INNOVATION ON TEACHING / LEARNING ASPECTS FOR ENTRY LEVEL COURSES

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Abstract

This paper presents an overview of fundamental characteristics of an environment in Teaching / Learning (T/L), based on practical experience leading with the first class of computer language for courses as engineering and computer science on university level.

It is discussed about characteristics of the course project that involves : training teachers where teaching means presenting aspects of psychology of communication , linguistics of communication , styles of Teaching/Learning ; students evaluation specially with parallel evaluation ; integration of disciplines ; philosophy principles of abstraction and hierarchy of mind .

It is also discussed about environment of T/L that means leading with resources that agree with the linguistics of communication in auditory , visual, kinesthetic, and auditory - digital aspects.

Put all together reaching aspects as diversity based on individual abstraction and working on essential potentiality of the student leads to flexibility and creativity, two important characteristics of a good T / L environment. Today this is more and more important while we live in a world essentially of diversity.

1. INTRODUCTION

The present paper discusses about Teaching / Learning (T/L) innovation aspects on education, specially for entry level courses disciplines.

A complete analysis involves University, Course, and T/L environment level. University is viewed as a part of a formal educational structure on the society. On University level, normally, there is a high abstract set of purposes, where, normally, is not to be found contradictions on it. On this level, it will be generated a project for chosen knowledge areas delegating to a more specialized level, the Course level, actions to be implemented for university purposes. This will be made developing and defining courses purposes that is finally implemented on T/L environment according to each course project.

The T/L environment is of major interest for discussion on this explanation. An overview of useful and basic questions, specially on this level, as well as some aspects, relative to Course and University level is given , filtering some important points for a primary analysis.

It is considered that a good T/L environment is that one that can offer to students a positive atmosphere, permitting self improving motivation, applying a diversity of kind of human and material resources.

The wide range of new technologies for T / L environments, today available, represents one kind of those resources but ,here, there will be discussed specially about on human resources amplifying the possibilities.

2. THE COURSE DISCUSSION LEVEL

The Course, in a more specialized level, has a preoccupation for what kind of professional is to be graduate in accordance with the university purposes. The Course is built over a philosophy of professional profile and it is the real approach for reach the kind of graduate student wished.

2.1 Pedagogic Purposes Directive

On the Course level, more concrete than University one, the pedagogic purposes directive is established. This is important because they are the guide for the implementation of actions that provide resources according to those purposes. By actions, it can be allocated human and material resources to build a T / L environment that finally reach the wished graduate student profile.

The most important point is to notice that pedagogic purposes directive, established on this level, will be more effective than individual classroom teachers decisions, direct token on the T/L environment, because it affects all the members from classroom to labs and students/teachers evaluation system.

2.2 Disciplines Integration Directive

With a Disciplines Integration Directive, teachers can, innovating, build an unique environment of knowledge for learning process. This can be reached, choosing themes on a high level hierarchy of abstraction. A theme can be subdivided per areas, in a generalization/ specialization hierarchy. The specialized teachers integrated themselves in a only one environment ,and, come, in the right moment, collaborating to solve a proposed part of a unique discussion theme. The proposal will be, on this moment, analyzed under their specialized view points. Semi-ideal, it can be done in separated classroom, but, synchronized by the course pedagogic survey so that teachers parallel discussing the related aspects of the same theme of study.

2.3 Preparing Teachers Directive

Preparing Teachers for innovation on T/L environment is very important and affects deep questions as classroom environment activities and evaluation process, always looking for the purposes of flexibility and creativity. And this directive, established on the Course level has a chance to be really effective on the class room environment.

Course can promove actions to prepair teachers, improving their abilities on communication process. This can be due by employing some simple and natural principles of psychology of communication [1] , linguistics of communication [9], [10], diversifying activities to work direction whole brain integration

pedagogy of learning, resulting the increase of students motivation.

Some of the improving possibilities on communication for innovation on education will be presented later on describing human resources on T/L environment.

2.4 Evaluation Process Directive

The Course level Standard Evaluation Directive, concerning whole process and disciplines, affecting the T/L members, are important to be established. When it is wished innovation over traditional evaluation system it is necessary to leading with a change on the mentality. A change, usually, is not so immediately and easy to operate .

The evaluation system proposed for a discussion is the parallel one. It is wished for an easy reason, it is more natural and near the real life cycle of learning. On real life, the feedback of experience is normal, useful, and increase quality of results, as step from a integrated evolution process . It is based on the possibility of change of no available hypothesis, for improvement, searching the increased quality of results. But, this mentality broke some way the ordinary mentality of traditional education environment. For this reason, that it is important to have this directive on course level, above the discipline itself. So all the teachers and students direct energy working on this change on behavior.

Naturally, there is a risk condition changing evaluation paradigm.

The students, on the traditional education paradigm of evaluation , usually reacts when the system call for a proof, as in a battle, to win. In parallel evaluation paradigm ,there is no battle atmosphere and it is possible that someone changes, for the first moment, to passivity state because there is a new opportunity waiting for . There is important to change mentality from passivity that can be presented on a open system to self responsibility working to generating a new behavior with involved people.

The reaction, in a agreeable T / L atmosphere is to establish and improve hypothesis. Important is the ´what to do´ with the partial results. This way is the natural one, as in normal life and this make the famous prototypers also in technical areas, remember Thomas Edson.

2.5 Recommendations on Course level

Some global recommendation can be emphasize here.

Disciplines Integration is recommended. If the course must subdivide into disciplines, it is recommended that teachers search a synchronization to harmonic flux of contents and make specific relations into disciplines contents.

Contents Integration is recommended. A discipline, when is it the cell of knowledge to be follow, can look to more abstract levels of discussion, enough general, to support the various relations and applications of methods of different points of view for the same proposed theme of study.

Teachers Integration on implemented actions is recommended . An example of action that can be implemented :The teachers involved in several course areas can work together in a specific project with time allocated, reaching a real integration. ex. English teacher can work on thechnic texts with the Computer Language teacher in a same project. So, students learn both areas in a simultaneous and natural form.

Integrated Evaluation Paradigm is recommended. When the Course level supports an innovation system of evaluation, risks of broken mentality on migration to new behavior are minimized by Course integration directive.

Parallel Evaluation is recommended. This leads with a natural form for learning and reachs harmony. But, repeating, the parallel evaluation directive is to be pursued by all the disciplines orientors to be more effective, than experiments, that make a teacher alone.

3. THE T / L ENVIRONMENT DISCUSSION LEVEL

The T/L environment level is of major interest on the present discussion . The principal aspect to be presented is about the human resources to support a kind of T /L environment required according to Course and University purposes. Considering, on the other hand, that quality on classroom can also be improved by using material resources. Those one can be subdivided on traditional and technological ones.

Resources that depend only on human factor, respect the need of time for the brain to absorbing new contents of information and also the need for the interpersonal relations on classroom . The technological resources, used as pedagogic tools, diversify activities causing natural motivation. Both refer to possibilities on working over the basic human channels of information representation there are visual, auditory, kinesthetic, and auditory-digital [11]. This pedagogic integration of resources is desired.

3.1 Pedagogical Purposes Directive

The T/L atmosphere can help to change individual experiences about the whole T/L process. A positive plus opened, solidary, involving and dynamic atmosphere characteristics are suggested as pedagogic directive presupposes. This is in a natural way, in accordance to Course work purposes over aspects as Potentiality, Diversity, Flexibility and Creativity. See FIGURE 1. This will be built employing human plus material resources improving specially communication factor. All of this can facilitate the birth of an adequate emotional state for an integrated learning using whole brain possibilities leading direct with creativity [3].

Work on
POTENTIALITY
        considering
DIVERSITY
        to reach
FLEXIBILITY
        that brings to
CREATIVITY

Figure 1: *T/L Environment Purposes*

3.2 Teacher Communication Directive

Teacher can improving communication diversifying speech and activities working over those channels of representation . It can be employed a proper linguistics of communication through words / expressions, see some exemplification on FIGURE 2. You can find a more complete list of words / expressions on [11]. Naturaly, the reader is invited to made his self preference words   list.

CHANNEL	EXPRESSION EXAMPLES
VISUAL	clear, look at, view point, **…**
AUDITORY	dissonant, ask, question, announced,

	hearing, **…**
KINESTHETIC	hold, tight, consistent, feeling, sensibility, **…**
AUDITORY - DIGITAL	observing, attention, improve, suppose, experiment, consider, study, **…**

Figure 2: *Example of Expressions Employing Each Information Representation Channel*

It can also be employed a proper discourse that opens possibilities on student mind, [10], with techniques as, metaphor about learning process, paraphrase to obtain ´rapport´, sentence smoothing, etc, as proposed by Milton Erickson on the well known Milton Model. See FIGURE 3. This occurs, because people pay attention following internal   meta-programs or self filters that create self signification for each received piece of information. So, teacher can speech for several kinds of People Mind Maps, diversifying, presenting aspects that reach the several kinds of meta-programs. For example, teacher, discussing contents, can yet amplify its understanding, trying always to give focus , in a same explanation, to similarities and also to differences between topics of contents . More information about Program Filters , and how to lead

with, is available on the known Milton Model proposal.

Discursive Technique	Sentence Example
Sentence Smooth	I would like to. You can make this way or this other **…**
No Specific Verbs	You can self verify that **…**
Mental Lecture	You can self ask why this **…**
Final Ask	You **…**, don't you? **…**

Figure 3**:** *Example of Discursive Techniques Employed on Milton Erickson Model*

Additional simple improvement, based on suggestion feelings, is to employing affirmative sentences and positive words. The impact of a critique for the unconscious really change, for ex. *´not good´* is better than *´wrong´* for a header. *´Remember´* is better than ´don´t forget' for an action to be taken.

3.3 Pedagogic Process Directive

The pedagogical integration aspects focus on teachers, students and process alternating according to chosen activities. Also integration of knowledge itself promotes continuity on the knowledge acquisition process.

Some activities, of the many possibilities that can be doing by the students are stimulating self expression and using the various channels of processing information. See FIGURE 4.

Channel	Example of Activities With Students
Visual	Self drawing resumes on charts
Auditory	Explaining / hearing about context,

	employing music
Kinesthetic	Manipulating material as books, tools, computers, representation about learning context
Auditory - Digital	Writing/ Reading texts discussing about meaning on learning context comparing with meaning in other ones

Figure 4: *Examples of Classroom Activities per Channels for Improving Pedagogic Process*

Another point to consider is diversity of Learning Style. If each one has self individual experiences about reality representation, and individual tendences, it is built self mind maps. It is natural to think, that it is present various learning styles in a T/L environment. One approach to beginning a reflection is Kolb proposal, [5], that subdivide Learning Styles on four kinds. It is suggested activities that lead with four steps cycle that are Motivation Discussion (the why, what´s important), Reflexive Discussion (What ? What´s existing ?), Active Experimentation (How?) and Self Discovery (Where? What to do with this).

3.4 Evaluation Process Directive

Following course directive, teachers can discuss about evaluation inter classroom and extra classroom. They can decide, eventual, to mixing systems according to each Course context.

Evaluation can follow a natural flux of knowledge integration activities. For example, building an algorithm (as proof activity on classroom) and adding an analysis , project and documentation (free time creative activities as home work).

3.5 Recommendations on T/L environment

After presenting an overview of some of the fundamentals characteristics of T/L environment submitted, hierarchicaly, to Course and University level, it is of interest to list some general recommendations based on studies and experiments on disciplines of entry level courses on computer science and engineering for many years.

Pedagogic Resources : it is recommendable an integration of human plus technologic resources. The two forms together help to create an interesting T/L environment.

Learning Styles : for one that has not yet worked about this aspect, it is important to begin diversifying . This can be done by choosing , and applying, a Learning Styles proposal , ex. Kolb´s one.

To begin, it is important to touch self sensibility for this aspect that lead with necessity of diversity.

Teacher remembers that it is important also to explore others than self preference Style of Learning.

Communication Channels : The way that vocabulary is employed is a cheap and deep possibility for reaching good emotional states, required for learning . Diversifying discourse and activities help to reaching all the human communication channels. Here, it is also important to remember to explore the other than teacher self preferences on communication channels. This is made by diversifying vocabulary, activities and proposed tasks for students.

It is also interesting to consider fatigue factor on the process of learning. Diversifying activities is a good start, but, it is also suitable to be considered that, normally, about 7+ - 2 is the ideal number of pieces of information to be given avoiding disinterest, see about Muller Magic Number [15],[16].People abstract information and retain 7+- 2 pieces of information per time unity. So, it is suitable to work on techniques that respect this. For example, it can be useful to subdivide items for presentation to maintenance of members interest.

Context Knowledge: it is important to consider that a hypothesis is always of utility minimum on a kind of context. Consider, with students, various possibilities of contexts. This changes the possibility of thinking over an unique point of view, and also, improves auto-regard and help to self find a creative way to knowledge acquire. An idea, could be to build a lexicon with significant words about the discipline topics. The same term can be presented from general to specialized context. This make more flexible the knowledge acquisition and respect more self abstraction representation of own experiences. This can help to improve quality of knowledge results, specially the theoretical ones on specific contexts.

Challenge : T/L is a challenge considering the work on persons potentiality because it is always possible for each one to growing up from today's knowledge level.

It can be salutary to discuss the adopted pedagogic theories with all members of the environment

bringing students to be more conscious of their part role. Consider that students have the same teachers necessities and responsibilities on self evolution process.

Teacher can also stimulate students self regard by given activities according to self qualities and improve others for flexibility. ex. an active student can help teacher with labs activities and a reflexive can help explaining the global of the class points at the end of activity.

It is also recommendable, sometimes, to change the work group members for flexibility .

Responsibility for all members on classroom. All tasks can be assumed by all members also the little ones. Building the good environment is responsibility of each one.

4. CONCLUSIONS

The possible innovation on a process that involves people, is the one that search to integrate parts. This integration is necessary to reach new knowledge levels.

This integration involves human aspects as changing personal behavior and flexible forms of communication including technological communication where new degrees of complexity are reached, [14].

The innovation looks for an integration as a rescue of natural life cycle principles applied to T/L environment. In a few words it can be said :

Integration against fragmentation on areas, members and resources application.

Continuity against process interruption. Horizontal continuity on contents and vertical continuity on quality of results (prototype and complexity approach model).

There are individual necessities of innovation, that are strongly recommended, but there is a necessity of support for a Course to reach high levels of quality, integrating areas, members and resources.

Each one, even without previous experience, can begin to change behavior as a part of a process . Beginners can start with some intuitive experiments. There are a set of details that are so little to be observed but effective on changing results.

There are a wide range of techniques and ideas that can be deep studied and implemented for improving T/L environment The presented examples wish to promove readers curiosity. Each one can find a manner, a way, a possibility on the several proposed education approaches available on the literature. Certainly, the reader will find himself a nice way to satisfy his necessity of innovation.

Some additional themes suggested for study are Whole Brain integration for Learning with Accelerated Learning under a positive atmosphere [3], Photo Reading for previewing materials [6], Mind Mapping [7], etc.

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