

Higher Education or Higher Instruction?

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“Education is that which remains, if one has forgotten everything he learned in school.” Albert Einstein¹

“But education, in the true sense, is not mere instruction...It is unfolding the whole human nature. It is growing up in all things to our highest possibility” J. F. Clarke²

“By education I mean an all-round drawing out of the best in child and man-body, mind and spirit. Literacy is not the end of education or even the beginning.” Mahatma Gandhi³

Abstract

The purpose of this short article is to differentiate between the notions of Education and Instruction, especially in the context of Higher Education, and to identify the kind of relationships that would make more effective the implementation of both of them.

To confuse the meanings of these terms or what concepts and uses are involved in their respective notions might be the source of intellectual muddle, unintentional misleading, and, hence, of pragmatic ineffectiveness, especially with regards to educational processes. Our hope is to continue reflecting and researching on this issue and, potentially, generate reflections and research from teachers and professors specifically regarding what is (and/or what should be) the meaning of *Higher Education*, and its differences with what we might call *Higher Instruction*. An increasing number of scholars (consciously or unconsciously) perceive or conceive some universities as institutions of, what might call, Higher Instruction rather than Higher Education.

In our opinion, there is an increasing confusion among meaning of the terms of “education” and “instruction” and, sometimes, they are used almost as synonyms. Both terms are much related, but they do not mean the same ideas or concepts. Using the metaphor of “color” and “surface” we know that both are completely different concepts though very related to each other. There is

¹ Several authors can be cited reiterating in similar words this quote (e.g. B. F. Skinner, E. D. Battle, Edouard Herriot, C. F. Thwing, Ralph Waldo Emerson, Agnes F. Perkins, James Bryant Conant, Evan Esar, E. F. L. Wood, George Savile, Lord Halifax, Alan Bennett, etc) Albert Einstein attribute to an unidentified “wit”. The complete citation from Einstein is the following: “If a young man has trained his muscles and physical endurance by gymnastics and walking, he will later be fitted for every physical work. This is also analogous to the training of the mind and the exercising of the mental and manual skill. Thus the wit was not wrong who defined education in this way: “Education is that which remains, if one has forgotten everything he learned in school.” Albert Einstein, 1936, 1956, p. 36 in the 1984 edition.

² Clarke, J. F. (1810-1888), 2013 edition, p. 36

³ Mahatma Mohan Karamchand Gandhi, Harijan: July 31, 1937,

no color that is not seen on a surface and no empirical surface with any color on it, but to confuse the notions of “color” and “surface” might take us to non-sense jumble between “Optics” and “Geometry”. “Color” and “surface” should be differentiated as concepts or notions in order to understand the reality in which both of them co-exist together.⁴

To achieve our stated objective, we will not try to conceptually define “education” and “instruction.” This is not the place to do it, nor is it our intention. Furthermore, from a systemic perspective, as well as from a post-modernist stand, definition of education should be done in the context of a culture and/or value system. Consequently, the definition should be done by the users of specific educational systems and processes. This is why we worked out in another article⁵ a meta-definition of “Education,” i.e. we defined a way of producing a definition of education by means of the corresponding users (students, parents, teachers, etc). Our purpose in this article is to describe important denotations and connotations of the notions of “Education” and “Instruction” with the objective to differentiate them with the purpose of effectively relating them. We will then briefly refer to the mentioned previous article in order to provide a context for what will follow.

Initial Reflections and Questions

The term “instruction” derives from Latin in- "in" + *struere* "to pile, build,"⁶ to structure; i.e. to pile, build IN the mind of the instructed a structure of information and/or knowledge by means of an instructor who provides such a structure. Consequently, instruction is some kind of structure transferred from one mind to another via verbal or written means of communication. The instructed subject is receptor of *external* information/knowledge structures. Is that by itself education, or one of the means of an educational process? The sense of piling on information and knowledge structures seems to be what we are mainly doing in Higher Education institutions, but as we will see below, to build up knowledge structures, in the mind of the student, **in**jecting them from an **ex**ternal source, is what should be *part* of the educational process, not to be confused with it as a whole. Instruction is one of the *means* of educational process. Other means are also required, especially those oriented to *enable and motivate* the student to get involved in processes of knowledge construction and self-structuring his/her mind according to 1) his/her personal objectives and 2) individual circumstances. The much known phrase of Ortega-y-Gasset “I am I and my circumstance”⁷ should be seriously and rigorously taken into account in considering any kind of educational process. Human beings are essentially different and their respective circumstances are also different. Consequently, any educational processes should take

⁴ It has been reported that this metaphor (color, surface) is related to a differentiation made by Aristotle and was previously been used in order to present a similar reasoning, but we could not find in Aristotle any use of this metaphor to refer to the necessity of analytical thinking in order to understand the respective reality. We are not meaning that it is not an Aristotelian metaphor, but that we cannot make any reference regarding this use of the relationship between color and surface.. But, Aristotle did treat at length the relationships between “color” and “surface.” He explicitly affirms that “it is a property of a surface to be the primary thing that is coloured, has used in addition something perceptible, being coloured, but *something which evidently always belongs*, and the property of a surface will in this respect have been correctly rendered.” 131b33-7; Oxford Translation, 1993, p. 222 (italics and emphasis added).

⁵ Callaos and Callaos, 1993.

⁶ The Century Dictionary and Cyclopedia (1911, vol. V), p. 3125

⁷ José Ortega y Gasset, *Obras Completas*, Vol. I., 2004, p. 757; Madrid: Ed. Taurus/Fundación José Ortega y Gasset,

this fact into account and not be limited to general, shared, or universal knowledge or knowledge structures (theories) but also to empower and motivate the student for initiating and maintaining processes of knowledge construction and self-knowledge, as well as of generating solutions to his/her individual problems, identifying means to achieve his/her individual objectives, while maintaining shared (common) knowledge that would allow him/her to communicate with other human beings in social and work contexts. Instruction is one of the means to communicate the student with his fellow human being. Disciplinary instruction, which is mostly what we have been doing in our universities, is necessary to communicate us with other people in our disciplines. Is that education? Or part of it? Shouldn't we also provide our students with the minimum required capability for communicating with people from other disciplines? Shouldn't we also provide our students with non-disciplinary communication capabilities? Are we providing Higher Education in our universities or just Higher Instruction or, even worst, Higher Instruction in narrow disciplines or sub-disciplines? This kind of specialized instruction is, in our opinion *necessary* condition in many educational processes but not *sufficient*, if our objective is to educate but not just to instruct. Let us provide some context for the opinion we are giving.

The term “educate” derives from Latin *e* (out) + *ducere* (lead, draw, educe), i.e. the primary sense of (mental education) is to “draw out or unfold the power of the mind.”⁸ To educate is “[t]o impart knowledge as well as mental and moral training to; developmentally and morally *by* instructions; cultivate; qualify *by* instruction and training for the business and duties of life. So it is evident that instruction is one of the means in the educating.”⁹ Instruction is one of the means of achieving at least two fundamentals educational ends. Consequently, more means should be included in an educational process and instruction should support the achievement of at least the fundamental end of “the business and duties of life,” i.e. the student life, his/her life in its different dimensions: the intellectual, the moral, the esthetic, the emotional, the social, etc. *Instruction is one of the means of education not one of its end, let alone its unique end.* We will frequently return, below, to this fundamental distinction from different perspectives and/or contexts.

Let us go back to the etymological meaning of “education;”¹⁰ which probably is the common source (or meta-source) of its present senses. It also possibly is what represents the *common* meaning that *communicates* the high diversity of definitions and philosophical perspectives that could be found regarding the concept of “education.”

As we wrote above, the term “educate” derives from Latin *e* (out) + *ducere* (lead, draw, educe). The term “educe” means “to draw *out*, to *extract*, in a literal or physical sense” In general, it means “To lead or bring *out*; cause to appear or be manifested; bring into view or operation; evoke.”¹¹ More analytically and precisely, the term “educate” derives from the Latin term *educates*, which is the past participle form of *educer* which, in turn, is the *frequentative* form of *educere*, past participle of *eductus* “(bring bodily nurture or support) while *educāre*, refers more frequently to the mind) a sense derived from that of ‘*assist at birth*’ (cf. *Educit obstetrix, educat*

⁸The Century Dictionary and Cyclopedia, 1911, vol. III, p. 1845

⁹ Ibid. (emphasis and italics added)

¹⁰ Ibid.

¹¹ Ibid. (emphasis and italics added)

*nutrix, instituit paedagogus, docet magister*¹²⁾”¹³ Consequently, inverting the original metaphor, we can conceive the notion of education as a frequentative (continuous) body, mental, and spiritual re-birth of the educatee¹⁴. Teachers (and parents, of course) are midwife delivers of this multidimensional (body, mind, and spirit) frequentative birth and re-birth of the educatee. As we will see below, this re-birth support is in itself a support for the educator multidimensional frequentative re-birth who also would be a continuously growing human being in his/her multiple human dimension

Revisiting what we described above regarding the etymological meaning of “instruction” and “education”, we might roughly say that to educe and to educate is to and *in-out* movement while to in-struct is an *out-in* one. Consequently, one way to relate instruction to education is a cybernetic one where the in-out movement requires (as one of its means) an out-in movement, and vice-versa. The best example of an educational method based on this cybernetic perspective is the Socratic one, in which the teacher or the professor *educes* (bring out, extract) answers from the student, via adequate questions which, in turn are formulated to the student according the answers educed from him/her. This cybernetic relationship have (or might have) both regulative loops (via negative feedback and/or feedforward) and synergic, co-amplificatory (i.e. co-educational) loops (via positive feedback). With this perspective, the instruction that a teacher might provide is one of the means used in the student education and the questions made be the students (via face-to-face interactions providing verbal and especially non-verbal information) are one of the means of the continuous education of the teachers. I personally have strong *believes*, in this co-educational perspective, which *justification* is based on my personal educational experience as educator. If we accept the notion of “truth” as “justified belief,” my personal, hence subjective, truth is that *the real educational process is a two-ways street: to educate one-self by means of trying to educate others and to educate others by means of trying to educate one-self*. This is the real educational process, according to my personally justified belief or subjective truth.

Gandhi affirms that “True education must correspond to the surrounding circumstances or it is not a healthy growth.”¹⁵ The most immediate surrounding circumstance is the life of a person in both his/her internal and external dimensions. His/her most immediate external circumstance is his/her culture, industrial environments, social surrounding and Society at large. Since these circumstances are highly varied, it is not possible to make a general definition of education with operational details. Consequently, each culture, society and even each region should make the most appropriate definition of education according the surrounding circumstances of the student. This is why, in our opinion, what is needed is a meta-definition of education, i.e. a definition of the process in which a specific definition of education might be done according to the respective surrounding circumstances. What is needed, according to this perspective, is a systematic and systemic methodology to define education according to a given set of surrounding

¹² The midwife delivers, the wet-nurse nourishes, the tutor instructs, the master teaches.”

¹³ Ibid. (emphasis and italics added)

¹⁴ Mahatma Mohan Karamchand Gandhi affirmed “By education I mean an all-round drawing of the best in child and man in body, mind and spirit.”

¹⁵ - Mahatma Mohan Karamchand Gandhi, Young India, 12-3-1925

circumstances. This is what we proposed in other papers which will be resumed in the next section.

Meanwhile, let us, according to this perspective, ask some questions related to Higher Education in a given academic discipline. Can we build a real knowledge structure, in an educational context, restricted to disciplinary domains and standards? What about the *surrounding circumstances* of given disciplines? What about the other disciplines surrounding it? What about the related disciplines? What about the surrounding circumstances of the real life problems which mostly are of multi-disciplinary nature? *Is a disciplinary knowledge structure (which what instruction might provide), by itself, education?* Is that Higher Education? Or is it mere Higher Instruction? Does a ***real and educational*** knowledge structure (and not just knowledge pilling up) require disciplinary knowledge structures to be related to other disciplines in order to correspond to reality and real life problems? ***Should disciplinary instruction be provided in the context of inter-disciplinary communications in order to support a real educational process which should related to the present and future life of the student?***

It is suggestive that “instrument” has the same etymological source of “instruction”. Are Higher Education organizations producing *mere social or industrial instruments* in the way we are teaching our courses and in the way Syllabus are being designed? Are we addressing the vital need of the student as an *integral, integrative, and integrated human being*? Can a university reduce its activities to a disciplinary syllabus, i.e. to instructing the respective technical knowledge and still being called Higher Education Organization? Should we restrict Higher Education to the respective technical logos and not to address the Ethos, Pathos, and non-technical logos required by human life? Can we still call education to the informing processes required to transform the student into an instrument to the Industry (and to Society in the best case) and not to be an effective instrument to his/her own human development and to his/her internal richness growing?

How can we provide a real Higher Education, and not mere Higher Instruction, in the context of disciplinary academic studies? Shouldn't we relate the disciplinary instruction to the student personal and future professional life? Shouldn't that require a minimum of awareness about the content of related disciplines? Isn't inter-disciplinary communication a requirement for higher education even in disciplinary careers? Wouldn't that require inter-disciplinary communication among teachers of different disciplines? Isn't inter-disciplinary communication a necessary condition for any disciplinary teaching process provided in the context of Higher Education?

Meta-Definition of Education: Methodology for Systemic Definitions of “Education”¹⁶

As we said above, besides ***general*** definitions of education, what is required is the design of ***specific*** educational systems and processes adequate 1) to the “surrounding circumstances” (as affirmed by many thinkers, e.g. Gandhi) and 2) to individual differences (as also affirmed by many thinkers, e.g. Ortega u Gasset’s “I am I and my circumstance”). Consequently, what is required a meta-definition of education, i.e. a ***general*** definitional methodology by mean of which we can define education for ***specific*** cases of educational processes and for the design of

¹⁶ We will base this section on several articles we published in the past regarding the definition of “education” and the application of this definition in different educational situations or domains.

specific cases of educational systems. The purpose of this section is to briefly describe a definitional methodology that might support consensual definitions of education in general and education in a specific context and set of circumstances, which require the identification of specific educational objectives and, consequently, specific set of means from which the most effective ones will be selected taking into account the human and the financial restrictions that always exists. In this section, and our papers referenced in it, we did not address the **content** of any educational philosophy, any conception of it or any meaning associated with the term. We will briefly describe the **form** in which any educational conceptions, philosophy, definitions, etc. might be taken into account in order to **con-form** the sought educational system to the identified corresponding specific objectives, means, and *the existent human and financial restrictions that always exist in any specific situation or set of circumstances.*

Elsewhere (Callaos and Callaos, 1993), after reviewing a high diversity of conceptions and studies in the educational area, we agreed with Ferrater-Mora (1980) that there are two macro-streams of thoughts regarding the notion of education: those which centered their attention on the education's **ends**, and those which emphasized the educational **means**. We noticed then that "Philosophical reflections on the ends did not exclude considerations about the means, and psychological/pedagogical treatments of the **instructional** means presupposed, implicitly or explicitly, educational ends. Some educators superimposed (or "sub-imposed"), frequently, teleological reflections on their methodological studies. Examples of these educators/authors are Pestalozzi according to Ulich (1972) and Kerschensteiner according to Ferrater-Mora (1980). And, on the other hand, Herbart (according to Dunkel, 1972) and Dewey (1887, 1816) are examples of those who formulated some methods congruent with the educational ends they identified in their philosophical enquiries. But other authors, mostly educators, **confuse** the ends with the means and this might be dangerous, in our opinion, from the intellectual, academic, pragmatic, and ethical dimensions.

Educational means might cause educational objectives with more or less effectiveness and efficiency. But, if means are taken as ends in themselves they might be not just ineffective but they might even produce the opposite of the sought educational objective, i.e. means might have negative effectiveness if they are confused with their respective ends. *Instruction might be (and actually it is) a very important means and a necessary one in Higher Education, but it should not be taken as an end in itself and, which is worst, removing other important means for achieving the educational objective.* This is why we alert, as we did it several times in the past (e.g. Callaos and Callaos, 1990), that it might be adequate to intent a *generative or a causal definition of the concept*; i.e., the "definien" would designate the cause that *produce or generate* the reality designated by the "definiendum". The causal definition, also called *genetic* definition, produces the reality designated by the "definiendum". The causal definition is, for several authors, such a Hobbes¹⁷ and Wolf¹⁸ the way of knowing and doing science. It is a kind of **analysis**, i.e. a way of going from consequences to principles, from effects to causes. If we also go in opposite direction, i.e. via **synthesis**, then we might get beneficial cybernetic loops. In order to achieve this kind of beneficial cybernetic loops we first need to explicitly differentiate between the ends and the means of educations. This is one of the most basic supports we had for the definitional

¹⁷ T. Hobbes, *Concerning Body*, 2, 10 (q.v. N. Abbagnano, 1974)

¹⁸ C. Wolff, *Logic*, 195 (q.v. N. Abbagnano, 1974)

structure we proposed before (e.g. Callaos and Callaos, 1993) with regards to a meta-definition of education.

From this perspective, to confuse “education” with “instruction” is analogically equivalent to confuse the "*definien*" with "*definiendum*", the causes with their effects. This is why we suggested in a previous work (Callaos and Callaos, 1993) a systemic definition of education, in general or in a specific domain, through a methodology based on *strictly and explicitly separating the identification of the educational objectives from the required means to achieve them, i.e. explicitly differentiating the definien from the definiendum, the causes from the effects*. The methodology we proposed is analytical in its first phase, and synthetic in its second phase. Both phases use hybrid modeling, i.e. qualitative and quantitative, verbal and mathematical, via Operation Research, i.e. Maximizing a multi-objective function with restrictions imposed by the identified means when implemented if the real world.

The “*whys*” of the educational systems or processes would be defined by the students and/or their parents (the immediate users) with the consulting support of educational experts (teachers, educators and philosophers in education, etc). “*What*” characteristics (skills, abilities, aptitudes, attitudes, etc) are to be expected from the educational process would be defined by students, educators, and the Society (including potential future employers) In the present educational systems the students decision in this aspect is limited to choosing his/her career. Students should have more opportunities to decide their future. Student advisors should try to adequate the educational system to the student’s potentially changing vocation, and not to limit the student choices to a pre-established educational scheme as it is frequently happening in some universities, especially in developing countries. The kind of adaptable educational structures frequently found in universities in the USA are regrettably seldom found in Latin-American universities, for example. We guess that this lack of adaptability might also probably be found in other developing countries. The “*hows*” should be identified by the educational experts empowering the parents (and possibly the students) with a veto power. The material *restrictions* should necessarily be identified by, at least, the *supra-users*, i.e. educational authorities and administrators. The Society at large should probably be included in decisions related with restrictions because material resources are usually provided by Citizen’s taxes in the Public Sector.

In the meta-definitional methodology we proposed, the “Whys” represented the **final ends**, the “whats” were related to the **mediate ends** and the “hows” are **means**; which, in turn, required **resources**. Columns and rows of matrices were the way we represented the explicit relationship between ends and means. The cells of the matrices were related to the *effectiveness* of a given means with regards to a given end. The effectiveness was identified by the users in each cell verbally (qualitatively) in a first phase, and quantitatively (via collective decision making) in a second phase. Quantitative weights of the ends are also identified by the users (via collective decision making, as well). These quantitative matrices (based on the qualitative ones) provide the data required for mathematical models by means of which the educational effectiveness is maximized subject to material and non-material (e.g. cultural, ethical, social, etc) restrictions. The result is an Operations Research model (more specifically an Integer Programming one) which solution process is a known one.

Furthermore, defining education by means of its end-means relationships would be in agreement with our aim of “operationalizing” the definition, in order to point out the *actions* that could be taken to achieve an adequate education, in general or in a specific domain. A causal definition of education would indicate the way to *generate*, to *produce* education. So, it is an *action oriented definition*. While recommending to have different definitions or perspectives on education as input to the methodology we proposed (Callaos and Callaos, 1999), we are far from falling into what is known as *genetic fallacy*¹⁹ because we did not propose to base the definition of education on *any historical process* that generate education, but we proposed, and we are still proposing, to review the history of definitions through history and then in resume them and provide them to the users of the educational system and process in order to allow them to reflect about the different definitions in order to relate them to their perceived needs and then to structure them in the matrices of objectives-means proposed in the methodology of the indicated paper.

Ends-Means chaining might be (and we actually believe it certainly is) an integrative force for generating a conceptual structure that would systemize and synthesize the high diversity of perspectives found in the educational literature. Education could be thought as an end and as a mean, as a cause and as an effect. Both aspects of education might maintain (at least implicitly) cybernetic relationships of co-regulative loops (via negative feedback and/or feedforward) and co-amplificatory (synergic) loops (via positive feedback). *These beneficial cybernetic loops might also happen between “education” and “instruction” if both notions are not confused from the conceptual (theoretical) and the practical (methodological) perspectives.* If we take the means, or potential means of education, as the *causes* (or potential causes) of the education as an end (or according to the established ends by the educational system users), then we would have a generative definition of the concept of “education” generated for a general educational system or by the specific users of a specific educational system. In the later case, it is essential to generate this kind of definition because users (and potential meta-users²⁰ and supra-users²¹) of the system are who should generate the requirements of the system to be used. According to our knowledge and the information we were able to gather, education is usually, implicitly or explicitly, defined just by supra-users and/or meta-users. From a systemic perspective this might be wrong, because a fundamental role should have the users in defining the ends of their educational systems. Otherwise, the educational system might lead, consciously or unconsciously, to *ideological oppression* or, worst, to implicit or explicit *indoctrination*.

To avoid conscious or unconscious intellectual or ideological oppression, or indoctrination, we suggested, in the above mentioned paper, a conceptual design of a Decision Support System based on Collective Decisions Making in order to achieve what we briefly described above with regards to integrated educational ends-means in different levels, where the users of the systems are who collectively decide the ends of education and the objective of a specific educational system (e.g. a specific, elementary, middle or high school, college, or university). As we said above educator would have a consulting role in the identification of the ends/objectives of an

¹⁹ See for example Copi, I.M., 1978; and Ferrater-Mora, 1980.

²⁰ By meta-users we are meaning “users of the users,” e.g. (in this case) professors and educational administrations while the *immediate and direct* users of educational systems are, or should be, the students, their parents and the Society at large.

²¹ By supra-users we are meaning those who “are or will be the educational authorities and those who have any kind of power on the educational system and/or its users”, e.g. deans, presidents, departments’ chairs, grants providers, etc.

educational systems, while the identifications of the means might be made by educational experts. All what we proposed is based on Collective Decision Making Support Systems. The one we are suggesting is based on: 1) the conceptual meta-design methodology we worked out for *Group Decision Support System for System Design* (Callaos, et. al., 2001) and 2) the collective decision making via *The Mathematical Solution of the Voter Paradox, or Condorcet Paradox* (Callaos, 1980, Callaos et. al. 1981). This kinds of collective decision support systems, we proposed for the definition of education, in general or specifically for a concrete educational systems, were also proposed or used in other contexts as, for example, "Conceptual Development of a Sociopolitical Information System" (Callaos, 1980a), "Political Participation Systems" (Callaos, 1980b), "A Collective Decision Making Approach for the Analysis of Complex Social Systems" (Callaos, 1981), "Designing a Latin American School for Statesmen and Executives" (Callaos and Callaos, 1992), "*A Sociopolitical Information System for a New Constitution*" (Callaos, et. al. 1999), "Group Decision Support System for System Design" (Callaos. et. al. 2001).

Summing up this section, we can say that in the article we referred to above (Callaos and Callaos, 1993) we provided a short systemic definition (more precisely a meta-definition) of "education" where we emphasized in its operational definition proposing a way of identifying 1) the fuzzy set (classical set and respective weights) of the educational objectives (*ends*) as required by the users of a specific educational system, 2) the fuzzy set of the corresponding or potential *means*, and 3) the ways of measuring and maximizing the effectiveness of the different means, as well as the effectiveness of a combination of them. In the methodology we proposed, *we were not favoring any conception of what education should be*. What we proposed then was a completely a neutral way of defining education, but what we did emphasized in was (and is) to differentiate the ends from the means.

In this article we are continuing our differentiation between means and ends, but not in a neutral way, since our objective here to differentiate between education and instruction, which we conceive it as one of the educational means. Consequently, our objective in this article is to go ahead and briefly describe our conception of education, reason it and provide some references regarding such a conception. This conception of us might be an input (along with other conceptions) for implementing the proposed neutral methodology proposed in the publication mentioned above. In other works, up to the present the articles we wrote regarding education were neutral (formal with no content), but in this article we are no more neutral, but are briefly describing our conception of education, via selecting conceptions like ours, i.e. we are trying to present **notions of education and instructions** with the specific objective of differentiating them. This differentiation is a necessary initial step to adequately relate them.

Consequently, we will try 1) to emphasize some conceptions of education, related to our own conception and to our explicit objective in this article, 2) to present different ways in which the term "education" has been used, and to 3) to suggest a possible or potential *common* ground regarding the notion of education and its differences with the notion of instruction.

The Notion²² of Education

Tons of books and articles have been written on the notion of education. Consequently, what can we add in this short article? Our main objective, as we already emphasized several times above, is to distinguish between the notions of education and instruction because we have been finding much confusion about these two notions, in spite of the tons of written material on education. Consequently, we will be *selecting* conceptions of education and uses of the term with the purpose of differentiating it from instruction. This selection is oriented to the mentioned objective. It is not a comprehensive one, i.e. it is not a comprehensive inventory of the different conceptions that exists regarding this concept. It is a *subjective selection oriented by the explicit objective of this article*.

We will use the word “education” in its more general meaning, as follows:

Education is “The imparting or acquisition of knowledge; mental and moral training; cultivation of the mind, feelings and manners. Education in a broad sense, with reference to man, comprehends all that disciplines and enlightens the understanding, corrects the temper, cultivate the taste, and form the manners and habit; in a narrower sense, it is the special course of training pursued, as by parents or teachers, to secure any one of all these ends. Under *physical education* is included all that relates to the development and care of the organs of sensation and of the muscular and nervous system. *Intellectual education* comprehends the means by which the powers of the understanding are developed and improved and knowledge is imparted. *Esthetic education* is the development of the sense of the beautiful, and of the technical skill of the arts. *Moral Education* is the cultivation of the moral nature. Technical education is intended to train persons in the arts and sciences that underlie the practice of the trades or professions. Education is further divided into *primary education*, or instruction of the first elements of knowledge, received by children in common or elementary school at home; *secondary*, that received in grammar and high school or in academies; *higher* that received in colleges, universities, and postgraduate study; and special or professional, that which aims to fit one for the particular vocation in which he is to engage. With reference to animals the word is used in the narrowest sense in training in useful or amusing acts or habits.²³

Notice that it is clear and explicit that this usually accepted general meaning of the term “education” includes several senses and educational processes have different objectives one of which is “imparting or acquisition of knowledge”. If a university limits its function to “imparting knowledge” and providing opportunities for physical education, can we still call it a Higher Education institution? Is that right or correct? Are universities using the word education in “narrower sense”, i.e. in the sense of providing special course of training pursued to secure one of the educational ends? If this is the case, is it right to confuse education by one of the means to achieve one of the educational ends?

²² What we mean by the term “notion” is a “set of related and potentially relatable *concepts* (represented by their respective definitions) and/or *uses* of the term.” Notions are usually described, and concepts are defined. More details, regarding *the notion of notion* can be found in N. Callaos, 2014.

²³ The Century Dictionary and Cyclopedia (1911, vol. III), p. 1845

Let us start with clear and representative real life examples, with which we can differentiate the notions of education and instruction. According to Heidi Ravven (2013, p. 389), “Nisbett points out that studies have shown that American of East Asian background have a slightly lower IQ than the Americans at large. Yet their achievements far out-strip not only their own IQ but those of other Americans.” Nisbett (2009, p. 154) concludes affirming that “Asian intellectual accomplishment is due more to sweat than to exceptional gray matter.” Consequently, if Asian-Americans have the same kind of *instructional* processes than the American at large, and slightly less IQ, what might be cause of their higher intellectual achievements? Is there any other answer than the education they have received in the context of their culture provided by their familiar context?

Nisbett (2009) find this kind of situation also in the Jews, more specifically the Ashkenazi Jews. *The American, while representing slightly more than 1% of the American population, received 40% of all American Nobel laureates*²⁴. Nisbett showed that the explanation is cannot be found in hereditary IQ. Is there any answer not related to the education the Jews receive in the context of their culture²⁵, i.e. in the context of their cultivated *values*, *beliefs*, thinking and doing *habits* along with an implicit or explicit *ethics* and consequential life’s norms and rules? After analyzing more evidence presented by Nisbett (2009), Heidi Ravven (2013, p. 390-1) affirms that “What is clear from the hard evidence, however, is that Jews achieve far more than their somewhat higher IQ averages would predict. So the difference is a result of environmental, contextual factors—whatever they might be. It is evident that education and culture are what Nisbett and Ravven are mostly referring to. With respect to the specific issue of education Heidi Ravven (2013, p. 390), based on the evidence presented by Nisbett (2009), affirms that “Like Confucians, Jews have a *strong emphasis on education*; also similar to those in the Confucian milieu, Jews have very strong family ties, and family expectations of the individual are demanding and hard to resist. Achievements are seen to redound to the whole family and even to the community. In sum, Nisbett says, ‘Jews place a *high value on achievement*, period’.”²⁶

Consequently, it seems to be evident that “achievement” is mostly generated by an adequate education, especially in its axiological necessary ingredient. Bill Gates (2009) affirmed that “Research shows that there is only half as much variation in student achievement between schools as there is among classrooms in the same school. *If you want your child to get the best education possible, it is actually more important to get him assigned to a great teacher than to a great school.*”²⁷ Consequently, it is evident that scholar achievement highly depends on the kind of education being provided. Instruction alone does not assure achievements. Instruction should be accompanied with (at least) emphasis on the value of achievement in order to produce scholar achievement. Likewise in life: strong emphasis in achievement, provided in educational

²⁴ This is for the American Jews who have at least one Jewish parent.

²⁵ We are using the word “culture” in its more general meaning, including the following senses given by The Century Dictionary and Cyclopedia (1911, vol. II) 1) “the systematic improvement and refinement of the mind, especially of one’s own. [Not common before the Nineteenth Century, except with strong consciousness of the metaphor involved, though used in Latin by Cicero.] 2) “The result of mental cultivation, or the state of being cultivated; refinement or enlightenment, learning and taste; in a broad sense, civilization: as a man of *culture*.” 3) “Training of the human body”, and 4) the pursuit of any art or science with the view of its improvement.”

²⁶ Italics and emphasis added

²⁷ Italics added.

processes with emphasis on the value of achievement will increase the probability of achievement in during and after the formal process of education. We might provide a similar reasoning with regards to the epistemological and ethical values. And here emerge an important question: is it really Higher Education the Higher Instruction that is not accompanied with an axiological education, especially in the epistemological and ethical values, and well as in the value of achievement? Aren't instruction and axiological preparation necessary condition for Higher Education? Should we still continue calling Higher Education what is evidently just Higher Instruction? Is that right? Is it fair? Is it ethical? We strongly believe, with rational and empirical justification, that ***axiological education should be an ingredient of any kind of education, including Higher Education***. This axiological education should at least contain epistemological, ethical, and achievement values. Among the epistemological values, creativity, analogical thinking should also be included. The student should be prepared or trained also in ***abduction*** and not just in *deductive and inductive methods* along with the epistemological values of these different ways of inferences. I am not suggesting that courses in these areas should be included in all academic careers, but each professor of each course should be aware regarding the epistemological, ethical and motivational aspect related to subject he/she is teaching. Otherwise, his/her role would be a mere instructional one in spite of his/her professorship. Is really a professor who does not care about (at least trying) to motivate his/her students regarding the subject he/she is teaching and to relate it to its potential relation with the student life, to his/her success in life according the respective epistemological and ethical values? In such a case, *what would be the real difference between a university professor and an instructor, besides different amount in their paychecks and bureaucratic academic hierarchy?*

Academic Informing Systems: Ethos, Pathos, and Logos

Elsewhere (Callaos and Callaos, 2014) we showed that our 40 years of experience developing about 120 software based information system showed us the practical importance and even the necessity of a systemic (not a systematic) methodology or meta-methodology that includes an adapted version of the *classical Greek Ethos, Pathos, and Logos* for developing, implementing and developing this kind of information systems. We also concluded that an adequate adaptation of the classical Greek Ethos, Pathos, and Logos is even more important and necessary in the analysis, design and implementation of non-software-based human information systems or human informing processes as it is the case of academic informing systems and processes, as well as other kind of educational systems and processes.

We wrote our conclusions and recommendation as follows:

1. We have shown via verbal reasoning and statistics, related to the *productivity* and *quality* of developing software-based information systems tailored to specific users' requirements, that *Systemic Methodologies are more effective than systematic ones*, though they might be less efficient, i.e. requiring more person-power, managerial time, and psychological energy from both developers and users.
2. We also have discussed and showed, via experience-based verbal reasoning, the huge importance of providing the developers with an updated *Trivium*, in order to improve their skills in handling natural language which is a necessary condition for the effective

application of their skills in Artificial Languages, as software and data-base designers and programmers.

3. As part of this updated *Trivium*, people involved in applying a systemic methodology for the development of an information systems and informing processes should adequately handle human communication and, consequently, the associated *Ethos, Pathos, and Logos*.

4. Because information systems development requires two main ways communication (actually it requires multiple ways), then there are situations in which developers and/or managers of the development project should also adequately handle the *meta-ethos, meta-pathos, and meta-logos* second level.

We recommend as next research activities or practice-based reflections, the following ones:

a) To analyze with more details via practice-based reflections, action-research, or action-learning the cybernetic relationships that implicitly exist, or explicitly should exist, among Ethos, Pathos, and Logos.

b) To generate research or practice-based reflections with regards the importance, even the *pragmatic* necessity, of applying Ethos, Pathos, and Logos in the context of other kind information systems or informing processes such as those in non-software-based contexts, as it is the case of Organizational Development or Change, Public Relations, Inter-National Relations, Inter-Cultural Communication, *Academic Activities*, etc.

We started working on a project related to Academic Ethos, Pathos, and Logos, mainly based on the findings we have had during 50 years of direct academic activities, or indirectly via managing and organizing them. Consequently, we hope that our next published article will be a first step in this direction. (Callaos and Callaos, 2014, pp. 31-33)

This article will be referenced in the articles to be written in the initial steps of the recommended project “related to Academic Ethos, Pathos, and Logos, mainly based on the findings we have had during 50 years of direct academic activities, or indirectly via managing and organizing them.” as well as in the collaborative work and collective reflections that might results from this project, which importance and urgency is increasing, in our opinion.

Applying the above conclusions to the specific case of academic informing systems and processes in Higher Education, we might suggest the following issues to be further studied, examined, researched, and/or which might serve as input for further reflections, dialogues and proactive conversations regarding the achievement of more adequate Higher Education organizations and processes.

1. Academic informing systems and processes, especially in Higher Education, should be designed by systemic rather that with systematic methodologies, including specific courses and academic conferences. An article is being written now for its formal publication in a journal regarding the application of systemic methodologies for an effective integration of traditional and non-traditional (conversational) conferences.

Those readers who are interested in a draft of this article before its formal publication can contact the author of this article through the email address provided at the beginning of this article. Systemic methodologies usually are more effective though less efficient than systematic ones. Educational processes should be, in our opinion, *more oriented to effectiveness than efficiency*, though real life solutions are based on a tradeoff made according to the real life existent restrictions in human and financial resources. Systemic methodologies require usually more person-power, managerial time, and psychological energy from both professors and students. More student effort is especially recommended for real learning which, in turn, requires a *motivating* professor and/or *adequate educational pathos processes*.

2. Any professor in Higher Education should be well trained and prepared to rain in an adapted *Medieval Trivium*, i.e. 1) *Grammar (to express correctly)*, *Dialogic (to think rightly)* and 3) *Rhetoric (to communicate effectively)*. We first noticed this educational requirement while teaching software-based information systems. We noticed that the most frequent failures in the development of this kind of systems and the most expensive ones were in Requirements Engineering rather than in software engineering or programming. This fact has been proven by many studies and statistics, especially in the United States. To be more effective in the requirements engineering phase the professional should manage natural language as well as artificial or computer languages. Regrettably software engineers and computer engineers are well instructed in artificial languages but not well educated in the use of natural languages. Almost no attention at all is paid in the design of these academic careers to using correctly, thinking rightly and communicating effectively in natural language, which is the interaction language with the users, but they spend almost all their career getting well prepared in the artificial language of computers. Their academic preparation should be balanced between getting skills in both kinds of languages (i.e. natural and artificial ones), if they are going to effectively analyze, design, and implement information systems. Regrettably this is not the case. They are being well prepared in handling the computer artificial languages, i.e. for computer programming, data-base design, etc., i.e. they are being well prepared for the design and implementations of *Electronic Data Processing (EDP)*, but not for *Information system Development*. Then we noticed that the same reasoning might be applied to Systems Engineering in general and we tried to create awareness on this issue in both the academic and the industrial worlds writing an article in the Venezuelan Computerworld journal entitled "*Importancia de la Trivialidad en Ingeniería de Sistemas*, i.e. "Importance of Triviality in Systems Engineering." Since then we included this article in several larger publications related to more general educational contexts (e.g. Callaos, 1995)

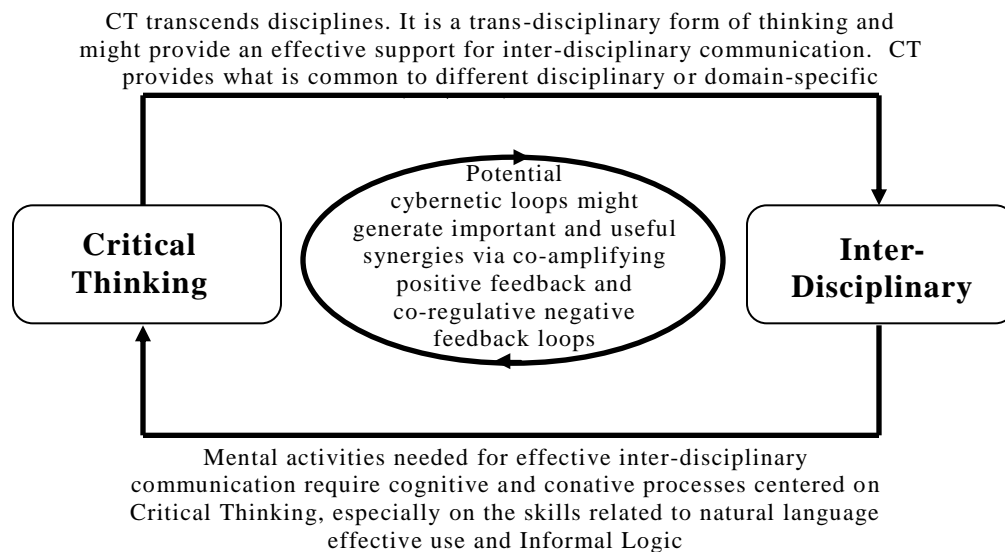
We also have discussed and showed, via experience-based reasoning (Action-Research), the huge importance of providing the developers with an updated *Trivium*, in order to improve their skills in handling natural language which is a *necessary* condition for the effective application of their skills in Artificial Languages, as software and data-base designers and programmers.

Critical Thinking and Inter-Disciplinary Communication Skills²⁸

Besides the epistemological and the axiological dimensions of Higher Education, or in their context, Critical Thinking should be part of it. On the other hand, inter-disciplinary communication skills are necessary of any Higher Education oriented to real life problem solving, which is a must in professional careers. An updated Trivium effectively supports Critical Thinking, Inter-disciplinary Communication and Education as a whole. Let us provide some details regarding this issue

Critical Thinking²⁹ (CT) supports, and might be supported by, effective processes of Inter-Disciplinary Communication, and both are required in Higher Education, especially in careers oriented to real problem solving which by nature require a multi-disciplinary approach and communicational skills with non-disciplinary stakeholders, users, or clients.

The potential cybernetic loops between these two kinds of cognitive processes (critical thinking and inter-disciplinary communication) might generate important and useful synergies by means of co-amplifying positive feedback and co-regulative negative feedback loops. Let us provide a short preliminary reasoning with regards to the just ventured hypothesis or reflection; which we resumed in the diagram below.



The trans-disciplinary nature of CT is among the consensual findings and conclusions achieved by 47 scholars and experts in Critical Thinking (CT), which was described in the Delphi Report³⁰. It is affirmed, in this report, that "while CT skills themselves *transcend specific subjects or disciplines*,

²⁸ This section is an updated and adequately adapted version of a previous article, Callaos, 2012.

²⁹ There are different definitions, notions, and conceptions of "Critical Thinking." We are mostly using here the notion consensually identified by 47 scholars and experts who went through 6 Delphi Method's rounds during 20 months. The result of this Delphi consensual procedure has been reported in the much known "The Delphi Report". An executive summary on this report can be found in Peter A. Facione, 1990.

³⁰ Facione, 1990

exercising them successfully in certain contexts demands domain-specific knowledge, some of which may concern specific methods and techniques used to make reasonable judgments in those specific contexts.”³¹ Consequently, it is affirmed, in recommendation 3, that “becoming adept at CT involves learning to use CT skills effectively in *many different contexts*.”³² Thinking skills in different context are essential to 2ducation, especially in Higher Education, including the one provided in a disciplinary context.

Since what is **common** to different disciplines is CT and what might differentiate them is the respective domain-specific knowledge (including specific methods, concepts, definitions, theories, and techniques), it seems evident to conclude that CT is what might effectively communicate disciplinarians from different disciplines, i.e. *CT is an inter-disciplinary form of thinking and might provide an effective support for inter-disciplinary communication*. Being **common** to different disciplines, CT might support the **communication** among disciplines or among disciplinarians. In our opinion, this is essential in Higher Education as conceptually differentiated from Higher Instruction.

CT might also support non-disciplinarian communication as, for example, the one required for communicating Science and Engineering with the general public, which is an important feature for legitimating scientific and engineering activities, especially those related to basic research. This is also, in our opinion, a distinguishing feature between Higher Education and Higher Instruction.

This conclusion coincides with my 30 years of experience in the development (analysis, design, implementation, and deployment) of more than 150 software-based information systems. Information systems developers (especially the analysts) need to be able to communicate with different disciplines as well as with the users, who mostly are non-disciplinarians and even workers and clerks who might not have had formal college education. For example, information systems supporting activities in Human Resources require the identification, verification, and validation of requirements from professionals in psychology, accountancy, finance, economists, lawyers, managers, statisticians, unions, etc.; and their users include clerks, besides the kind of professionals mentioned before, as well as managers, supervisors, executives, and directors. Consequently, inter-, and non-disciplinary communication is a **necessary** condition, though not a sufficient one, in the effective development of information systems. Hence, implicit or explicit, formal or informal education in CT is an important issue in the education of information system engineers who need inter-, and non-disciplinary communication skills in order to provide computer professionals, software engineers, and programmers with information regarding the respective system’s requirements; which should be done in *disciplinary* language, and which will end up in the *Artificial Language* required as input to the computer. Then, it is evident that inter-, and non-disciplinary communications skills, as well as an effective use of *Natural Language* and CT are required in information systems development. Correct, relevant, and adequate **Informal Logic** necessarily precedes the **Formal Logic** required in Software Engineering, programming, and, in general, computing activities and processes. This kind of *chronological precedence* and *logical necessary condition* is also found in many professions, applied sciences, and new disciplines named with hyphenated words, which represent the integration of different disciplines. In this kind of circumstances, CT, natural language skills, and effectiveness in handling informal logic support the effectiveness of inter- and non-disciplinary communication with others and with one-self (self

³¹ Facione, 1990, p.5, (emphasis added).

³² Ibid. (italics added).

communication supports our thinking processes). *These kinds of communicational skills are essential in Higher Education, while Higher Instruction might require just disciplinary communicational skills.*

This is why we have pointed out and emphasized, in several occasions, the **importance and the effectiveness of triviality** in both 1) the original or etymological sense, mentioned above, and 2) in its pejorative sense, i.e. the quality of being trivial, ordinary and commonplace. Non-ordinary (disciplinary or technical) language should be, at the end of the road, translated to common language in order to integrate disciplinary languages and academic narratives into ordinary language. *Shouldn't that be part of Higher Education while not necessarily is part of Higher Instruction?*

Etymologically, “trivial” derives from the Latin word *trivialis*, and this derives from *trivium*. As we described, shortly above and elsewhere³³, the word “trivium” was used in the Middle Ages to mean the group of three subjects, related to language teaching, which formed part of the curricula. The other four subjects taught formed the group named the *quadrivium*. The *trivium* meant the “three ways” to language, to its good and effective use. This three ways or subjects are: Grammar, Dialectic (in the sense of Dialogic) and Rhetoric. **Grammar** teaches to speak well. **Dialogic** provides the art of maintaining a useful dialogue, i.e. a competent communication. And **Rhetoric** provides the means of doing a pragmatically effective use of the language, i.e. obtaining the practical results sought by the use of the language. So many people knew the *trivium* in the Middle Ages that its three integrative subjects become a commonplace. Hence, the word *trivialis* emerged; which means “trivial.” And, here we have a **bewildering paradox**: what it was a common place in the Middle Age education is not so common, in our time, in professional activities that need most of it. ***Trivium is not trivial any more in our time***, especially in the field of information systems where it is so needed and almost a necessary condition for effective professional activities. It is not being adequately taught in informing sciences and it is not at all included in Computer Engineering or computerized Information Systems Engineering curricula, or in professional careers that require it. *Trivium* is as essential to an Information Systems Engineer performance as it is to a lawyer. Until Information Systems (and professional) curricula designers do not understand this situation, the importance of solving its related problem and the real necessity of including in the respective curricula a *trivium*, adapted to our times, there will be no strong hope for increasing significantly the future professional effectiveness of the students. An updated Trivium, or its contemporary equivalent, should be part of Higher Educations, especially in professional careers.

We would guess that the *trivium* was the middle age way of teaching CT, or CT is an essential part of an updated Trivium for the XXI Century. An adaptation of the *Trivium* to the present Century would be an adequate way to prepare disciplinary professionals to communicate with the (non-disciplinary) users of their professions and, of course, to communicate with professionals from other disciplines. CT is a necessary condition for communicating via natural language and informal logic. Both are necessary conditions for communicating disciplinarians with non-disciplinarians as well as disciplinarians from different disciplines.

On the other hand, the kind of thinking required for inter-disciplinary communication need mental activities that might support additional development in CT skills in those who are willing to exercise their cognitive and conative capacities in communication with disciplinarians from different disciplines. Facione affirms that “Like reading and writing, CT has applications in all areas of life

³³ Callaos and Callaos, 2002.

and learning.”³⁴ Consequently, CT has applications in all disciplines as well as in intra-, inter-, trans-, cross- and non-disciplinary thinking, learning, and communicating. CT is associated with the **common** skills required in any kind of thinking and, hence, of communicating, because to communicate requires to think.

The specific concepts, terms, theories, methods, definitions, standards, etc. that characterize a given discipline might not support the communicational process with other disciplines, and certainly does not support a non-disciplinary communication. Consequently, *those who effectively engage in inter-, or non-disciplinary communication have to restrict their thinking to what is common with other disciplines (or to what is common to the general public) and this necessarily involves CT mental processes.* This is essential in Higher Education, though not necessary for Higher Education.

The active processes in CT and in the Trivium (where disciplinary concepts, terms, theories, etc. might not be used for external expression of thoughts) activate the neural nets associated with critical thinking and communicational skills, which, as skills, the more they are used the more they get interiorized and solidified. The more restrictions we impose to our thinking in the context of disciplinary languages (concepts, terms, theories, definitions, etc.) the more we need to use cognitive processes which are (or should be) **common** to other disciplinarians’ (or non-disciplinarians’) cognitive processes. This evidently might improve those thinking/communicational skills which are not exercised via specific-domains. These non specific-domain skills are, by definition or conception, the CT and the Trivium skills. Consequently, inter-disciplinary communication might implicitly improve CT and Trivium skills.

Consequently, as a preliminary conclusion, we might venture the hypothesis or reflection we made at the beginning of this short article, i.e. ***Critical Thinking supports, and might be supported by, effective processes of Inter-Disciplinary Communication. And both might support and get supported by an updated Trivium adapted to the XXI Century.*** If this is a valid reflection then co-regulative and synergic co-amplifying cybernetic loops might be generated via negative and positive feedback, respectively; and it should be an essential part of Higher Educations, though not necessary ingredient in Higher Instruction in many disciplines as frequently taught in many universities, paradoxically named Higher Education organizations.

³⁴ Facione, 1990, p. 4

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