



Participation and knowledge through Plickers in high school students and its relationship to creativity

Jaraby Reyna de Thomas¹, Verónica López-Fernández^{1,2}, Fátima Llamas-Salguero^{1,2}, Pilar Martín-Lobo^{1,2} and Silvia Pradas^{1,2}

¹ Neuropsicología y Educación, Universidad Internacional de La Rioja (UNIR), La Rioja, Spain
veronica.lopez@unir.net

² EDUC-06 Neuropsicología aplicada a la Educación (NyE)

Abstract. This research aims to know the relationship between knowledge, participation and creativity in a sample of 60 students (30 girls and 30 boys), aged 15 and 16 years (15.6 average and standard deviation 0.49) at an American learning center. The instrument used to evaluate creativity was the test CREA (Corbalan et al., 2003) and used to evaluate the participation and knowledge of the students was the Plickers application. The Pearson correlation and a descriptive analysis to find out the average, deviation, maximum and minimum of each variable, were used to know the relationship between the variables. The results indicated that creativity is related to the participation, and this knowledge. Therefore, due to the relationship between the variables, teaching must include factors such as creativity and interaction for more meaningful learning.

Keywords: active learning, creativity, knowledge, participation, education, technology

1 Introduction

This study has as main purpose to discover new learning mechanisms for schools using new technologies in search of innovate the classroom and collaborate with teachers, schools, parents and people in the community and is part of the new plan of the United States Department of education. All together working as a team, preparing students to live, work and thrive in a multicultural, multilingual world highly connected in the innovation of new technologies that adopt the new science standards of the next generation for the libraries in public schools and education centers in private schools, from primary to grade of secondary grade. Providing an educational environment open to the where the teachers are communicators, guides and motivating students to learn new trends of information technology and communication (ITC). High school students will have the opportunity to thrive in a world of the 21st century, which requires the ability to make personal decisions, use technology with ease, resolve challenges or current and future problems of humanity, and participate wisely in a democratic society. The study of creativity, the creative problem solving, and change leadership allows individuals to expand their capabilities and develop their full potential. The leaders who know how to carry out and manage the change are in demand in all industries around the world.

Active learning and educational methodology

Can be seen at the active learning as a teaching strategy - apprentice - learning whose design and implementation focuses on students by promoting their participation and reflexion continues through activities that promote dialogue, collaboration, development and construction of knowledge, as well as skills and attitudes. Active learning is an essential principle of the new instruction to what now is usually called "learner-centered" or "learning centered" education of Weimer [1]. If the teachers want a greater part of student learning, then the active learning is an essential component of effective teaching and the result can be masterly to the professors that can inspire their students. It is common that students feel rather disconnected from the content of the teacher have to must make the classroom an environment of participation that there is connection with the students with games in order to draw the attention and producing classes full of motivation. The advantages of a teaching class with learning active allow that teachers are seen as presenters with a sense of the subject as designated by Svnicki and McKeachie [2]. For teachers be viewed as instructors in the classroom has its



advantages: (1) allows the teacher to complement the text of a book and pro-portioned material of last generation as a learning tool; (2) the teacher gives a status of 'control' in the classroom, students may not disrupt the flow of material and there will be fewer distractions; (3) allows the master of information key to bring learning the material in class more simply and that what has been learned is evoked without problems when considering students; and (4) provides an opportunity for the teacher encourages students inspiration.

Active learning has different definitions that focus on two key com-speakers: "do" and "what it reflects." The most general definition mentioned active learning come from authors Bonwell and Eison [3]: "The participation of students in doing things and thinking about what they are doing" (p.5). The authors emphasize that students must participate in activities that include reading, writing, these research studies that evaluate the performance of the students have shown that many of the strategies that promote active learning are comparable to the conferences to promote the content domain to bring to class discussions to solve problems and can learn from them in order to create the ability of understanding of the issues learned to be independent either by connection of the issue with the reality and what can the student share in the class as a case that will help to students to feel connected with the teacher.

The definition of active learning, promote neuroscience [3], Leamnsion [4] says that active learning is different investigation as "stabilizers used repeated times, certain synapses, appropriate and desirables in the brain" (p.5). To which, the synapses of diligent students, may be overshadowed by the way incapacity of members give the educational institution. Active learning has the word "action" as a very important ingredient to which the student perceives what they learned reaching metacognition. The definition by Zull [5] defines education as "lifelong learning based on experience" (p.14), Zull emphasizes "doing" and uses the expression "action", which emphasizes the value of where originates in "what the student perceives about your own actions. The action is a learning test. Zull also uses the term "metacognition" to highlight the importance of the students when they think at the time that they are doing. Metacognition is at the heart of all learning [5]: "the final result of the journey [from the brain to the mind] is to understand our own intelligence" (p.30). Similarly, Ambrose, Puentes, DiPietro, Lovett, y Norman [6] specify the conclusion of action learning and experience as an alternative to the effectiveness of better learning and very similar to the definition of Bonwell and Eison [3], Among other arguments about the learning active presented by Prince [7] "learning is a process that leads to change, which occurs as a result of the experience and increases the potential to improve future performance and the apprenticeship" (p.5). Prince in this investigation taking elements of active learning and the in-body readings as evidence on the activity of improvising with participation in class and as this benefits the peer class work and helps the environmental liabilities of class pass another more active level for best performance of the students in the class.

2.1.1 Approach of active learning and educational methodology

Active or significant learning is related to participation and teaching and creative methodology. In fact, authors as Wesseler [8] and Gopalakrishnan and Aravin-dakshan [9] alludes to the importance of the active and significant learning using a creative methodology, through what he calls creative participation, which is characterized by the involvement of knowledge, experiences, feelings, strengthening discovered processes.

This is, to promote a significant and active learning, no doubt through implementing creative and innovative educational methodologies that meet a series of requirements, and move away from the methodologies traditional focused only on the teaching role. Sotelsek and Robin [10] argue that this methodology that promotes meaningful learning facilitates learning based on student prior knowledge of the contents of lessons learned to complement the new concepts of the new class. Without forgetting that priority should be given to reasoning and understanding, stimulate critical thinking of students and content not conceive as a closed set of ideas, but as an open body of knowledge in which there are different perspectives.

Benefits of active learning

The dynamics of teachers trained for the students is important to offer a creative environment study groups to help educators to ensure that learning is motivated to occur significantly at the learning exchange [11] where is dedicated to the "learning spaces that curriculum support focused on the student." and to offer content in a responsible and realistic way to students. Weiman [12] showed that the halls with students with the same level of learning, were able to learn more concepts than the assistant teachers that has trained in the use of interactive teaching methods (small discussion groups, in class test that used response personnel or "response controls", demonstrations in class systems and small session of questions and answers) techniques are offered by the teacher where these students are better trained in topics and were very stimulated to learn new concepts in class



using a focus read-only [13]. These tests identify the learning in the classroom. Purpose of this study is that teachers can learn a set of issues that contribute to active learning in the classroom will be used in the development of creativity which verifies learning environments [14]. The objective of this study was to identify headings behaviors and activities that used active learning in conjunction with creativity in the classroom [15].

The importance of active learning is to achieve the meta-analysis of learning in groups small in science (science, technology, engineering and mathematics, [STEM]) by Springer, Stanne, and Donovan [16] these studies examined the development of academic disciplines and specific criteria. The meta-analysis showed that the different forms of Small Group learning are indicated to promote a high level of performance academic, what motivated attitude of the teacher to students promotes learning, and the greater the persistence among the courses better will be the interpretation of learning according to the study by Springer, Stanne, and Donovan, [17].

Tools and resources for active learning

This new generation of teachers is concerned about resources that benefit in the classroom for teaching purposes. All of these resources should bear in mind a number of aspects which are essential to be considered as tools that allow: be, mix, share, interact and cooperate [18]. If it fails any of these items may not be considering them as tools that are expected to generate significant changes in a deliberate process that generates evidence, which are substantial results in a process-so formal rules-based and based on scientific literature [19]; [20];[21].

Learning and technology

In the educational process in the classrooms, it has a series of resources that are with-engine as part of active learning which served for Ramirez [19] to daily activities such as learning tools:

- Blogs. a tool for asynchronous collaboration that teaching level used it as review and expand content for research of an educational way to communicate with students and expose comments of the learned topics, researched. Another way of using blogs is as an instrument of communication in the classroom where the teacher can announce different events, tutoring services, to reflect the evolution of his thought and expertise for a certain period of time in the school year, or to publish their work in the manner of a portfolio and receive comments regarding this.
- Wikis. These mean collaboration that help hierarchical unit directional of learning where extend the space and time of training anywhere with Internet access. It can be used as space of communicate, collaboration, for performing and presenting a topic concerning task.
- Podcast and vodcast. Podcast and vodcast were originally intended as versions audio blogs and are used as an audio file free, that you can download and listen to on your computer or an MP3 player, like an iPod. Distribution is through an rss file, so you can subscribe and use a program to download it and listen to it when the user wants to.
- Social networking and virtual worlds. These forms of communication are often more dynamics. Social networks are making new friendships, virtual, and come from content, interact, create communities of similar interests, readings, games, friendship, relationships, relationships, etc. Virtual worlds are important for the high educational potential to the in the most real demonstrations.
- Slideshare, Scribd, and concept maps. They are web sites for sharing and exchanging files text, presentations, or create conceptual maps, which then can be compared with others inside or outside the classroom to a space more broad as does the publications on the web.
- Flickr or Picasa. They are web sites to upload and share photographs with different interests because it is family, business, informative way or demographic form.
- Youtube, Ustream... allow us to carry out video or recordings of a short film for the purpose of gain a broad exposure to people from different parts of the world. Many people, educators and professionals use these websites to present interviews, important research topics taught class, a practice with musical instruments or any other activity that we consider **outstanding**.
- Collaborative maps. Google Maps allows us to more quickly find sites and places of interest. As represent geographical maps for information to be able discuss aspects social, political, historical, geographical, centered on a theme or subject in one is collaborative in the classroom.
- Virtual platforms (Moodle) and forums. It allows us to carry out any training (e-learning) mode to Exchange themes between teachers and pupils.

In our competitive times the learning process has to be changed and also demanding to be able to respond to the methodologies in the teaching process - apprentice - je in a positive way.



Active learning Neuropsychological bases

Neuropsychology is the specialty that is in charge of a proper relationship with different medical specialties who study the brain.

It is important to highlight the evolution of brain and cognitive functions in order to know the stages that allow a better understanding of the operations of the brain neuroanatomy.

Active learning helps to provide opportunities to students to talk and listen in a more expressive way, writing, reading and reasoning about the contents, ideas, problems and concerns in an academic subject [22]. Active education integrates the contents of the classes of the students part of the education of learning active to the long-term memory to which these students may use the concepts and theories of the course in a more effective way, less time will be required to review the material and answer questions about content and more time can be used for activities of a higher level of thinking to any other mental through our neurocognitive abilities.

There is no doubt that it is easier to learn about topics that may interest us and provoke us curiosity. To investigate what is happening in the brain in these situations investigation how curiosity (intrinsic motivation to learn) influences the memory and learning using fMRI [23]. The study showed a significant improvement in memory for information in States of high curiosity in meaningful learning and incidental, in comparison with the low curiosity, and that high curiosity, there was more activity in the midbrain and the nucleus accumbens, as well as the midbrain area segments ventral and the hippocampus and the connectivity between these regions.

Processes cognitive according to Piaget [24] the basic processes that allow the improvements and adaptation of the brain are those of assimilation and accommodation. As defending Montessori [25], it is the same environment that educates the child, why give him an absolute importance to educational materials, passing the teacher to an according to plan.

Active learning neuroscience offers us a kind of secular learning than usual which is based on the learning of the students in a way characteristics passive class, which includes listening to lectures and taking notes. On the contrary when carrying out examination of the investigation effectively teaching routine-mind is used as a form of teaching to which they are oriented more towards study-teas that are often grown in a way active for example, through the participation of students in problem solving [26]; [27].

Neuroscience gets a new appreciation of the form of teaching learning methods influence and like these help the improvement of the results of the studies. With the emergence of the neuroimaging techniques in the 1970's and the functional imaging in the 1990s (i.e., fMRI), researchers have contributed how studies the brain processes different types of information from a few years ago. Effective-mind scientists have had a predilection in the study of learning and memory, and in general, these studies show that multimodal or multisensory learning engages in physical changes over the longer term in the brain, and helps to the perfection of the retention of memory and the memory.

Some studies such as the mental image of Kosslyn [28] uses only images mental such for perception of learning to which Pyslyshyn [29] relies on symbolic theory of images, has established strict criteria for the support of the Pro-position theory, saying "to support this point of view, it is important not only to these areas topographic organized to participate in imagery" ", but that his participation is type - the way in which your topographical organization is involved also reflects the spatial properties of the image" (P.175). The main objective of the present study was topic map of mode individual-participate in each of three conditions: perception, imagination, and attention control / perceptual using images of magnetic resonances related (fMRI) to build map of interpretation of the imagine.

For this reason that the mention of neuroimaging techniques is important in the 1970s and the functional imaging in the 1990s (i.e., fMRI), in particular scientists have great appreciation for these studies showing as multimodal or multisensory learning leads to physical changes over the longer term in the brain, and improvement of the evocation of what they learned.

Learning is greater when multiple neural pathways are activated at the same time. This means that participation as many sensory, cognitive, emotional and social processes of students will increase your learning potential.

The problems this active regions of the brain involved in executive functions (for example, the prefrontal cortex) this happen when students learn passively.

Short written works incorporating this tactile stimulation induces [30], help visual processing using imagination [31], and messy activation in the prefrontal regions involved in executive function the use of varied teaching methods. The issues of multiple ways to integrate contents through the activation of a variety of interconnected brain processes as written, listen, talk, interact, movement, etc.



Induce students to empathize with new learning methods using personal experiences this active older memory pathways and support that the new reporting to engage physically with them.

Promoting students to work in pairs or groups, this involves social, emotional, hearing and motor networks. When students work between Yes, cognitive and sensory networks help to involve more in the subject. These processes include talk and listens others, experiencing positive emotions, physical movement, and problem solving. Comparing this active learning with passive learning normally implicated, less use of the parts of the brain, where students can listen and limited competence and not there is storage of learned material.

Relationship between creativity, participation and knowledge

Principles of creative teaching us wants to expand with the words "creative class" is important for students to teachers. Since you must create development at the mind and creative skills. Objective, teachers can increase activities to develop creativity where generated in a suitable learning environment. Creative teaching needs imagination, flexibility, originality, ability to adapting, and its use in the solution of problems of curriculum. Therefore it is necessary that the assigned person have control of education and that it reconciles the basic principles that are pair - you of the creative potential:

The rule of rating, should be spontaneous creative thinking that is not out of fear of a wrong answer; another rule of flexibility is part of a structure; This want of-cir if we do a task too elaborate, we are not limited to the pen-writing or children; to understand the rules of the patience, the teachers, can be tempted to provide the correct answer to the children or direct their pen-thought processes; learning to be independent to solve answers involves time; Finally the rule to push themselves to achieve the response of the different use - des to the activities that are offered in programs, as well as adapt them and use them as needed to the teacher [32].

Based on commented, the overall objective of this study is to analyze whether there is a statistically significant relationship between creativity, knowledge and participation in classes. Therefore it is essential to check the following specific objectives: know the participation of students in classes, assess the creativity of sample and evaluate the knowledge which has sample.

2 Methodology. Experimental design

This research work is in search of levels of creativity, knowledge; participation and motivation of students in high school education that were part of our research and if there is a relationship between them. For this reason, the initial hypotheses are:

- There is statistically significant and positive relationship between creativity and the knowledge
- There is statistically significant and positive relationship between creativity and the participation
- There is statistically significant and positive relationship between the knowledge and the participation

To do so followed a non-experimental, correlational and descriptive design.

Sample

The sample used in this research consists of 60 students (30 boys and 30 girls) pair - you 3 ° of ESO with ages of 15 and 16 years of age (average 15.6 and standard deviation 0.49).

In the present study was conducted at the school located in the East of the County of Suffolk, New York at Riverhead district high school. Riverhead district has approximately-high a population of 33.500 whereby this divide between 66.1 percent of whites, 15.8 percentage of African American people and 25.3 percentage corresponds to the Hispanic race. Social class - economic that it influences in this district of Riverhead is varied because in certain areas such as Flanders is an area of lower middle class and the inhabitants of the area are afro American people as most Hispanic people is engaged in agriculture by the great vineyards and work in the service area. Riverhead also boasts a population of people who work in Manhattan and Connecticut that are large pro-force by which class people account medium-high.

Instruments

To know the levels of creativity used the test creates that has been created by Corbalán, Donolo, Tejerina, Limiñana [33]. Test CREA measuring creative intelligence through cognitive assessment, which carries out the generation of questions in the theoretical context of search and solution of problems.

The use of the test can be used, both individually and collectively, and easier administration. It tends to be applied to children of 6 years, adolescents and adults.



This creates Creative Intelligence Test used with 3 sheets: sheets A and B goes - give to teenagers and adults and sheet C applied to children.

PLICKER is application to stimulate active learning: review of knowledge and pair-participation.

This dependent variable is an application just to keep inter-degree students and motivated in class time. PLICKER is a tool used by the teacher or instructor who has aimed to create an environment where participants earn confidence to answer questions and at the end of each participation the teacher uses the system to register the percentage of correct answers of each student at the end of each session with PLICKER, the master against each of the students and measured how much participation has been carried out during the week. Weekly teacher can measure levels of participating with each student's knowledge. It is very easy to use these cards PLICKER, just visit the website and tighten card free printing button. Each card has letters and 63 cards are which you can distribute to 63 students. The only thing you have to do is questions and your students to take their cards and the will on the side of letters (A, B, C, D) to answer the question. The teacher uses his cell phone, IPHONE or Android download App to your mobile will be a tool that won the attention of students in a way interactive and the result percentage ranges is:

Low: 0 to 50% of shares

High level: 51% to 100% of shares

The most amazing thing of this application class will make anything better assimilated and in addition to class time pass quickly and the use of PLICKER can be supplied individually or in a group.

Procedure

To conduct this study with a sample of 60 students of high school to carry it out the explanation to the management team and the leader of the center objectives of the investigation, asking permission and its collaboration in this work. I will inform the administrators of the secondary Riverhead Central School District of the days that it would perform tests for a week. Teachers cooperated with the participation of their classes and get parents permits for carrying out the tests.

The observer offers creates Creative Intelligence Test, throughout the study with the teacher and teacher trainer Professor. After consent is requested written authorization from the families of students chosen to be part of the test .

Provided the group creates Test (groups of 30 girls students and 30 guys) made use of the library for the groups of students making a first takes contact with them to foster a preferably relaxed and serene atmosphere. We used the blade B, indicating the instructions to members of each group to develop the test. To perform this test each student had 4 minutes previously making sure that they have understood the instructions and be motivated to start the test.

For PLICKER information gathering is taken at the time formulas your questions and the students respond. Each has letters (A, B, C, D) and the cards are 63 students rotate the card on the side of the letter to answer the questions without fear to respond or make a mistake. Teachers should download the PLICKER App on the Iphone or Droid phone. To collect the questions the teacher raises the cell and students tend the cards with their respective answers cell phone picks up information in a database. Each question creates the participation of students begin to respond whenever formulas a question by creating an atmosphere of motivation and active creativity. Statistical analysis: We made use of Excel and EZAnalyze 3.0.

3 Results

Below is the table 1 show the descriptive statistics of the variable of creativity, participation and knowledge (Table 1).

Table 1: descriptive results

Variables	Media	ST	Min	Max
Creativity	9,80	4,25	3	25
Participation	27,47	9,48	3	40
Knowledge	35,15	10,14	5	44

Scale: ST: Standard Deviation. Min: Minimum. Max: Maximum



Continuation displays the correlational results (table 2).

Table 2 Analysis of correlations

	Pearson	p
Creatividad y conocimiento	.165	.269
Creatividad y participación	.369	.004
Participación y conocimiento	.903	.000
N of Valid Cases	60	

4 Discussions

In terms of the level of creativity, has been used the test of creative intelligence CREA, which highlighted the general level high 8.3 average 4.5 and 4.7 low which is attributed responsible for the creative development where the individual can make a reflection review and evaluating critical - creative [33].

With respect to the knowledge of the active learning the mean was 35. 15 so Stenberg and Lubart [34] discusses the concepts and components that influence creativity and one of the resources is the knowledge. Knowledge influenced among students who participated in the class and showed flexibility in the development of thinking.

In relation to the participation, the average was 27.47 is another resource for the development of the creativity influencing the intellectual challenge that used the effort to lead to creativity.

Regarding the relationship between the variables of creativity and participation, this study has found that there is statistically significant relationship between creativity and the participation are interrelated by motivation which is an essential component in creative learning [35].

Creativity is a conception of ideas that add to the cognitive processes more refined of the human being, detailing each evolutionary, social, and educational experiences and their manifestation in different number of fields. Creativity is set in this work of different forms of inclusion of contextually in tests observed in the moment of each teacher teaches their student, being original and constant in the evolution of a new concept: the newness of concepts and the contributions of students to participate in class to help that the mind to achieve cognitive processes to stimulation personality motivation, emotions that used the affective world, play a singular in this learning process component where we're all creative to a greater or lesser extent as also we can go develop it slowly.

Torrance and Hansen [36], investigated the conduct of the teachers could study how teachers posed questions to their students which could be more or less creative, and observed that creative teachers accepted good shape students ideas and incorporate new ideas in the structure or sequence of the subject to be treated, also used to stimulate their students , instead of teachers-us creative they were more direct and tolerate greater number of periods of silence with less participation and students out of the confusion.

In these approaches the influence of teachers is essential to the production of methodological knowledge in the classroom and as teachers they systematize with the active learning of students who will be influenced by the ongoing contributions, concepts and skills to engage in projects in different subjects to do research that organize students to analyze their work developing modalities to respond objectively process organization and sequence of work solve De Souza [37]. Therefore the teacher methodology is a process of change in search of new approaches for innovation of a new teaching model to improve the educational system in creative, interdisciplinary and contextualized education [38, 39].

One of the keys that complement the new methodologies of active learning is the motivation [40]. The contribution of motivation in students is often expressed through class participation, suggesting questions to teachers of subjects that the attention and causing positive stimuli between teachers and students in better performance in class in use of information technologies and communication, TIC improving knowledge of students and challenging teachers to improve to improve the academic curriculums [42] [43].



Entries have a strategic role in the Organization of the skills of the student, with the participation levels of organization and quick running between the individuals creates a structure of experiences involving the student to improve his attitude to a more functional and cooperative attitude that develops multiple tangible and intangible interrelationships stimulating learning [44].

In the learning process, it is important to take into account two characteristics as: is to manage the paradox and diversity with special clarity of the issues. The creation of change and complexity helps the learning process because teaches the student the ability to change, be flexible and take full advantage of the dynamics to expand their knowledge and motivated students can start to make more competitive and demanding in the form of instruction in each work because they make sense of balance, thoughts - systematic strategic resources and strategic capabilities as it is knowledge which is something intangible [45].

Socialization is a factor in the management of knowledge as it mentions Nonaka and Takeuchi [45].

The knowledge - socialization is important because it is a rewarding form of learning that full teachers such as students with experiences that will provide different ways of thinking to be able to solve specific problem using common sense. Many times the stress, lack of communication, rejection, social factors deprives the student to respond to teachers with better attitude and is made difficult the participation and cooperation in group. These negative factors that greatly influence in the classroom at the time of learning, it is important to discuss the fears of students to inform parents, teachers and psychologists of the schools and facilitate learning to students that cost them participation. Before these positive and negative factors is very important socialization on the part of students and teachers, having success in these cooperative relations between the two sides is fostered individualism and fear will lose share to create an atmosphere where all can succeed is "we won two and win all" and this creates a leadership in the classroom [46,47].

To achieve that leadership in the class all parties have to take into account the elements of the intellect according to Vargas [46] and these are: the Organization, the human, social and technological. This set of elements highlighting the intellectual factor of the members is essential for the Organization to be structured; the technology that members can make new trends in technology and knowhow to integrate it to improve the methodology of the class and know how to take advantage to the use of tools to solve problems; human parties can provide the set of abilities, skills, and attitudes that can incorporate the learned concepts, experiences and join cooperation in an open way.

It is necessary to say that in reality different postures of origin field of education, psychological and social complement is made up of human to which knowledge Delval [47] introduces the elements of constructivism and its multiple variations of capacities of human beings to reflect, learn, anticipate, control of a positive nature and build a culture focused on focus operation and content of the mind in construction of knowledge and conviction of human beings.

The conception of constructivist teaching and learning in different approaches according to Coll [48] where wide on the theories of human development, genetics of intellectual development theory and other theories of development and learning, theory of meaningful verbal learning and socio-cultural development and learning theory, all of these factors influence education in social practice and the socializing where the social nature and socialization processes build personal identity.

Educational intervention contributes to the resolution of divergent psychological problems as: the psychological development of the individual as it is the flat intellectual and as is in its development in the school. Identification and care as it is the need to be motivated in the process - learning. The rethinking of modalities and different kinds of methodologies in school to help the developing learning, the search for new learning strategies, the importance of promoting the interaction of the teacher with the student driving to a cooperative learning environment, the reevaluation of the role of the teacher as guide, facilitator, driver and transmitter of concepts to emphasize the student's learning.

One of the aspects of learning is that it has to be a significant learning and therefore significant learning presents situations in the school area, as well as Ausubel has it [49,50] says the first two types of learning is: receptive and discovery. The second learning is: responsive and meaningful. So the situation of learning may become repetitive reception, meaningful reception, repetitive discovery and significant discovery. Not on the other hand however the activities in the classroom have to be responsive driving learning and student can reach advanced stages of learning.

Cognitive structure integrates various knowledge in meaningful learning that are indispensable to coordinate concepts intended to relate them broadly to reach the goals of the reception of concepts interrelate them that are organized hierarchically in a cognitive structure that facilitates the interpretation of material taught in class to the memory.



There are a number of phases in the meaningful learning is connected according to Shuell [51]. Motivational factors are interconnected where it depends on creating, requires it is facilitated by providing information to curricular content teachers for teachers and students, support materials and training further advantages in intrinsic motivation, active participation, understanding and new learning strategies.

These learning processes tend to memorize and interpret schematic knowledge, like looking at global information procedure and review to learn the information. Gradually the students be able to build a picture of mastery of material. The opportunity to reflect on situations and materials and the elaboration of conceptual maps and semantic networks that generates tasks solution metacognitive behavior - problems [51].

It is worth to emphasize that learning should be a way to determine and set up cognitive bridges that influence the reception and the motivational discoveries of each student.

5 Conclusions

There is a statistically significant relationship between the variables of studio. Practice the implication of these findings has reflected at the time of put technology in classrooms and to design teaching methodologies that promote creativity, participation and knowledge previous.

References

- [1] Weimer, Maryellen Gleason. February 1989. "Who's Doing All the Work." *Teaching Professor* 3: 1
- [2] Svinicki, M., & McKeachie, W. J. (2011). *Teaching tips: Strategies, research, and theory for college and university teachers* (13th Ed.). Belmont, CA: Wadsworth.
- [3] Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom*. ASHE-ERIC Higher Education Report No. 1. Washington, D.C.: The.
- [4] Leamson, R. (1999). *Thinking about teaching and learning: Developing habits of learning with first year college and university students*. Sterling, VA: Stylus.
- [5] Zull, J. E. (2011). *From brain to mind: Using neuroscience to guide change in education*.
- [6] Ambrose, S., Bridges, M., Lovett, M., DiPietro, M., & Norman, M. (2010). *How learning works: 7 research-based principles for smart teaching*. San Francisco, CA: Jossey Bass. ISBN: 978-0-470-48410-4
- [7] Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education*, 93, 223-232.
- [8] Wesseler, Matthias (2002): Neurociencia en el Proceso de Enseñanza-Aprendizaje. In: Taller Regional UNISTAFF, UNACHI, David, Panamá. 9-11; "What We Teach." *Journal of Staff, Program, and Organization Development* 8: 81-99.
- [9] Gopalakrishnan, Ambili and Aravindakshan, Sreejith. (2010) Efficacy of Participatory Learning and Action (PLA) for Quality Improvement in Environmental Education and Research (March 5, 2010). UGC sponsored National Seminar on Quality Improvement in Educational Research: Innovative Trends, 2010 . Available at SSRN: <http://ssrn.com/abstract=1733264>
- [10] Sotelsek and Roblin (2008). The effective uses of digital storytelling as a teaching and learning tool. *Handbook of research on teaching literacy through the communicative and visual arts* (Vol. 2). New York: Lawrence Erlbaum Associates.
- [11] Cullen, R., Harris, M., & Hill, R. R. (2012). *The learner- centered curriculum: Design and implementation*. San Francisco: Jossey-Bass, John Wiley & Sons.
- [12] Wieman, Carl. (2001) From the National Academies: overview of the National Research Council's Board on Science Education and personal reflections as a science teacher Department of Physics, University of Colorado at Boulder, Boulder, CO 80309, USA.
Cell Biology Education 02/2005; 4(2):118-20. DOI: 10.1187/cbe.05-02-0069 Source: PubMed
- [13] Haak, D. C., HilleRisLambers, J., Pitre, E., & Freeman, S. (2011). Increased structure and active learning reduce the achievement gap in introductory biology. *Science*, 332, 1213-1216. doi: 10.1126/science.1204820
- [14] Murdock, T. B. (1999). The social context of risk: Status and motivational predictors of alienation in middle school. *Journal of Educational Psychology*, 91, 62-75.



- [15] Ekvall, G. (1987). The climate metaphor in organization theory. In B. Bass & P. Drenth (Eds.), *Advances in organizational psychology* (pp. 177–190). Beverly Hills, CA: Sage.
- [16] Springer, L., Stanne, M. E., and Donovan, S. 1997. Effects of small-group learning on undergraduates in science, mathematics, engineering, and technology: A meta-analysis. Madison, WI: National Institute for Science Education.
- [17] Springer, L., Stanne, M.E., and Donovan, S. S. 1999. Effect of Small Group Learning on Undergraduates in Science, Mathematics, Engineering and Technology: A Meta-Analysis. *Review of Educational Research*, 69(1), 21–51.
- [18] Martin, D. (2011) "Concept Mapping, Mind Mapping and Argument Mapping: What Are the Differences and Do They Matter?" *Higher Education* 62 (3): 279-301 doi: 10.1007/s10734-010-9387-6.
- [19] Ramirez, J. (2012) The Intentional Mentor: Effective Mentorship of Undergraduate Science Students *The Journal of Undergraduate Neuroscience Education* (JUNE), Fall 2012, 11(1):A55-A63.
- [20] Salinas, J. (2004). Innovación docente y uso de las TIC en la enseñanza universitaria. *RUSC. Revista De Universidad Y Sociedad Del Conocimiento*, (1), 1-16.
- [21] Weaver, B. (2007) "Tablet PC-Enabled Active Learning in Mathematics: A First Study", *PLT*, 2007, Pen-Based Learning Technologies, International Workshop on, Pen-Based Learning Technologies, International Workshop on 2007, pp. 1-6, doi:10.1109/PLT.2007.38
- [22] Meyers, Chet, & Jones, B. Thomas. (1993). *Promoting active learning* (first edition ed.). San Francisco: Jossey-Bass.
- [23] Gruber, M.J., Gelman, B. D., & Ranganath, C. (2014, October). States of curiosity modulate hippocampus-dependent learning via the dopaminergic circuit. *Neuron* (84), 1-11. Available online at <http://dx.doi.org/10.1016/j.neuron.2014.08.060>.
- [24] Piaget, J. (1981b). La teoría de Piaget. *Infancia y Aprendizaje*, 2, pp. 13-54.
- [25] Montessori, M. (1982). *El Niño, el secreto de la infancia* (1ª ed.; 6ª reimp.). México: Diana. (Obra original publicada en 1958).
- [26] Michel, N., Cater III, J. J., & Varela, O. (2009). Active versus passive teaching styles: An empirical study of student outcomes. *Human Resource Development Quarterly*, 20(4), 397-418.
- [27] Wingfield, S. S., & Black, G. S. (2005). Active versus passive course designs: The impact on student outcomes. *Journal of Education for Business*, 81(2), 119-123.
- [28] Kosslyn, S. M. (1978). Measuring the visual angle of the mind's eye. *Cognitive Psychology*, 10, 356–389.
- [29] Pylyshyn ZW (2002) Mental imagery: in search of a theory. *Behav Brain Sci* 25:157--238.
- [30] Mueller, P. A. Oppenheimer, D. M. (2014) The Pen Is Mightier Than the Keyboard: Advantages of Longhand Over Laptop Note Taking. *Psychological Science*, 2014; DOI:
- [31] Shah, J., Higgins, E. T., & Friedman, R. S. (1998). Performance incentives and means: How regulatory focus influences goal attainment. *Journal of Personality and Social Psychology*, 74, 285–293.
- [32] Bowkett S. (2007) *Jumpstart!. Creativity. Games and activities for ages 7-14*. London: Routledge.
- [33] Corbalán, F.J., Martínez, F., Donolo, D., Tejerina, M., Limiñana, R.M. (2003). *CREA Inteligencia Creativa. Una medida cognitiva de la creatividad*. Madrid: TEA Ediciones. Obra galardonada con el VII Premio Internacional TEA Ediciones.
- [34] Sternberg, R.J. y Lubart, T.I. (1993). Creative Giftedness: A multivariate Investment Approach. *Gifted Child Quarterly*, 37, 7-15.
- [35] Fernández, R. y Peralta, F. (1998). Estudio de Tres modelos de creatividad: criterios para la identificación de la producción creativa. *Faisa*, 6, 68-85.
- [36] Torrance, E. P., & Hansen, E. (1965). The question-asking behavior of highly creative and less creative basic business teachers identified by a paper-and-pencil test. *Psychological reports*, 17(3), 815-818.
- [37] De Souza, Joao F. (2007). *Contribución de Orlando Fals Borda a la Teoría de la Educación*. "Simposio Internacional de Investigación Acción y Educación en Contextos de Pobreza. Un Homenaje a la vida y obra del Maestro Orlando Fals Borda". Bogotá.
- [38] Garcia-Ramirez, JM. (2012). La comunicación, clave de excelencia visible en la Educación Superior. *Journal for Educators, Teachers and Trainers*, 3, 25-36.
- [39] Garcia-Ramirez, JM.; Garcia Sempere, P.; Fiorini, M. (2012). *Docencia Universitaria y Creatividad*. Granada: Editorial Universidad de Granada
- [40] Esteve, JM. (2008). La formación de profesores en Europa. Hacia un nuevo modelo de formación. *Actas del II Congreso anual sobre fracaso escolar*. Palma de Mallorca: Govern de les Illes Balears.
- [41] Garcia-Ramirez, JM. (2011). Una reconsideración de la excelencia visible en la educación superior: la escucha empática. *Andaluciaeduca*, 66, 84.
- [42] Esquivias, MT. (2009). Enseñanza creativa y transdisciplinar para una nueva universidad. *Encuentros Multidisciplinares*, 31, 43-52.
- [43] Garcia-Ramirez, JM. (2012). Las Tecnologías de la Información y la Comunicación, TIC, en la educación universitaria. *Andaluciaeduca*, 76, 77.



- [44] Hedlund, G. (1994). A model of knowledge management and the N-form corporation. *Strategic Management Journal* , vol.15, 73-90.
- [45] Nonaka, I. y Takeuchi, H. (1995). *The Knowledge-Creating Company*, New York: Oxford University Press
- [46] Vargas, A. (2001). El cooperativismo agrario en la provincia de Huelva. *CERES. Cuadernos de Estudios Socioeconómicos de Huelva*, n. 6, 6-43.
- [47] Vargas, A. y Pelayo, Y. (2001). La práctica de los principios cooperativos en las almazaras cooperativas de la provincia de Huelva. En: *Inteligencia empresarial. La gestión del conocimiento en la empresa*, Jaén: Diputación Provincial de Jaén. Instituto de Estudios Giennenses .393-401.
- [48] Delval, J. (1997) Hoy todos son constructivistas. *Cuadernos de Pedagogía* (257), 78-84.
- [49] Coll, C. (1996) Constructivismo y educación escolar: ni hablamos siempre de lo mismo ni lo hacemos siempre desde la perspectiva epistemológica. *Anuario de Psicología* (69)153-178, Universitat de Barcelona.
- [50] Ausubel, D.P. (1976) *Psicología educativa*. México: Trillas.

In conclusion, assessment of teachers by high school students can not only help tuning teaching techniques but also promote mutual understanding among each other with respect and discipline ultimately improving the quality of education. [Written by - Saad Yasin]. 1 1 1 1 1 1 1 1 1 1 1 1 Rating 3.30 (15 Votes). Actually, creativity differs in that it exceeds the valid level of activity of the student and crosses the former border, available opportunities, it helps to realize what had previously been relatively and historically impossible for personal development. From the standpoint of pedagogical sciences, the development is the result of active interaction of the internal natural forces and human social and educational conditions. Abilities are the individual characteristics of the people, on which the acquisition of knowledge and skills, as well as the successful implementation of the various activities depends on [2; 679]. With the aim of modern understanding the problem, indicated by us, is expedient to stay on the concepts of algorithm and methods of solving creative problems.