Research Paper

Proposal for the socio-educational evaluation of the Integrating Course1 in the Mechatronics Career at the UT Altamira

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Abstract:
The development of integrative projects has been the result of a series of adaptations and improvements in the Integrative Course 1, taught in the third term of the Mechatronics degree at the Altamira University of Technology. The evaluation of this has been traditionalist, not very conducive to learning and comprehensive training of students. To improve it, the socio-educational model was incorporated to carry out an analysis and design of a heading from the socio-educational perspective to identify weak points that influence the development of learning by competencies as well as the relevance of the instrument implemented. The method used is explanatory abouts rubric dsign since socio-educational approach, which required a great effort and dedication, to make explicit the elements that would integrate it to evaluate a technological project, and to discover how the professional training of teachers substantially influences both the planning, direction and evaluation of the subject in question.
Keywords: *evaluation, knowledge, project, society, socioformative.*

I.   INTRODUCTION

The evaluation by competencies consists of highlighting the importance of the application of skills in a real situational context, that is, showing significant performance in concrete scenarios of action, which allow the identification of the adequate competencies to act according to the demands of the situation (Rendón, 2014; Díaz Barriga, 2006). It differs from the traditional assessment used to define student promotion from one level to another (Champin, 2014, p. 566), "focused on determining quantitatively which were the levels of learning dominated by the students within a passive approach in which they acted as simple recipients of a series of contents expressed masterfully by the teacher" (Guerrero, Vera & Castro, 2014, p. 20).

There are various approaches to learning assessment, such as constructivism, behaviourism, psychogenetic approach, social-constructivist approach, among others. Socio-training, on the other hand, based on social constructivism and complex thought (Hernández, Tobón and Guerrero, 2016), "consists of orienting the training of people within the framework of the challenges of the knowledge society, seeking to ensure that they have a solid ethical life project and contribute to the social fabric, socio-economic development" (Hernández, Tobón, González and Guzmán, 2015, p. 32) and sustainable social development (Luna-Nemecio, Tobón, & Juárez-Hernández, 2020); furthermore, I have considered that training becomes a social process based on the interaction between individuals and collaborative work, intending to solve the problems of the context, leaving behind behaviourism, constructivism and cognitivism (Luna-Nemecio, Tobón, & Juárez-Hernández, 2019, p. 32).

Socio-educational evaluation lies in "a process of support and feedback aimed at enabling people to identify, interpret, argue and solve problems in the context using continuous support and feedback based on certain evidence" (Tobón, 2014, in Hernández, et al, 2016), that is, it is a process where a diagnosis, providing, continuous support to individuals, teams, organizations and communities to learn to solve problems of the context, improving their performance and allowing them to develop the talent needed for the knowledge society, through self-assessment, co-evaluation and heteroassessment, based on the development of products and tools that facilitate the process of meta-cognition, through collaborative work and complex thinking (Tobon, 2017).

The main characteristics of socio-educational assessment are: 1) it is based on the problems of the environment since it "seeks to make students learn to identify, interpret, argue and solve problems of the context. A problem is a challenge of transforming a given situation into an expected or ideal situation, in a meaningful environment" (Tobón, 2017, p.22); 2) it is based on context-relevant products, that is, 'they are tangible evidence that gives an account of the action taken in the face of the context's problems by applying complex thinking" (Tobón, 2017, p. 23); 3) it is based on collaboration, since "it implies a continuous process of collaborative work, defined as the coordinated actions of a group of people to achieve a common goal" (Tobón, 2017, p. 24); 4) seeks the continuous improvement and development of talent, whether of "one or several specific aspects until a sufficient or expected level of mastery is achieved, taking into account the challenges of the context" (Tobón, 2017, p.35); and 5) articulates self-evaluation, co-evaluation and heteroevaluation (Hernández, et al., 2015, p.32).

Socio-educational assessment differs from constructivist assessment and behavioural assessment in the following aspects: 1) it addresses the problems of the context; 2) performance is assessed through relevant and appropriate products; 3) products are analysed based on specific instruments, such as rubrics (Martinez, 2018); 4) collaborative work is done to develop talent and improve performance; 5) individuals are expected to achieve higher levels of performance concerning to problems and 6) achievements and experiences are shared with others, the family and other individuals. It should be noted that the socio-educational evaluation emphasizes the work with the ethical life project, as well as the formation of the entrepreneurial spirit (Tobón, 2017). However, it has common threads with these approaches, such: 1) emphasis on timely feedback; 2) analysis of prior knowledge; and 3) accompaniment of learners for self-assessment and continuous improvement (Tobon, 2017).

Although improvements have been made in the evaluation process, it has deficiencies such: 1) emphasis on the administration of objective tests that show the degree of appropriation of the content without addressing challenging problems of context; 2) consequently, the training of reactive professionals rather than proactive ones; 3) the quantitative aspect prevails over the importance of the comprehensive training of students. To determine progress towards a socio-educational assessment, a comparative study was made of teaching practice at the University of Altamira, in the Mechatronics career, in the course "Integrative 1".

The purposes of the study were: 1) to determine the educational or pedagogical approach followed in the evaluation experience analysed; 2) to establish the achievements and areas of opportunity in the evaluation experience taking into account the references of socio-training and the challenges of sustainable social development with the support of a validated rubric in the area; and 3) to propose actions to improve the planning of the evaluation and the design of the instruments used, to strengthen the orientation towards addressing problems and products relevant to the context; and 4) to suggest some elements to improve the implementation of the evaluation based on collaboration

Development

To contextualise this document, the Altamira University of Technology offers technological training by competences, whose teaching-learning process aims to graduate qualified personnel or skilled labour in a short time, to join the business sector of goods and services.

There are seven courses offered at the Higher Technical University Level (TSU), taught in the morning shift. The curriculum is organised by quartes from the first to the sixth term, the latter is called professional stays. It is, therefore, the third four-month period of the Mechatronics career, where the subject considered for this work is located. The graduation profile consists of planning and implementing automated and general control systems; supervising the maintenance of automated and control equipment to contribute to the successful operation of the company; integrating the components of measurement and control systems according to the needs and technical specifications, and establishing links between equipment and/or devices to make the communication and control processes more efficient.

Concerning the objective of the course in question, it aims for the student to demonstrate the competence to "develop and maintain automated and control systems, using appropriate technology, following standards, technical and safety specifications, to improve and maintain production processes" (Uts.edu.mx, 2019).

The following is the heading that had been used to qualify unit 1

Table 1: HEADING FOR EVALUATING PROJECTS IN THE CURSEINTEGRATIVE 1. UNIT I

PERFORMANCE CRITERIA	COMPETENT	MINIMUM	Poor	Points OBTAINED
COVER: 5 points	Order of data, clarity, cleanliness, title and members 5 -4 points.	Data not correctly ordered, no clarity or cleanliness: 3-2 points	Does not meet completely way:1-0 points	
INDEX: 5 points	Complete and paginated: 5-4 points	Incomplete: 3 - 2 points	No index:1-0 points	
INTRODUCTION: 2 points.	Expresses clearly the different parts of the introduction: 2 points	Lack of clarity in the introduction: 1 point	Does not meet completely way: 0 points	
GENERAL AND SPECIFIC OBJECTIVE: 10 points	The objectives are clear, measurable and achievable: 10 - 7 points	Lacks clarity, is not measurable and achievable: 6 - 3 points	Does not fulfil the requirement: 0 points: 2- 0	
COMPANY DATA: 2 points	Location by google maps: 2 points	Some of the elements are missing: 1 point	Does not meet completely way: 0 points	
FLOW DIAGRAM UNIT 1: 5 points	The flow diagram is logical and according to the productive process: 5 - 4 points	The diagram does not clearly express the productive process: 3 - 2 points	Does not meet completely way:1-0 point	
PURPOSE OF THE PROJECT (ONE QUARTER): 5 points	The proposal of automation describes in a clear and precise way: 5 - 4 points.	Lack of precision or clarity in the automation proposal : 3 - 2 points	The automation proposal is deficient: 1 - 0 points.	
JUSTIFICATION OF THE PROJECT: 10 points	It expresses technical, ecological and economic reasons that validate the project, as well as its relationship with other subjects: 10 - 7 points	Lack of precision in the reasons that justify the project, the relationship with other subjects is not clear: 6 - 3 points.	Deficiency in the justification: 1 - 0 points.	
THEORETICAL FRAMEWORK: 10 points	Use textual quotations, paraphrases and specific contributions: 10 - 7 points.	Use few textual quotations and paraphrases and makes few contributions: 6 - 3 points.	Does not use textual quotations, paraphrases or specifies contributions: 2 - 0 points.	
TIMELINE (PROJECT) 2 points	Presents a completely program's activities: 2 points	Incomplete the programmed activities: 1 point	Does not comply with the requirement: 0 points	
BIBLIOGRAPHIC SUPPORT (information sources supporting the project): 10 points	Three information sources per team member: 5 - 4 points	Two information sources per member:3 - 2 points	One information source per member:1- 0 points	
EVIDENCE: 5 points	Presents photos, video, and other forms of evidence of the participation of the members: 5 -4	points Evidence is not awarding: 3 - 2 points	Does not meet completely way: 1 - 0 points	
LEARNING EXPERIENCE g(two paragraphs), explaining the remarkable knowledge acquired 5 points	The explanation is clear and convincing: 5-4 points.	The explanation it doesn't have clarity.	Does not meet completely way: 1 - 0 points	

EVALUATOR: _____

COURSE: _____GROUP:_____ TEAM:_____

TOTAL SCORE: _____

Source: Own elaboration, for evaluation of the first unit during the development of Integrator projects (2013).

II.   METHODOLOGY

Due to the characteristics of the present work, the comparative-descriptive method was chosen, in which "comparative techniques have been refined and strengthened in the field of social sciences. Together with case studies and experimental studies with which it has a close relationship" (Collier, 1993 and Gómez & De León, 2014, p. 228), more and more academics and researchers make use of it. Therefore, it "allows to

understand unknown things from known ones, the possibility of explaining and interpreting them, to outline new knowledge, to highlight the peculiarity of known phenomena, to systematise information distinguishing differences with similar phenomena or cases" (Gómez & De León, 2014, p.229).

There are "two forms of property- or object-centred comparisons with the classic distinction between quantitative and qualitative methods of social research: comparative approaches that emphasise properties are generally in a quantitative orientation and those that emphasise objects are in a qualitative orientation" (Piovani & Krawczyk, 2017, p.13). Comparison has a fundamental role both in the experimentation of physical sciences and in the quasi-experimental designs used in the human sciences. Statistical analysis is mainly done on the based on comparisons; it inevitably ends up being compared even in case studies (Fideli, 1998, p. 11-12).

Based on the previously established problems, we analysed the instrument used to evaluate Unit 1 of the subject in question, compared with a new one designed under the socio-educational pedagogical model, which favours competent learning of the TSU.

Evaluated Experience

Table 1.

Characteristics of the subject, module or programme in which the analysis of the learning assessment process was made

Educational level:	University Senior Technician in Mechatronics
Subject or module:	Integrator 1
Semester or grade:	Third Quarter
Structure of the subject or module:	Project description
Mode:	Face
Duration of the subject in hours:.	30 hours; two one-hour sessions per week
Number of credits:	Doesn't apply
The pedagogical approach followed:	Competency learning.
Documents evaluated:	Subject Planning Certificate: Integrator 1[Rossette, 2019]; First Unit Evaluation Rubric [Rossette, 2019]

Source: own production based in Tobón (2017).

Instrument

Diagnosis around the evaluation process in Integrative 1 was proposed from the application of the Heading of Learning Assessment Practices from Socioformation (Table 2), which was designed and validated by CIFE (2018). This instrument seeks to determine the level of progress in the implementation of the evaluation oriented to the integral training of students to face the challenges of the knowledge society, as well as sustainable social development (Luna-Nemecio, Tobón, & Juárez-Hernández, 2019). It is integrated by three performance indicators and five levels of action: pre-formal, responsive, resolute, autonomous and strategic. Thereby evaluate Unit 1, or first phase.

Table 1

Structure of the Rubric: Evaluation Practices of the Integrative Subject 1. Unit 1, from the Socioformative Model.

INTEGRATOR ASSESSMENT PRACTICE 1. UNIT 1					

Product: Written
Value: 100%

Instructions: Analyze and identify some of the problems of the context (industrial, social or environmental) and based on your previous knowledge, propose to solve the problem in collaboration.

Indicators	Pre-formal	Receptive	Resolutive	Autonomous	Strategic
1.- Analysis of a problem. I analyse and identify a problem in the context (industrial, social or environmental) and propose a relevant solution, based on previous knowledge	I indicate some elements of the problem of the context (social, industrial or of the environment) but without proposing a solution lacking in previous knowledge.	I recognise the problem of the context (industrial, social or environmental), based on little previous knowledge.	I diagnose the problem of the context (industrial, social or environmental), based on some previous knowledge. I propose a relevant procedure to solve the problem of the context.	I argue the problem of the context (industrial, social or environmental) and the way it should be solved based on previous knowledge and propose several relevant procedures to solve the problem in collaboration.	I articulate the problem, denoting the mastery of previous knowledge and other different disciplines, and propose other relevant alternatives to solve it collaboratively.
Weighting: 20%	0	5%	10%	15%	20%
2. Information and knowledge management. In the report, I analyse the problem of the context (industrial, social or of the environment) based on the availability of technological and economic resources. I elaborate a visual presentation of the prototype that I will develop in the 5th four-month period.	In the report, I address a problem of context (industrial, social or of the environment) and I describe it with different contributions without coherence.	In the report, I present the theme of the project, divided into the following parts: cover, table of contents, objectives, justification, theoretical framework, relationship to other subjects, timetable, learning experience, bibliographical support. I include the APA rules and correct spelling.	In the repaort, I describe the context (industrial, social or environmental), and analyse and interpret based on the previously reviewed literature.	In the report. I critically analyse the previous knowledge and use the literature analysing the contributions of recent technological innovations.	In the report, I propose and support the solution to solve the problem of the context (industrial, social or of the environment), supporting through the analyzed bibliography. I present different pieces of knowledge in order to tackle and solve the problem in the context.
Weighting: 30%	0%	15%	20%	25%	30%
3. Oral and written communication. I express my ideas orally and in writing in the team with to enrich the work of the team.	I often repeat the ideas of my colleagues and other authors to express my own. I find it difficult to express my ideas.	I look for some words in the texts that help me to express my ideas orally and in writing. I select the words I need to express my ideas to my colleagues and make myself understood.	I write in my own words and express my ideas clearly. I implement actions to communicate with others. I process my ideas in an organised way to later express them and make myself understood.	I explain the ideas that I want to convey verbally and in writing so that my colleagues understand my ideas. I argue my ideas using examples so that my colleagues can understand me better. I write reports in which I analyse and explain my ideas clearly.	I project my ideas and concepts orally and in writing so that my colleagues can easily understand what I want to convey, taking into account the communicative requirements of each situation. I communicate assertively, handling the various situations that may arise with respect and cordiality with people at all times. I apply communicative strategies according to the interlocutors, the context in which I am immersed and the objectives I pursue. I generate communication channels with my colleagues so that ideas can flow between everyone.
Weighting: 20%	0%	5%	10%	15%	20%

4. Ethical life project. I seek to solve problems based on values to contribute to social and organisational development and care of the environment based on the problem of the context (industrial, social or environmental).	I seek to work responsibly and/or respectfully in the analysis and resolution of a problem of the context (industrial, social or environmental).	I prepare an analysis together with my colleagues, in collaborative work. I carry out the resolution of a problem of the context based on the values, honesty and social responsibility.	I carry out the tasks involved in the analysis and resolution of the problem of the context (industrial, social or of the environment), I deliver in time and form the required analyses based on values, honesty and social responsibility.	I analyse and explain the contributions of the problem of the context (industrial, social or of the environment) that serves for the resolution of problems and the improvement of the conditions of life and the social and organisational development, based on personal development and care of the environment.	I propose some action that helps to improve living conditions and that seeks social, personal development. I help to take care of the environment based on the resolution of the context problem.
Weighting: 10%	**0**	**7%**	**8%**	**9%**	**10%**
5. Collaborative work. I collaborate with colleagues in the analysis, identification and proposal of solutions to the problem of the context (industrial, social or environmental) based on my previous knowledge.	I approach others to be integrated into the work and do not make relevant contributions to solve the problem of the context.	I carry out some activities with colleagues providing solutions to solve the problem of the context.	I integrate with the team to address the problem by applying the previous knowledge and contribute actively to the activities. I look for the distribution of roles by assuming one of them to achieve the goal.	I articulate with the team and seek the coordination and participation of all by implementing the relevant improvements in the process through self-evaluation.	I promote strategies so that all of us in the team collaborate to solve the problems. I contribute to the resolution of conflicts so that there is integration within the team. I support colleagues who find it difficult to solve the problem based on their previous knowledge and I help them to move forward.

III. RESULTS

As the results of the comparison between the traditional rubric (first heading) and the socioformative rubric (second heading) the following is specified:

1. Heading 1 does not include a central problem as a starting point for the project, whether of industrial, social or environmental origin, that is, there is no identification of a problem of the context, it was completely omitted, that is, there is no specific need thataddresses the development of the project. While in the socio-computer heading, the problem is the central point and basis for the construction of each of the phases and activities to be carried out to resolve the situation of origin proposed.

2. The first heading follows the type of traditionalist evaluation, focused on assigning a number that measures student performance according some number of requirements set out in their respective categories. In the second heading, the percentage allocation expresses a gradual and progressive level of performance, locating the student in a specific competency category, depending on the degree of performance shown when performing each of the activities corresponding to unit 1.

3. The first heading sets out each of the categories and performance levels corresponding to phase 1 of the project, focusing entirely on the structuring of the written document. The second has a holistic character, composed of categories and performance levels that involve aspects such as problem analysis, information management, the ethical life project, collaborative work, the communication capacity that entails awareness in the individual and team action of students.

4. The verbs used in the first heading are written impersonally. They are descriptors of each of the activities to be carried out in phase 1 of the project, leaving aside the main actor: he is a student. However, in the socioformative heading, first-person verbs involve the subject in development in each of the activities to be carried out; that is, the awareness in each of the tasks to be performed is individual as a team.

5. Although in the first heading teamwork is assumed, or is understood as an essential part of the program of the subject, it does not emphasize the degree of importance that corresponds to it, since there is no way to

evaluate the performance of the subject, therefore, it does not favour its cohesion, favouring the lack of commitment of the members in the fulfilment of phase 1. One of the strengths of the socio-computer heading is the transcendentality of collaborative work, to solve a particular problem proactively since it entails such a level of interaction and integration, that both tolerance and respect, are fundamental factors in bringing the design, development, design and construction of the project to fruition; because it is a model of interactive learning, which invites students to build together, for which it demands to combine efforts, talents and competencies through a series of transactions that allow them to achieve the goals set by the members of a team (Maldonado, 2007).

6.   The first rubric does not use a specific taxonomy (based on some theoretical-pedagogical model), which requires each of the various tasks to be carried out by the student, during the process of development, design and construction of the project. In the socioformative heading (based on various pedagogical theories) taxonomy notes, delimits, particularizes each of the activities to be carried out for the achievement of objective: the functionality of the prototype, responding to a need of the environment.

7. In the socio-computer heading, self-assessment, co-assessment and hetero-assessment are a fundamental part of both the learning process and the student training process, promoting individual and collective conscious action, as well as the value of honesty and continuous improvement. On the other hand, the first heading, there is only the heteroevaluation on the part of the teacher, avoiding the responsibility of the student to himself (hisactions) and to his peers, leaving open the possibility for pretexts, irresponsibility, guilt conflicts and non-compliance with the task or work.

IV.   DISCUSSION

Based on the comparative study carried out, it can be observed that in the evaluative practice provided in the subject of Integrator 1, both the planning of the subjects and the implemented instrument, Hernández, Tobón & Guerrero (2016) consider:

They are inscribed in a context dominated by the management of information for the approach of a programmatic content of the subjects, which favour the standardization of learning processes generating rigidity at the time of application from a perspective of programmatic selection of subjects, which contribute to the standardization of learning processes generating rigidity at the time of application from a perspective of selection, classification and control of individuals and institutions themselves (p. 359).

Although competency learning has been strongly driven by bodies such as OECD, UNESCO, IDB, ILO, etc., "educational practices in the classrooms of Ibero-American countries, including Mexico, continue to base their learning strategies on the transmission of information to students, which entails a high degree of descontextualization in the face of the reality that needs to be addressed and on which , new generations will have to solve problems of various kinds" (Hernández, et al., 2016, p.360).

However, to evaluate integrative technological projects through cross-cutting headings from a socio-computer perspective, seeks the transformation of training practices in different environments (educational, organizational and social) through collaboration and cross-cutting projects (Tobón, 2013), developing instruments that contain the necessary elements that improve the skills development, collaborative work and solve a problem of the environment. Therefore, socioformative rubrics "allow to evaluate the performance in the realization of processes or evidence and constitute an opportunity for improvement in current educational practices" (Hernández, Tobón & Guerrero, 2016, p. 359).

The planeación of evaluation within teaching activities is that the educator must create significant new situations, for the student to learn what he needs for his self-realization and participation within society. Therefore, the teacher must modify in his planning the objectives that he intends to evaluate and evaluate the learning results, that is, that the contents of the subject are immersed in the learning results; hence the need to implement the strategy called problem-solving (explicitly) in the planning of the subject, with the learning results being the essence of the curriculum. Therefore, the purpose of planning should be focused on developing the skills needed by today's society and identifying the results of learning that refer to relevant processes in the social, professional, environmental context, as it is a key element in the design of the micro curriculum (Tobón, 2019).

4. In the particular case, the CGUTyP, is responsible for making the modifications, updates and improvements of the programs of the subjects, which to date remain in force, as is the subject "Integrator 1", which has not undergone any modification since it was incorporated into the curriculum in 2013. Only the program of the most is not provided with the mechanics under which the subject will have to be planned, how to direct learning without the specific orientation for the development of the projects that students will carry out.

5. What gave rise to various ways of teaching the subject in question, according to criteria rather subjective than objective; the experience that many teachers have had in the industries and companies where they have worked; which does not include prior pedagogical training. Lack that has become a constant in the organic structure of the University, since, in the process of hiring new staff, no training requirements are included in the field of teaching, rather, *ad hoc profiles are required* to the various careers, in this case, Mechatronics. the learning process is subject to both these conditions (extrinsic and intrinsic already described), influencing the academic and integral training of students (Tobón, 2019).

6. Turning to another aspect, it is important to mention that context-based assessment is a central feature of socio-computer evaluation and consists in educated people identifying, interpreting, arguing and resolving context problems, since according to Gutierrez-Hernández, Herrera Córdova, Bernabé, & Hernández-Mosqueda (2016), where a problem is a necessity that due to its complexity must be analyzed, understood and resolved taking into account the many factors involved, as well as the consequences, to take into account the various options to address it (Tobón 2017). In this study, it could be determined that the heading used years ago lacked a sufficient methodological basis to support the process not only of evaluation but of the comprehensive training process of students. However, it is necessary to carry out the application of the socioformative heading, to be able to carry out a subsequent study to measure the effectiveness of this.

7. Likewise, evaluation based on performance products is another axis of socio-computer evaluation and consists, in particular concerning this work, in the development of a project, which must be tangible that solves a problem of the context, where the complex thinking that occurs through: critical analysis, systemic analysis and creativity is applied (Tobón, 2017). It is for this reason that rubrics are based on evidence such as reports, records, essays, videos, audios, testimonies, etc.(Tobón, 2013). The characteristics that these products should have as mentioned by Tobón (2017) are as follows: they are tangible; account for addressing a problem; they are prepared by the student with critical analysis; demonstrate achievements in the training received; it allows you to evaluate different piece of knowledge in an integrated way: to be, to do, to know and to live together. Evidence is tangible products and evidence demonstrating people's performance in solvingcontext problems (Tobón, 2010).

8. This is how evaluation based on performance products is characterized by the fact that rubrics contribute to developing complex thinking by promoting reflection in students and assessing the address of problems in their transversality, considering uncertainty (Hernández & Tobón 2016). In this sense, the rubrics address the chaos and uncertainty that any evaluation process entails since from the establishment of levels of dominance it is feasible to articulate the different knowledges that make up a person's performance and to graduate their relevance and quality. Besides, the evaluation is aimed at solving problems with an overview of what is expected of citizens in the context (Hernández, Tobón & Vázquez, 2014). Socioformative headings promote participatory processes by generating an evaluation for continuous improvement through the establishment of criteria, evidence to be carried out and domain levels that can be evaluated and improved from the proposal of this approach (Hernández, Tobón & Vázquez, 2014).

9. In this study, socio-computer headings show a comprehensive evaluation process by employing context problems, domain levels and feedback based on the application of metacognitive principles, which promote motivation for continuous improvement and assume error and uncertainty as key elements for the consolidation of an ethical life project (Tobón , Calderón, Hernández & Cardona, 2015). Other studies from the business field warn of the need in organizations to create a method that gives the possibility to define and develop competencies (knowledge, skills and attitudes that facilitate successful performance), contribute to greater productivity and leadership, and in turn, make it more competitive organizations and this is achieved through performance assessment (Alveiro, 2009).

10. In any skills assessment process, instruments are essential, because it makes it possible to assess both the training process and the obtaining of a central product, therefore, the instruments must be comprehensive because they have to incorporate the process, the result, self-assessment, co-evaluation and hetero-assessment. It should be emphasized that, from the perspective of socioformation, it is intended to avoid the development of instruments for heteroevaluation, co-assessment and self-assessment independently, but rather is intended to develop the evaluation instrument in an articulated way, since the socioformative approach is based on complex thinking and system theory (Tobón, 2018b). In the comparative study carried out, it was found that the instrument used previously, did not allow a comprehensive evaluation of the subject Integrator 1, since it only encourages the development of project using declarative knowledge. In other similar studies, it has been found that to transcend the instructional design, of a stage model that presents inaccurate actions, a rubric has been developed to articulate the principles and criteria of ADOIVA (indicators that assess the level of relevance in

which each stage contributes to educational quality from the distance modality), through the approach of socioformation , which guarantees the quality of the distance education model (Montoya - Juárez, 2018).

11. Feedback should be comprehensive and refers to collaborative assessment, involving parents, teachers, people in the community and/or with members of organizations, which aims to provide a continuous response with achievements and aspects to be improved and is characterized by its two central elements: firstly to indicate achievement and then to point out some aspect to be improved. (Tobón, 2018b).

12. Informal assessment in socioformation refers to continuously diagnosing, re-evaluating and supporting students without the need for planning or instruments, and seeks to adapt to each student's progress, e.g. feedback without instrument or planning or indicators, because it depends primarily on the teacher's experience, so it is very important in socioformation. (Tobón 2018). For its part, Talenquer (2015) states that the study conducted found that informal evaluation arises spontaneously in the classroom and tends to focus on obtaining learning information whenever the opportunity arises. Asensio, Rodríguez & Asenjo (2012) call this informalevaluation as an asthmatic or subjective one, and coinciding with Talanquer (2015) mentions that its main characteristic is to be superficial, improvised, with unverified validity and reliability. These assessments are emerging, unplanned, based on scarce data and quite a few subjective data.Finally, formative evaluation is a key component of socioformation, and is that this type of assessment can occur at any level of student-teacher interaction, either with the entire group, with a small group of students or in a one-to-one interaction (Talanquer, 2015). In this type of evaluation, the verb is given to evaluate the meaning of estimating, calculating, justifying, valuing, appreciating or pointing out the value, attributing value to something. The operation of evaluating something or someone is to estimate its non-material value.

13. Formative assessment is a key component of socioformation, and consists of the process in which students and teachers share learning goals and continuously assess progress with respect to stipulated learning outcomes. Its purpose is to determine the best way to continue the teaching-learning process concerning to the needs of the course (Tobón,2018). It has the following characteristics: 1) focuses on the performance or process that the student performs; 2) is descriptive because it reports specific information about what is expected in the student, how they are doing so and how they can improve; 3) is based on aspects that in student has developed correctly and in their areas of opportunity; (4) considers error as an essential part of learning, so it overvalues it and clears up bewilderment; 5) Promotes metacognition in the student, without providing him with the answers, therefore feedback is essential for the student; and 6) it is timely as it allows the student to work basis on improve in a promptly, that is, during the process (Education Quality Agency, 2016). In the comparative study, the heading designed under the socioformative model presents a breakthrough to evaluate the projects developed by students in the subject Integrator 1 and once applied measurement of the impact that it will have on the integral training of students, the reason for a study or subsequent studies should be made.

V. CONCLUSIONS

From the analysis carried out, the following conclusions can be established:

1. The theme: Proposal for socioformative evaluation of Integrative Subject 1, in the Mechatronics Career. UT Altamira consists of analyzing and comparing a style adopted (without theoretical-pedagogical basis) long ago, with a new one whose method is socioformative.

2. Socioformation emphasizes the following aspects: (1) directing the formation of individuals according to the challenges of the knowledge society, to provide them with a solid ethical project of life, assisting in the construction of the social fabric, sustainable socio-economic and social development; (2) encourage interaction between individuals and collaborative work in order to solve the problems of the context, among others.

3. Socioformation has as its main benefit for teachers, seeking the transformation of training practices in different environments through collaboration and the realization of cross-cutting projects, which allows and implements instruments containing necessary elements that favour the development of skills, collaborative work and solve a problem of the real environment of action.

4. The topic covered addresses the following axes: the standardization of an evaluation style within a technological cutting education system; socioformation, on the other hand, as a provider of a new methodological reference framework that provides a new evaluative paradigm from an inclusive, social and environmentally focused perspective; which represent a change from the traditional methodology focused on behavioural, instructional, numerical and individualistic.

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5. For socioformation not to become a fad in education, it is necessary to have self-criticism, to consider research and to seek continuous improvement. Therefore, the new evaluation heading should be under continuous review, to respond to the demands and needs of the social environment. Since the generation of inclusive projects, it must directly impact the various scenarios: academic, industrial-business, and social.

REFERENCES

[1]. Avila, M. and Paredes, I. (2015). The assessment of learning within the framework of the curriculum competitions. Omnia, *21*(1), 52-65. Downloaded from: http://www.redalyc.org/pdf/737/73742121005.pdf

[2]. Education Quality Agency (2016). *Formative Assessment Guide*. Santiago de Chile. Downloaded from: https://www.evaluacionformativa.cl/wp-content/uploads/2016/06/Gu%C3%ADa_Evaluaci%C3%B3n_Formativa.pdf.

[3]. CIFE (2018). *Heading of Learning Assessment Practices from Socioformation*. Mexico: CIFE.

[4]. Champin, D. (2014). Skills assessment in medical education. *Peruvian Journal of Experimental Medicine and Public Health,31*(3), 566-571. [Consultation Date September 18, 2019]. Downloaded from: http://www.redalyc.org/articulo.oa?id=363/36333049023.

[5]. Eol, R. (2015). Epistemology and practice of research on strategic learning in Latin America. Journal of Education and Humanism. Download: http://dx.doi.org/10.17081/eduhum.17.29.1254

[6]. Fidereli, R. (1998). La Comparazione. Milano: Angeli.

[7]. Warrior, Waldemar; Vera, Luis José; Castro, Luis; Fossi, Leonardo. (2013). Evaluation of learning skills. Negotium, *9*(26),19-59. [consultation date: 18 September 2019]. Download: http://www.redalyc.org/pdf/782/78228464002.pdf.

[8]. Gómez, D. and De León, A. (2014). *Comparative method*. 223 - 251. Download: http://eprints.uanl.mx/9802/1/Estudio%20Comparado.pdf

[9]. Hernandez, J. (2013). Skills assessment processes from the socioformation. *Ra Ximhai Magazine,9*(4), 11-19. Download: https://www.redalyc.org/pdf/461/46129004001.pdf

[10]. Hernández, J. S., Tobón, S., and Vasquez, J. (2014) Conceptual study of teaching socio-computer. *Ra Ximhai*. Download: http://www.redalyc.org/pdf/461/46132134006.pdfx

[11]. Hernández, J. S., Tobón, S., and Vásquez, J. (2015). Study of Socioformative Leadership through Conceptual Mapping. *Ibero-American Journal of Educational Assessment.* Download: https://revistas.uam.es/index.php/riee/article/view/2878/3095

[12]. Hernández, J. S., Tobón, S., González, L. and Guzmán, C. (2015) Socioformative evaluation and academic performance in an online graduate program. *CIFE University Center*. Mexico. Download: http://www.scielo.org.ve/pdf/pdg/v36n1/art03.pdf

[13]. Hernandez - Mosqueda, J, Tobón, S, Guerrero R., G. (2015). Context issues: philosophical and pedagogical basis of socioformation. *Ra Ximhai, 11*(4), 125-140. Download: http://www.redalyc.org/pdf/461/46142596008.pdf

[14]. Hernández, J.S., Tobón, S. & Guerrero, (2016). Towards a comprehensive performance assessment: socio-computer rubrics. *Ra Ximhai, 12*(6), 359-376. Download: https://goo.gl/cZLlk6.

[15]. Hunca M., J. (2017). Competency assessment from the socio-formative approach. *Socio-computer evaluation forum.* Mexico. MARCO University Center. Downloaded from: https://www.researchgate.net/profile/Jesus_Huanca_Mamani/publication/323627549_La_Evaluacion_de_Competencias_desde_el_ Enfoque_Socioformativo/links/5aa0c4020f7e9badd9a3017e/La-Evaluacion-de-Competencias-desde-el-Enfoque-Socioformativo.pdf

[16]. Luna-Nemecio, J. (2020). To think about sustainable social development: multiple approaches, the same goal. Mount Dora (USA)/Quito (Ecuador): Kresearch/ Reengage. Research Center in Social Sciences and Humanities from Latin America. Doi: https://doi.org/10.35766/dss20

[17]. Maldonado P., M. (2007). Collaborative work in the university*classroom. Laurus*, *13*(23), 263-278. Download: https://www.redalyc.org/articulo.oa?id=761/76102314

[18]. Martínez, S. and Rochera, M. (2010). Skills assessment practices in the Mexican preschool education from curriculum reform. Analysis from a socio-technical model and located. *Mexican Journal of Educational Research, 15*(47). Download: https://www.raco.cat/index.php/Educar/article/view/124455

[19]. Martínez, J., Tobón, S., López, E. (2019). Curriculum: an analysis from one approach socio-computer. *IE Journal of Educational Research of REDIECH,10* (18), 43-63. DOI: https://doi.org/10.33010/ieriediech.v10i18.200

[20]. Martínez V., M.G. (2018).The Learning Assessment, with the Application of the Socioformative Approach. *CIFE*. DOI: 10.13140/RG.2.2.15006.18249

[21]. Medina, E. & Tobón, S. (2010). Comprehensive training and competencies. Thought complex, curriculum, didactics and evaluation. *Inter-American Journal of Adult Education, 32*(2), 90-95Download: https://www.redalyc.org/pdf/4575/457545095007.pdf

[22]. Mejía, O. (2012). From traditional evaluation to a new assessment based on Competences. *Educare Electronic Journal, 16* (1), 27-46. Download: http://www.redalyc.org/pdf/1941/194124281004.pdf

[23]. Montoya L., L. and Juárez H., L. G. (2018). Socio-Computer Rubric to promote educational quality as part of the Institutional Design methodology. *ADOIVA*. DOI: 10.13140/RG.2.2.12618.21447

[24]. Moreno O., T. (2016). Learning and learning assessment. Mexico: *Metropolitan Autonomous University.*Download: https://www.uv.mx/bvirtual/files/2017/12/Evaluacion_del_aprendizaje_y_para_el_aprendizaje.pdf

[25]. Perez, M. (2014). Evaluation of competencies through portfolios. *Educational Perspective, Teacher Training, 53*(1), 19-35. [Consultation Date September 18, 2019]. Available in: http://www.redalyc.org/articulo.oa?id=3333/333329700003

[26]. Piovani, J.I. & Krawczyk, N. (2017). Comparative Studies: Some Notes historical, epistemological and methodological. *Educacao & Realidade, 42*(3). DOI: 10.1590/2175-623667609

[27]. Rossette G., J. (2019). *Integrator Subject Planning Card 1*. Mexico: Universidad Tecnológica de Altamira.

[28]. Salazar-Gómez, E., & Tobón, S. (2018).Documentary analysis of the teaching training process in line with the knowledge society. *Spaces,39* (45), 17. Download: http://www.revistaespacios.com/cited2017/cited2017-17.pdf

[29]. Sánchez. S., El Filali, B., López, V. (2013). The process of learning through a complex thinking. Lecture presented at the Latin American and Caribbean Conference for Engineering and Technology in Canc'n, Mexico and published in the memoir. Download: http://www.laccei.org/LACCEI2013-Cancun/RefereedPapers/RP148.pdf

[30]. Sep. (2013). Strategies and evaluation tools from the formative approach. Download: https://www.educacionespecial.sep.gob.mx/pdf/doctos/2Academicos/h_4_Estrategias_instrumentos_evaluacion.pdf

[31]. Talanquer, V. (2015). The importance of formative evaluation. Chemical Education, *26,*177-179. Download: http://www.scielo.org.mx/pdf/eq/v26n3/0187-893X-eq-26-03-00177.pdf

[32]. Tobón, S. (2007). The complex approach to skills and curriculum design by propedeutic cycles. Download:

https://dialnet.unirioja.es/servlet/articulo?codigo=2968540

[33]. Tobón, S. (2011). Curriculum management from socioformation. Download:
https://issuu.com/cife/docs/e-book_socioformacion_y_competencia

[34]. Tobón, S. (2013). Training projects: transversality and skills development for the knowledge society. *CIFE Institute.* Mexico.
Download: https://seminariorepensarlabioquimica.files.wordpress.com/2016/01/s26-srbq-fad910_sergio_tobon-_3_.pdf

[35]. Tobón, S. (2013). *Comprehensive training and competencies. Complex thinking, curriculum,didactics and evaluation.*Bogota:
ECOE. Download: http://cort.as/-N_9P

[36]. Tobón, S. (2013). *Curriculum management methodology. A socio-computer perspective.* Mexico: Trillas.

[37]. Tobón, S. (2017). *Socio-computer evaluation. Strategies and instruments*. Mount Dora (USA): Kresearch. ISBN 978-1-945721-26 -
7. Link: https://cife.edu.mx/recursos/2018/08/23/evaluacion-socioformativa/

[38]. Tobón, S. (2017).*Essential axes of knowledge society and socioformation*. Mount Dora: Kresearch. DOI: dx.doi.org/10.24944/isbn.
978-1-945721-19-9 link: https://cife.edu.mx/recursos/2018/09/03/essential-axes-of-knowledge-society-and-socioformation/English
version: https://cife.edu.mx/recursos/2018/09/06/ejes-esenciales-de-la-sociedad-del-conocimiento-y-la-socioformacion/

[39]. Tobón, S. (2018a). Conceptual analysis of the socioformation according to the knowledge society. *Knowledge Society andQuality of
Life (KSQL), 1,*9-35. Download: http://fisod.org/ksql/index.php/ksql

[40]. Tobón, S. (2018b). *Guide to curriculum design and redesign from socioformation and complex thinking.*Mount Dora: Kresearch.
Download: https://cife.edu.mx/recursos/

[41]. Tobón, S. (2019). Axes of socio-computer evaluation. Download: https://cife.edu.mx/recursos/2018/10/03/ejes-esenciales-de-la-
evaluacion-socioformativa/

[42]. Tobón, S., Martinez, J. E., Valdez, E., & Quiriz, T. (2018). Pedagogical practices:Analysis using conceptual mapping. *Spaces, 39*
(45), 26. Download**:**
https://www.researchgate.net/publication/328851969_Practicas_pedagogicas_Analisis_mediante_la_cartografia_conceptual_Pedago
gical_Practices_Analysis_by_conceptual_cartography

[43]. Zabala, A., & Arnau, L. (2007). How to learn and teach skills. Barcelona: Graó. Download: http://goo.gl/bXkiYg

[44]. Zabalza, M.A. (2018). *Learning Assessment*. In S. R. Herrera-Meza and S. Tobón (Moderators), *III International Assessment
Congress*. Congress conducted by the CIFE University Center, Cuernavaca, Mexico.
Download:https://cife.edu.mx/recursos/2018/10/03/evaluacion-del-aprendizaje-enfoque-formativo/

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