

LEARNING METHODOLOGY BASED ON ACTION WITH ACTIVE ACTIVITY EMPHASIS USING SUCCESSIVE REPETITIONS

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Abstract— This project integrates two important methodologies in teaching and learning; Edgar Dale's methodology of action-based learning, giving emphasis to active part and Hermann Ebbinghaus methodology of successive repetitions to improve the forgetting curve, this applied in research to the elaboration and publication of research articles developing embedded projects and startup. The integration of the two strategies under criteria of quality, motivation, law of attraction and the use of a positive language focused for a learning with relevance for the engineering of peace, applied in last year students of Engineering in a public university of Peru, determined favorable effects in significant level. The level of results improved remarkably, reaching over 80% of qualified works in reviews for events with publications indexed in prestigious databases such as Scopus, as well as in journals.

Keywords— *Methodology; Action-based learning; Successive repetitions; Elaboration and publication of articles; Engineering education*

I. INTRODUCTION

Edgar Dale methodology of action-based learning with an emphasis on active participation, redeems procedures that achieve the highest levels of retention.

Also Hermann Ebbinghaus methodology of learning based on successive repetitions in specific periods of time significantly improves the level of retention of a normal process without repetitions.

Both methodologies of great influence in results of high performance in learning, can be integrated considering criteria of quality, motivation and others, as well as actions related to the law of attraction and positive language, that in its breadth of meaning in our case focused for a learning with relevance for the engineering of peace.

In this sense, in this work we take into consideration aspects and relevant data related to education and specifically to the methodology of action-based teaching and teaching methodology based on successive repetitions, which we have below: In Kolb's study, learning styles are considered within his experiential learning model, followed by a tool used:

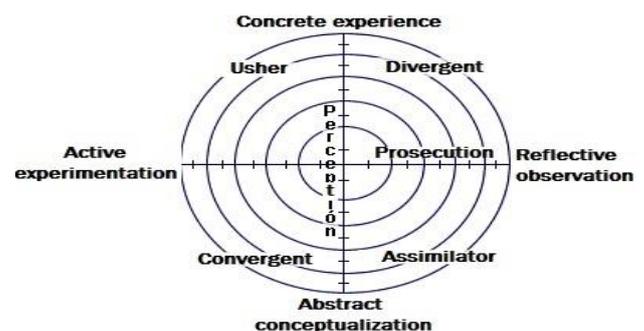


Figure 1. Quadrant of learning styles (Kolb, 1984, cited in Jiménez and Aragón 2009) [1]

With regard to memory, authors such as Shiffrin (1970), Feigenbaum (1970) and Reitman (1970) have conceptualized memory as a mnesic activity, which allows the active elaboration of the presented information, where the subject will encode the same by selecting its most important features. Essentials Information that depending on the type, is introduced in a certain system, being organized in a subjective manner [2].

Memory processes can be considered essentially in 4:

- Coding, registration or retention of information.
- Organization.
- Storage.
- Evocation or retrieval of information.

Memory is not the only function that participates in learning; however, it is the brain function that allows the recording, retention and evocation of data that were present in the past, being a fundamental function in education. The methodology considers the application of actions of higher level of influence on the learning, repeating it in specific periods according to the tests carried out by Ebbinghaus to achieve a higher level of retention.

We can also mention an important model in this study, Research suggests that students only retain 20% of what they learn (Gardiner, 1998). How much do you remember from your

high school courses? Why? Geoff Petty's (2009) extensive research into effective teaching suggests that the Present-Apply-Review (PAR) model is the most effective [3]

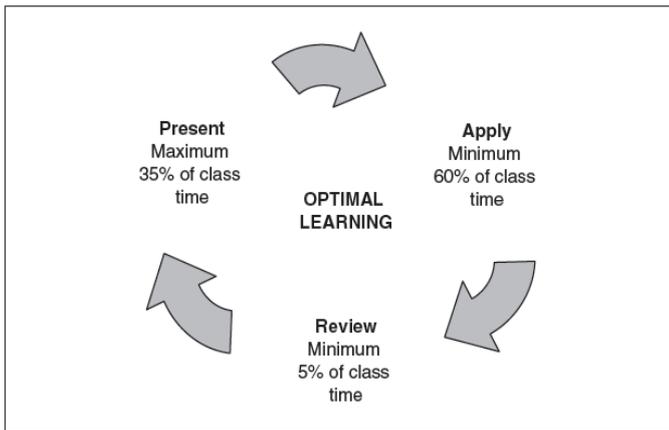


Figure 2. The P.A.R. Model [4]

II. LEARNING METHODOLOGY BASED ON ACTION WITH ACTIVE ACTIVITY EMPHASIS

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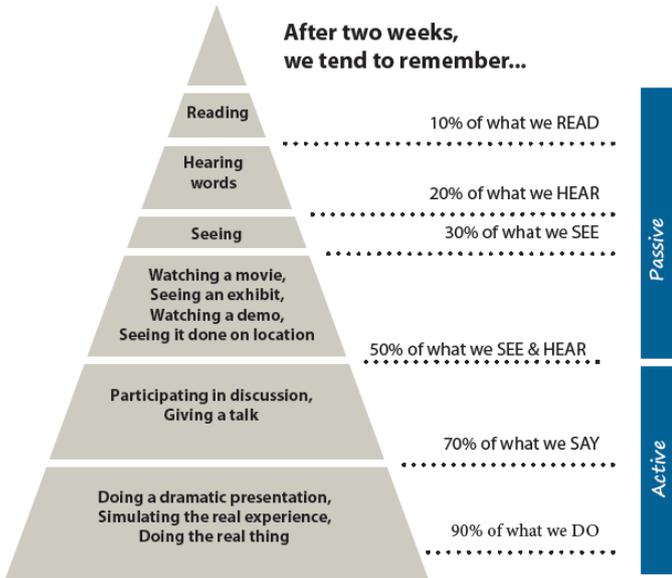


Figure 3. From Effective Adult Learning: A Toolkit for Teaching Adult (p. 13), based on the research of Edgar Dale, originator of "The Cone of Learning."

In his study, Edgar Dale also elaborated the following table relevant to this study.

Project Based Learning (ABP or PBL, Project-Based Learning) is a teaching method that proposes the student as the

protagonist of their own learning. This methodology is based on the ideology of the constructivists. [5]

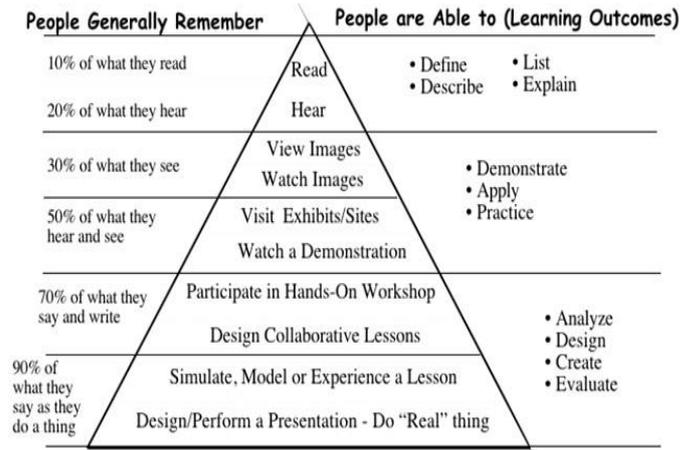


Figure 4. The cone of Edgar Dale's experience

Adapted from Wiman & Meirhenry Educational Media 1960 on Edgar Dale

The ideal in the pyramid or learning cone of Edgar Dale, is that regardless of the tool we use to convey ideas or knowledge, we incorporate activities that encourage active learning, based on an experience learning, since as Dale mentions, what we say and we allow the student to appropriate knowledge between 70% and 90% [8]

There are several problems in the used learning methods, which can be grouped in three categories.

There are several problems in the used learning methods, which can be grouped in three categories. The first one is the problem of exponential world knowledge growth, which makes prompt adjustment and fast fact acquiring the key of success. [6] Despite the quicker adapting that is nowadays required, the majority of the learning institutions still rely on the old fashion way of information transmitting. [7].

Web lectures can be used to augment, not replace, the classroom learning experience. The traditional one-to-many lecture still prevalent in classrooms today all but ignores accepted contemporary learning theory. Much of this is due to the inherent lack of learner engagement in such lecture settings [9]. Often, the problem is not that the instructor does not desire to foster learner engagement; rather, the instructor does not have time to do so while also covering all the required course material. Our goal, therefore, is to take advantage of the opportunities and technological affordances [10] of web lectures in order to decrease the in-class time spent on information transfer and increase the in-class time available for more active learning.

Dale's original cone of experience contained the following categories starting at the tip and moving toward the base: Verbal Symbols, Visual Symbols, Radio Recordings-Still Pictures, Motion Pictures, Exhibits, Field Trips, Demonstrations, Dramatic Participation, Contrived Experiences, and Direct Purposeful Experiences. Dale (1970)

noted, “Difficulties arise when abstractions have inadequate foundations...Because a verbal symbol does not resemble anything the child can do or see, he may have difficulty in relating it to his own experience” [11]. Similar to Dale’s cone of experience (1946), high-impact practices seek to provide students with concrete experiences as opposed to more abstract experiences.

III. LEARNING METHODOLOGY BASED ON SUCCESSIVE REPETITIONS

Ebbinghaus formed lists of "nonsense syllables", meaningless combinations of letters such as PIB, WOL or TEB. He memorized lists of 13 meaningless syllables. Then, after different periods, he relearned each list of syllables. He found that the longer he waited after the initial learning of a list, the longer it took him to learn it again. Most of the information was lost in the first hours.

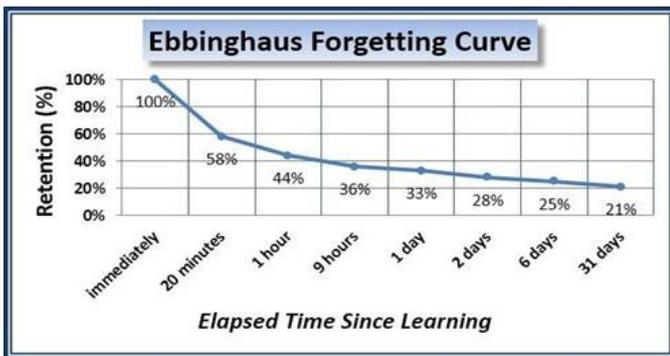


Figure 5. Ebbinghaus Forgetting Curve

In all experiments reported by Ebbinghaus [12], he used only himself as a subject. Single subject designs are not unusual in memory psychology. Especially in the study of autobiographical memory we find several diary studies based on one person’s personal memories [13, 14, 15]. They have the advantage that there is no inter-subject variability, although they still require hundreds of trials to reduce the variance due to differences in stimuli and other factors.

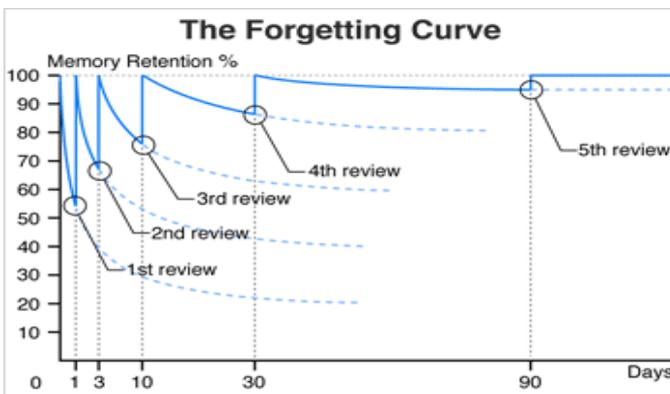


Figure 6. Memory Retention

This places a great burden on the subject. Indeed, Ebbinghaus’ forgetting curve is based on seven months of experimenting, often up to three sessions per day. Wagenaar

[16] meticulously recorded one daily memory during six years and spent several months recalling these

The contributions of Ebbinghaus dominated for many years the research on memory.

IV. INTEGRATION STRATEGIES OF LEARNING METHODOLOGIES AND OTHER CRITERIA

This study considers important the integration of the two strategies under criteria of quality, motivation, law of attraction and the use of a positive language focused for a learning with relevance for the engineering of peace. Below are strategies related to this process:

A. Strategies that favor retention in successive repetitions:

Minimize interference

Avoid confusion with similar issues by identifying their key differences. Relate to elements already memorized.

Subdivision of the subject in number of sessions directly proportional to the level of complexity of the topic.

For a greater complexity of the topic, more sessions as long as the sum of the times of the sessions are the time allotted to the topic and the time of each session allows to reach the student. The Malleability of Memory.

We also consider the inclusion of positive language and positive thinking this integrated methodology.

Well, you know what Hermann, we responded. As much as these technologies would provide more fine grained control over what we remember, the brain is pretty good at editing events already. In fact, we are biased to remember aspects of our life as more positive and successful than they really were. [17].

For example, people remember gaining better grades than they really did in high school [18][19]. “Why would people do this?” he wondered. We explained that it might be that remembering the past in a rosy way is actually pretty good for us, in fact we tend to do it when we think about the future too [20 [21].). There is a strong link between memory and the self and rosy remembering of our own lives can serve to maintain a positive sense of self [17]. Recalling the past in a negative way, a pattern observed with depressed individuals, might serve to do the opposite [22]; [23];

That the brain edits our pasts in a positive light is healthy to the extent that it can promote a positive—though illusory—view of the self [17]

Among the elements of the environment we have some great impact on learning outcomes, including positive thinking, our mind thinks and attracts positive things, in situations their way of seeing things is towards the positive, as well as the use of a language positive that encourages positive thoughts.

The true philosophy of life is an abundant optimism, free in spirit, practical, affirmative, <an optimism> that inspires a favorable attitude for the spiritual conditions of health, happiness and prosperity. He who understands how he has

created his own misfortune should return to the sources of life and power"[25].

Wilson in his famous study on the variables and characteristics linked to happiness stated: "The happy person is shown as a young person, healthy, with a good education, well paid, extroverted, optimistic, free of worries, religious, married, with a high self-esteem, a great work ethic, modest aspirations, of one sex or another, and with a wide-ranging intelligence " [26].

The positive thinking and the positive language focused for a learning with relevance for the engineering of peace.

The Japanese culture shows important criteria of quality as every day to improve something small, this small and daily improvement becomes part of us in the long run, in a philosophy of life, in the continuous improvement applicable to our teaching, also values and being human as the most important value. We can mention giving each thing its place and giving our best effort at every moment, doing it with passion favors the achievement of objectives, as part of the quality strategies applicable to the methodology.

Motivation and perseverance are fundamental to achieve the objectives, "being optimistic favors significantly in achieving the objectives."

The most important thing to achieve the proposed significant objectives is to know that you can do it and repeat them when you propose, moreover overcome them.

V. IMPLEMENTATION OF METHODOLOGY

In the National University of Callao, students worked with an end-of-career course in electronic engineering, with related experiences, the benefits of carrying out research, developing a project with their respective research article and publishing it in a prestigious event that indexes its publication in prestigious databases.

In the work sample, up to 90% of research articles were approved for publication in prestigious databases such as Scopus and WoS, among others.

Table I. Events with proceedings indexed by Scopus WoS and others.

Event	Host	Students	Groups
ICMME2018	China	10	3
IJCR (Journal)	India	4	1
ICMSC2018	Rusia	5	1
ISRIS2018	Malaysia	4	1
IJSER(Journal)		4	1
IJSR(Journal)		4	1
ICMES2018	Thailandia	3	1
ICIMA2018	Malasia	4	1
ACEIT-18	India	3	1
ICO2018	Thailandia	3	1
UKCI2018	United Kindong	3	1

Table II. Papers submitted and accepted, proceedings with ISBN register, ISSN register indexed in prestigious databases.

	students	groups
Accepted	47	13
Not accepted	5	2
Total	52	15

In the analysis it is important to determine the percentages accepted for each event, so these results are shown below.

Table III. Percentages in events with proceedings indexed by Scopus WoS and others.

Event	Host	Students %	Groups
ICMME2018	China	19.23	20
IJCR (Journal)	India	7.69	6.67
ICMSC2018	Rusia	9.61	6.67
ISRIS2018	Malaysia	7.69	6.67
IJSER(Journal)		7.69	6.67
IJSR(Journal)		7.69	6.67
ICMES2018	Thailandia	5.76	6.67
ICIMA2018	Malasia	7.69	6.67
ACEIT-18	India	5.76	6.67
ICO2018	Thailandia	5/76	6.67
UKCI2018	United Kindong	5/76	6.67

Table IV. Percentages of papers submitted and accepted, proceedings with ISBN register, ISSN register indexed in prestigious databases.

	Student %	Groups %
Accepted	90.38	86.67
Not Accepted	9.61	13.33
Total	100.00	100.00

It is important to mention that the chosen sample was in typical conditions where the integrated teaching methodology was developed considering particular criteria such as positive thinking and positive language with the added value of focusing on the use that strengthens peace, we can say to a teaching for the peace engineering.

VI. ANALYSIS OF RESULTS

It is worth mentioning that this study is influenced by the conditions of the Callao region at a political, social and economic level, as well as the profile of the electronic engineer at the National University of Callao.

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CONCLUSIONS

- The number of successive repetitions is directly proportional to the level of memory retention, considering that the interval between each successive repetition influences the retention level.
- The motivation based on experiences and the demanding control of continuous progress in the preparation of research articles raises the level, getting to qualify in events that index in a prestigious database up to 90% of jobs.
- The use of successive repetition methodology improves memory retention and applied in the methodology of participation-based learning with emphasis on the active part (what we say and do) achieves the most significant levels of learning by up to 90%.
- Motivation, positive language, positive thinking; Optimism in achieving the objectives significantly facilitates the success in the teaching methodology in the case presented by up to 90%.

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