) Learning verification and self-evaluation exercise: It is always better to insert a brief, final verification in the lesson plan, even very short, to complete the process. For example, we can create a quiz through Socrative, or another instrument, to verify how much the kids really learnt. Furthermore, it is fundamental to train the kids to self-evaluation and to track down their mistakes themselves. This can be done launching a debate on the test just proposed, but also encouraging the students to self-evaluate their products (powerpoint, videos, boards, presentations ...) by handing them self-evaluation forms, prepared in advance.

2.2 The lesson's execution



Don't take the following suggestions as strict guidelines, it is clear that no human being can manage to do properly everything listed next. We should downsize the expectations, mistakes can be made, let the teacher make mistakes!; the action and the effort will produce self-esteem, identity and confidence, anyway, between both the students and the teacher.

Feedbacks : The importance of giving and receiving feedbacks has been already widely discussed, let's see, now, how to give them. " Did you understand? " is one of the most useless questions that a teacher can ask to his students, because most of them will answer yes, both (obviously) the ones that really understood, and the ones that didn't understand a thing but didn't realise it. We should verify the comprehension in another way, more objective, with simple and short questions possibly addressed to the whole class. Always remember to balance out positive and negative (or critical) feedbacks, trying, when possible, to tilt the scale towards a higher number of positive feedbacks. This doesn't mean we have to cheat, critical issues should be brought to light, but often, teachers focus more on what has been done wrong and less on what has been done correctly. A small test is enough, ask one of the students to keep count of the positive and negative feedbacks given. Finally, remember to use phrases that exhort and valorize the subject, avoiding phrases that can devalue or harm the subject

The use of space, moving within the classroom : From what has been said so far, it is clear that activities require that teachers shift frequently between the groups to follow and guide work, therefore, if the teacher is sat behind the desk all the time, it is likely that the groups have not been followed properly and didn't receive enough feedbacks. While teaching, teachers should try to be conscious of their use of space within the classroom: Are they standing on front of the desk? Behind the desk? Do they spend more time sitting or standing up? Do they move along the classroom a lot or they prefer to keep a fixed position?

Rhythm and tone of voice, look: Some aspects, let's be honest, are highly subjective and we can't expect that a teacher change completely before entering a class, however, personal thought on the following can help the individual teacher to identify his strengths and weaknesses, and manage to enhance the first ones. The tone of voice used throughout a lesson is high or low? Fast or slow? Is it monotonous? Managing to modulate the tone of voice is a trick to get the attention. In the same way, a look addressed to the whole class (and not elusive or fixed) helps the students concentrating

Body (and hands) language : Illustrative and symbolic gestures help following the explanation, while self-adapting gestures (manipulation towards ourselves), or hetero-adapting gestures (manipulation towards objects) are a distraction and should be avoided

Debates management: Do we ask any questions during the lesson? Do we offer any summary briefings ? Do the students remarks get resumed, reformulated or developed? Participation in the debate is encouraged? If all this gets done, probably, we reached an excellent level of interest and participation

Strenghts and weaknesses: Ultimately, teachers should try to maximize their strenghts, that can be different from each other, One can have an excellent sense of humor, another one can be extremely creative, or a third one can be overly enthusiastic.

2.3 Lesson's observation



Working together, in a group of teachers, implies a shared drafting of the lesson plan, but also a shared observation of the lesson itself, to improve its planning, and help our colleagues to find their strenghts, support them and encourage them.

A debate, and the rafting of a report, should follow the end of the lesson's observation. The purpose of the report is recording the debate and remarks emerged during the rewiewing process based on the information produced by observation. Who reads the report must understand the intentions at the origin of the lesson, the reasons of its developement and the issues faced, managed and solved during the rewiewing process. We need to retrace the whole process from the purposes choice, to the lesson planning, up to the final, post-lesson debate.

The lesson's debate : As a remainder, here are the indications on how to run the debate that follow the lesson's observation, prior the drafting of the report.

- 1) The teachers group that planned the lesson establish specific roles: moderator (the one that will ensure the respect of turns of speech), debate timing manager, verbalist/s.
- 2) The debate with observers will be run by the whole group that planned the lesson, and not only by the class teacher (who teached the lesson).
- 3) The moderator will introduce the work defining a schedule for the debate, he also express the purpose of the group that planned the lesson.
- 4) The teacher that run the lesson will have the first right to talk, followed by the other members of the planning group. Impressions on what worked, what didn't and what should be modified, will be heard.

- 5) The problems identified while planning will be exposed. Also how they have been solved through solutions found during planning time
- 6) The planning group's teachers invite the observers to comment on the lesson in comparison with its target.
- 7) Observers must give both positive and critical feedbacks, expressing remarks of their observation.
- 8) Each observer comments on one specific aspect or moment of the lesson, making sure to avoid the predominance of one observer over the others.
- 9) It is important that timing is respected, this way we will not lose sight of the main targets of the lesson's debate.