# *People are Process*

A Pedagogical Reflection on the PS 141 laboratory class
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submitted by:

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# *Introduction*

When has education become serious business? Education, just like most other things in today's modern world has become a commodity. Some people, with bigger bank accounts and more opportunities end up with a better education than other people with less material resources. Like most other things, the symbol may have become more important than the actual thing. A college degree, for instance, isn't merely considered an achievement, isn't even merely a placeholder of supposedly gained skills. It has become currency, a passport to greater material wealth.

When has education become more than just the process through which a human being endeavors to gain a more meaningful relationship with his world? A child moves about his life in wonder and awe. Everything seems new to him, interesting, puzzling. Education for him, isn't merely a currency to be acquired, but a necessity. He doesn't

merely inquire to gain affirmation from a person in authority as many college students do. He inquires because he has to.

I believe that education shouldn't just be seen as a means to a future, productive, and materially gratifying life. Education is a life onto itself. Its experience, meaningful though it should be, is its most important purpose.

A child's life is infused with meaning and a desire for learning. For a while, he seeks out his own educative paths, asking questions from his parents, using his hands to explore his world, absorbing the meaning that his senses flood him with. However, as the child grows, more and more individuals become part of his educative process. As he enters school, other people begin to take responsibility for what is taught him, for what they think he should learn.

I believe it is important for our schools to imbibe a pedagogy that continues or at least reinforces a child's early learning process, that elusive experience of wonder and awe, and one that builds on his early sense of meaning making.

I am certain that there are many pedagogic models in existence, and in practice that would embody the values I have outlined above. It might be useful, then for us to observe these models and learn from their examples.

It is, thus, the purpose of this paper to study such a model, and extract from our observations some principles which may be inherited by teachers across other disciplines.

For this purpose, I have chosen to examine a particular electronics class from the Ateneo de Manila University Electronics and Communications Engineering Department (ECCE), facilitated by Mr. Tristan H. Calasanz. Mr Calasanz, or Sir Tris as his students call him is coincidentally my father. In this example, I wish to present an educational model which is not only student-centered (as many approaches call themselves) but centered on the learning of everyone involved in the process, the teacher, included.[1]

I shall be drawing heavily on conversations I've had with the said course's facilitator / teacher, on laboratory reports and exams submitted by the students, and on the materials / information provided by the teacher in his class website. I shall also be including excerpts from a paper entitled *A Pedagogical Reflection: The Ateneo SCADA[2] Project*, which Mr. Calasanz presented to the Dean of the College of Engineering.

A footnote though. Although this paper could explicitly be construed as a case study, as it is, by all means, such, I ask the reader to allow me to be a little more personal at times, since on my part, this paper shall be more of an attempt to share the insights that I've gained through meaningful conversations I've had with my father on the way home from work, stopped at a traffic light on V Luna, and on everyday, informal dinner conversations.

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[1] I have initially thought of presenting a paper on the infusion of the inquiry process in an electronics class. However, as I studied the materials, I realized that even inquiry is just one of the components of this specific pedagogy. Thus I decided to take a more wholistic approach, studying the pedagogy in its entirety, and extracting important elements from it, one of which, would be inquiry.

[2] SCADA stands for Supervisory Control and Data Acquisition.

# *The Professor*

A note about Sir Tris

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Rarely do we find a teacher thoroughly enjoying himself as he conducts his class. Even more rare would we see a man over 60, who still experiences the world through a child's curious eyes. Sir Tris has only been teaching at the Ateneo for around two years, having just left a better-paying job in the energy private sector.

He went into teaching self-taught in electronics, eager to share, armed with a lifetime's worth of skills, values and insights, happy to have been given an opportunity to do what he loves most: teaching.

I guess that, as a daughter, knowing like him like I do, that the best way I could describe his teaching would be *that he enjoys his teaching the way he enjoys his food.* My father loves to eat. Every meal to him is a feast, and every bite he takes in with gusto. He often tells me that his life is his prayer. And I guess this is reflected in the way he conducts his classes.

*The classroom is the platform for the growth of human beings. The teachers manage this platform in a way that they facilitate the creation of an environment, where the human being's "freedom to think" is unleashed and enhanced. If the human being was not there in the first place, there would be no school, no classroom, and no teacher.*
*-- Tristan H. Calasanz*

# *People are Process*

## The importance of a sense of reverence towards the human being

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One Saturday afternoon, as my father was washing the car and cleaning the driveway, he chanced upon two sparrows, who apparently were mother and father to a baby sparrow. They were teaching their child how to fly. He saw that they were having a pretty difficult time, and since he knew how dangerous it was for this helpless bird, to be on his own, with larger animals appreciating any chance for a meal, he decided to offer his assistance. At this point, he laid down his palm as gently as he could on the pavement where the baby bird was. Soon, the bird hopped into his palm, his parents frantically waiting by. But I guess they knew he wasn't going to hurt their child. He patted the bird on his head and took him to a level that was higher than ground. Then he gently prodded him on, all the while saying,"You're safe with me, kid."

This story could perhaps begin to tell of many stories, could perhaps hint at a number of philosophical conversations. However, I meant to tell of this story because of the

pedagogy that it embodies. Nevermind that the student in this story was a small bird. Nevermind if the learning and teaching occurred without the four walls of the classroom. What should be striking here or at least what struck me regarding this story, was the extraordinary reverence that was exhibited for another.

Here, my study on pedagogy begins.

Medical doctors, as they are initiated into the profession are urged through their oath, to "First do no harm". Teachers, in my view, should inherit some of the principles inherent in this very old saying, and should even go a little further to the thought, belief and life that embodies reverence towards the children that are entrusted in their care. Doctors, in charge mostly of people who are in need of healing or who need help in curing disease, are urged not to do harm as the people they are caring for are probably in a lot of pain already. Teachers, on the other hand, have an equally honorable and vital vocation, in that they are given the privilege through which they could help another grow and realize the value of his own life. "First do no harm," then becomes just the first step. The next, more important one is to realize the importance, the life of the human being in his care, and from this recognition, start on providing the environment from which and within which individuals can realize their growth.

The Montessori "method" expresses a statement that parallels this thought. In a Foreword to Dr. Maria Montessori's book *The Secret of Childhood*, Margaret Stephenson writes, "She [Montessori] did not care for the word 'method' which denotes in our minds a system of schools and educational institutions. Over and over again, she insisted that we

must think in terms 'help to life' if we were to understand what she was trying to make people see. If we are thinking of life, then, not of a school or class, we have to take a very much deeper, broader, and wider view than if we were to study merely a system of education . . . The first thing to do is to realize that Dr. Montessori was working for life, not merely for the educational process of life; and only if we understand this, can we begin to understand what was her real contribution to mankind. If we are studying life, not a child in a class, we are faced with something different from a person who has to be taught, someone who has to work at certain things for certain periods of time, someone who has to reproduce what has been assimilated, someone who will reach a certain standard of educational achievement, someone who will be granted a certain mark for word done, someone who will work and play well with others. This is not a child to be reported on, marked, graded, classified, labeled, but a living organism following a pattern of development."[3]

Sir Tris believes that *people are process*. An emphasis on *process* enables us to see the individual as free, free to pursue his goals, free to realize his own values. He believes that values can never be forced into a human being, can never be imposed from the outside. The teacher, as a person in "authority" cannot coerce his students into inheriting his own sense of value. Values that seem to have been assimilated by the students through a coercive process, he believes, will not stand for long. As soon as the hold of force or submission is removed, the individual will continue to live his life according to the values that he finds relevant.

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[3] Maria Montessori, The Secret of Childhood (New York: Fides Publishers Inc., 1966), xiii.

Sir Tris believes that a person's growth is determined by his values, and that for one to be successful in facilitating the creation of an environment that builds on this process of growth, one needs to be propelled by a sense of reverence for the person. He says, "because you respect the fact that your students have their own value systems, you need to facilitate the creation of environment where the students could be free to express themselves." This environment is founded also upon an atmosphere of trust. One must believe that an individual, given the liberty to pursue his own sense of value, would seek out his own process of growth. With this trust comes compassion, and through compassion, one's sense of freedom becomes fuller.

Saying that people are process also means that we go beyond the usual perception in education that the student is just mind, or that nurturing the mind is the only thing that is relevant to education. Sir Tris believes that education should enable the individuals, not only to grow cognitively, but also to become better people. Education should engage the totality of the person and not just his intellect. As Morris Berman writes in his article *The Body of History* of the study of history, so shall I say for education, "our education has been disembodied long enough; the time has come to flesh it out."

What the class is

Physics (PS) 141 is a course on Analog and Digital Electronics offered to Computer Science majors. As such, it is the only electronics class that the students would encounter throughout their four-year stay at the university. It seeks to introduce major theories, concepts, and practices in the fields of Electronics and Communications Engineering and Computer Engineering. It is composed of a lecture class and an equivalent laboratory class.

The laboratory portion of the course is handled by Mr. Calasanz, and as such would be the focus of this study. Sir Tris handles two sections, that each meet once a week in a four-hour session (Tuesdays and Thursdays 8:30 am - 12:30 pm). One section is comprised of twenty students, while the other section is composed of twenty-one students.

*We also learned how to work safely with electronics and at the same time not be afraid of trying out new things. Best of all, I learned that I can learn a lot of new things, do a lot of work and enjoy and have fun at the same time.*

*-- Patrick Alarcon*

# *The Joy of Work*

Individuals learn the most if they enjoy what they do

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March 12 -- The two sections were to culminate their classes. Sir Tris gathered them in the audio-visual room and told them that since he trusted that they knew what they were doing and they knew what to do, that he would just sit in the back of the room and enjoy the show.

For three hours, laughter and excitement filled the room, as groups presented their projects and shared the learning that they gathered for the whole semester. Skit after skit, circuits and their functions were presented and discussed, completed projects were dramatized.

Their teacher had no idea of what they were to present exactly. His instruction was "to liberate your minds". He wasn't about to lay down rigid parameters within which they were to conduct their business.

At one point in the presentation, cellphones were conspicuously gathered on the teacher's desk. Apparently, as the plot goes, the cellphones were stolen, and another thief wanted to steal the cellphones from the first thief. He inched his way to the desk, glancing all around him, and then suddenly, an alarm sounded. Truth be told that the alarm was set off by the project of Aquilino Gamban and his group. Equipped with sensors, the alarm was to sound on, as somebody approached its perimeter.

Rare do we find students laughing, happily excited, as they took their final exams. This day of presentations actually marked the end of a month-long finals. But the students didn't seem to mind, not that they didn't take it seriously, but that they were thoroughly enjoying themselves. They didn't even seem to care about the grade. Before the month began, their teacher asked them about some ideas that they wanted to be carried out. One group wanted to embark on a project that would measure the intensity and loudness of applause, determining which group's applause was the loudest. Project after project, they chose their finals. And for the whole month, they inched wire per wire, building circuit after circuit. It isn't rare to find a group suddenly yell out in exhilaration after they finish a particularly difficult module of their work, or after clearing a particularly rigid road-block. And now, after the presentations have ended, some groups have voiced their intentions to continue on with their projects even as they start their summer break.

This whole scenario illustrates one of the most important values in Sir Tris' class, one which he would be quick to remind his students, that of the importance of enjoyment, of liking what you do. He believes that we learn the most if we enjoy what we do. As a child,

we enjoyed our daily explorations in our world. He wanted to bring that natural, creative habitat of learning back.

Further, he writes, " Experiments have shown that persons rate of learning are related to their motivation. This relation is such that the faster they learn something they enjoy, the more they are encouraged to pursue it even more." And that "[i]n all these discussions, the teacher 'must' ensure that the atmosphere being created contains strong ambiguities that will continue to challenge the student's 'freedom to think'."[4]

His students seem to agree. One student writes, " I have relearned that learning is fun; that the easiest way to learn something is to like it first. I have also learned to let my ideas run loose and find someway to implement them. That sums up everything I can remember right now of what I learned so far in this class. The last few sentences describe what I learned that is not part of the academic material, which I believe is still some of the best things I have learned so far."

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[4] Tristan H. Calasanz, A Pedagogical Reflection: The Ateneo SCADA Project <http://www.geocities.com/thcal/techno.pdf>. 2000

But these students were sophomore computer science majors. By that age, as most of us would recall, much of the excitement of learning has been suppressed, replaced by a myriad of fears. Many of these students came to class, not actually looking forward to being there. It was just a required course. Many of them confessed, in their written exams, that they weren't interested in electronics to begin with.

*Oh! And I also learned that one should be relaxed, open-minded and patient when making circuits. Problems occur, it's part of life with electronics. What we have to do is to keep on trying and never give up -- it will work out in the end.*

*-- Bien Felix*

And since an electronics laboratory class would be using electricity, integrated circuits, wires, wires, capacitors, bread boards, there was also an element of hesitation. Of fearing that they were going to break something, burn something, make the room and their hands explode. To deal with these fears, the teacher assured them at the start of the semester that nothing they were to do in the class would cause the building to explode, that the worst that could happen to them would be to slightly burn a finger or two.

*The Commodity of the Pedagogy:*
*For the students to be able to ask the question,*
*"what happens if?".*
*If that has been achieved, then the process*
*would have worked.*

*-- Tristan H. Calasanz*

# *Inquiry*

What does the pedagogical model teach us?

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The students sat back on their chairs and waited for the teacher to start the class. It was the first day of the semester, and the general air that the teacher felt was an atmosphere that seemed to tell him, "Talk to me," as if the students were testing him, daring him to prove himself. And then he started the class with a mission. For that day, they were to do some brainstorming for their projects. So for the next few hours, idea after idea was voiced out, some silly, others serious, some inventive. Some treated the exercise as a game, one that shouldn't be taken seriously. However, in spite of this, one would notice that the air in the classroom was cleared, the ice broken. Everyone felt relaxed and unthreatened. Sir Tris would often tell his class, "Anything that is worth thinking about is worth saying." Thus, the fear of most students of being judged or humiliated was put on the side, and everyone just blurted out their ideas, as Sir Tris wrote down every single idea on the board . . .

The PS 141 class has provided the students with a free, flexible, and fluid but structured environment within which and from which the language of electronics is learned, its theories and concepts simplified at times, personified at others, but always experienced first-hand.

As we endeavor to discuss what a structured environment might mean, it might be useful, at this point, to distinguish between norms and rules. A norm is related with behavior and the values that belie our behavior. A rule, on the other hand, usually points to a prescription for action, such that once the rule is laid-down, and as rules often are precise and specific, actions are greatly streamlined to follow the rule. The structure that we speak to here is comprised more of norms rather than of rules. General norms, as when we say for instance that "Anything worth thinking about is worth saying," give the individual more freedom within which to act. We do not say that everyone is coerced to speak, but that rather if anyone has something to share, he should feel safe sharing it. Rules define. Norms circumscribe. Rules tend to restrict rather than make possible. Norms outline the general values of behavior.

The environment is facilitated in a way that the students feel safe being goofy or playful, or afraid and frustrated. The teacher models to his students his own values. As he laughs and jokes, his students are made to feel safe to laugh and joke as well. Laughter and enjoyment, as we pointed out earlier are chief components of this pedagogical process. As students enjoy what they do, they are motivated to persist at what they do. And after a while, even the teacher's offer of affirmation as a stimulus for motivation, becomes

secondary, as the students start to learn because they need to. When learning has become a necessity, external motivation can take the back seat.

However, throughout all these processes, it is important that the students know that their teacher trusts them. Herein lies the importance of the sense of reverence for the human being that we pointed to earlier. A human being's natural growth process is reinforced when he is treated with care and reverence. The compassion with which a teacher relates with his students positively influence their learning.

However the human experience and interaction component of the process would be incomplete without the inquiry process within which they are nurtured. It would be useful to take note that the inquiry process / the technical aspect of the course gives birth to the human experience and vice-versa. One builds on and is built through the other.

*Aha! The storytelling part! I believe I'm going to like this...*

*After all resources were exhausted (teacher's time, money, effort) our great group has finally seen the outcome of such an ominous experiment (ominous because we had to do it for 5 times, which led us to a conclusion that our breadboard is cursed...probably by the last failing student who used it). Alas! There where ten blinking lights! Finally we have created something that looks more advanced, more fitting to our ages, than the last experiment!*

*As far as we can recall, there were twelve blinking lights: two from the old 555 experiment which are blinking alternately and ten from the new one that are blinking...wait a minute...look... its something new! The ten LED's are blinking one by one! In addition, the LED's somewhat complete a cycle first, allowing everything to blink at an equal amount of times! It is as if they were disciplined by the new IC's to blink in a systematic way! This inspired us to further investigation...spectacular!*
*- Aquilino Gamban and group*

The academe usually regard inquiry in the form of dialogue, such that inquiry is propelled by and through a series of open questions, as when we ask, "What is a number?" Discussions of this sort usually take the following forms: What do you mean? What are your assumptions? What are your evidence? What are the implications of your statement?

Philosophical discussions usually analyze and explore the statements and questions with which we carry out our inquiry.

Moreover, our notion of inquiry is usually founded on an philosophical inquiry on concepts, such as death, time, number, good, and others. Even proposals on the infusion of the inquiry process across disciplines usually take this same form. Some suggest, for instance that we could use the question "What is a number?" to embark on a philosophical discourse in a course in mathematics. Here, an interesting point could be raised. Is an inquiry on specific concepts all that an inquiry process could be? What of inquiry as behavior? As something that our actions imply or embody? The technical courses' contribution to this matter could be particularly useful and thought-provoking. Could inquiry be taken to mean also a series of discernible behaviors? Are certain behaviors indicative of inquiry, such that even if concepts and categories are not immediately articulated, that we could also regard the series of actions as itself inquiry? Could there, then, be inquiry without elaborate articulation?

I believe that our response to this question will not be gained by polarizing the issues. I do not believe that the two varieties of inquiry are mutually exclusive. One builds on the other. One might not even be possible without the other. However, in a technical course such as electronics, inquiry on concepts become only one component of the whole inquiry process.

Inquiry can be embodied by behavior, as questions such as "bakit ganito?" and "paano kaya kung?" could also be discernible behaviors. A student may not seem to be

asking questions but as he moves one component of the circuit and attaches it to another, his actions themselves are indicative of questioning. However, it would not be correct for us to say that such a process is without conceptualization or categorization. It might be more correct to say that the inquiry is navigational and yet analytic.

At the outset, we see that the inquiry process in the PS 141 class is obviously navigational, but what do we really mean by this? Theories, categories and concepts aren't discussed apart from their functions. They are not handed down as a series of lectures before an experiment. As the students navigate, adding one component to the circuit, modifying currents, etc., the categories are gradually formed. Thus, it might be more correct to say that they *come to know* of these concepts and categories along the way. The students are not presumed to know about these theories before they can be trusted enough to carry the theories out in practice.

At the outset, students are responsible only for the observation of the behavior of the circuits as they are modified. The teacher provides the categories at this point. However, as they continue on with the experiments, as they figure in run-ins with the circuits, and there comes a need to troubleshoot, students are then led into asking the questions themselves.

One of the advantages of a technical course such as electronics is that it encourages inquiry by its very nature. Questions generated in an electronics class are stimulated / propelled by real-life experiences. If in front of us, a capacitor is burned, we have to ask why. The nature of the subject itself necessitates that we inquire. And in this specific pedagogical example, because the process is navigational, as schematics are shown on the board and are

asked to be built, and then modified and then made to be more complex, students become accustomed to the process, and specific categories such as that of a capacitor or a resistor, become described in the form of observed, real, behavior rather than just associated theories. This has been clearly illustrated by a certain group dramatizing the functions of each circuit in the form of a courtroom proceeding.

Here we come to another important feature of the inquiry process, in that when the process is facilitated in such a way that it becomes navigational in character, the understanding of the pertinent categories is always relevant, always *here and now*. Meaning is easily constructed as the subject matter itself is experienced, is sensed, is seen, touched and heard.

But even so, the teacher still tries to enable the student to make connections between what one experiences in the experiment with what the students experience in their lives outside the classroom. He does this by constantly making analogies.

Connecting theories with experience is useful in understanding what these theories mean in depth. However, the ability of a student to make further connections also becomes indicative of his own level / depth of understanding.

The ability and ingenuity of the students to connect the theories with the movie Harry Potter (see box), for instance, is indicative of their own understanding in that they are able to translate these themes into other arenas which are important and meaningful for them. The laboratory experiment poses the question / riddle / challenge: "How would you

be able to explain this to your 12 year old brother or to your mother?" The question necessitates that one be able to simplify and translate one's understanding.

The written exam, moreover, asks the student two questions: What have you learned so far? and What questions do you have in your mind regarding the experiments?

Allow me to analyze the second question first. If in the preceding paragraphs, we discussed how valuable and indicative one's ability to connect his learning to other arenas is to his level of understanding, the present question illustrates that one's ability to generate or ask questions is also indicative of the depth of his understanding. If one is able to move beyond the subject matter at hand, as when we say Idea X could be illustrated by Example Y, he must also be able to construct or deconstruct even Idea X. Our questions also indicate if we can move beyond these existing theories into other theories.

*Imagine that you are Harry Potter in your second year at Hogwarts School of Wizards. You are also the 7442 chip. NE555 is Headmaster Dumbledore. He tells the other chips, students of the school, when to "change" magic words (signals). 7490 is Potions Professor Snape who gets signals or "commands" from Dumbledore and he gives out 4 "commands" (output pins). The "commands" (signals) are given in a specific order (the order is in binary count). This combination of "commands" (signals) produces a "spell" which are then passed to you, Harry. Depending on the "spell" taught to you, you can produce only one potion (output of logic "1" on only one of 7442's output pins). Now you can light up ten lights in succession as you speak a "command" (signal) to them. You can see a display (seven-segment LED) light up as well as you count from 0 to 9. [In parenthesis are comments which maybe a little too technical for a 12-year-old to understand.]*

*--TJ Raymundo and group*

The first question in the exam is also important in that it is actually a question about many things, and one that operates on many levels. The first level could perhaps be that of cognitive growth. What specific learning elements / theories have you learned? However, if

one has been attuned to the learning process, the question could take on a more meaningful / resonant turn, as when we begin to speak of human experience.

I have been pleasantly surprised as I went over the students' exam papers. Many of them, I have discovered, have become philosophers of education themselves. They offer poignant and relevant suggestions and insights as to how they learned and as to what conditions have been favorable to their learning process. One student writes, "I remember this experiment the most because it was the one that took most of our time. I think we repeated the whole setup for 5 times, in 3 meetings that is. Why we were left behind . . . so frustrated, without hope and helpless. Fortunately, we tried to find the good spots in our bread board and we succeeded at last on our fifth try. 'try and try until you succeed'. We also learned to be more patient, more critical, intuitive and understanding of what we were doing."

This observation is useful on at least three counts. First, the ability of the students to reflect even on their learning process, indicates a higher-level skill, that of meta-cognition, where one doesn't only understand a specific learning item X, but is also able to reflect on how one knows X.

Second, this ability also illustrates another advantage of a learning process that is navigational, in that it inspires / encourages the student to become attuned to his own responses and behavior as he moves along the process. One becomes more conscious of himself when he is absorbed in what he is doing, especially if what one does is grounded on one's senses, on one's sense of touch, sight, sound and smell.

Thirdly, this ability also indicates that the student has acquired one of the most important skills in today's modern workplace: that of learning how to learn. A critical student isn't just able to memorize facts. A critical student also knows how to learn when conventional sources are not available. A student writes, "Following a circuit diagram won't make you good in electronics. Making and designing a circuit diagram of your own does."

Moreover, as I see it, the process of learning that is encouraged in this pedagogy, is one that is intuitive and yet critical. Answers and solutions aren't always expected to come in a linear, rational process. Moving about *de oido*, then has some value here. As one student writes, "I've learned that it is vital to be careful and 'careless' at the same time. Careful because sometimes one wrong connection can ruin an experiment but 'careless' too because sometimes one wrong connection can create wonderful and boggling results. "

Instilling a process of learning that is intuitive in character is useful on several counts. One, it brings us back to our natural, creative, explorational method of learning, one that is especially characteristic of our childhood. Second, this process inspires a lot of AHA! moments in that unexpected results are welcomed and even encouraged. Thus, when AHA! moments increase, motivation increases as well. Third, this intuitive process seems to be encouraged in the modern workplace.

Sir Tris, himself, was self-taught, and this could probably be one of the reasons why he teaches the way he does. Self-taught people are usually more intuitive in their learning process. We try at a lot of stuff to find out what works, and only then, do we try to analyze

what important principles have been demonstrated by our learning. EXPLORE and then ANALYZE. Formal schooling usually takes the reverse route, feeding students with theories without providing them the means nor the opportunity to carry them out in real life. A learning process that is intuitive enables us to have more respect for the journey to understanding rather than just for the right answers.

However, at this point, it might be useful for us to acknowledge the role of the teacher in this whole setup. A learning environment that seeks to allow the student as much freedom as he needs, to be able to find his own growth, needs a teacher / facilitator who would be comfortable with the ambiguity that is the consequence of this environment. He must have a broad grasp of the subject in theory and in practice, before he can be able to encourage the students to lead the class into areas that interest them. He must also be comfortable in admitting that he doesn't know everything, and must be willing to give up this superficial air of power that his occupation and his authority provides.

Most of all, the teacher must also be eager to learn. My father isn't just eager to learn. He is also very eager to play. And I guess he inspires this in his students as well.

*Clearly, a new curriculum was needed to respond to these contemporary demands, and a reorientation in teaching style must follow -- one more participatory than didactic, more critical than accepting, more creative than familiar. Our core and major curricula have thus been reoriented, and student-centered learning is made an integral part of our teaching.*
*-- Elements of Student-Centered Learning*

# *The Environment*

## A final note on the importance of support from the school

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A pedagogy that is founded on trust and a desire to liberate the individual would also only work within a university or environment that tolerates if not encourages this kind of setup. The Ateneo de Manila University, despite its being a Catholic school embraces the pedagogy that is student-centered. In a handbook entitled *Elements of Student-Centered Learning* given out to members of the faculty, it is written "[o]ne of our most important goals in the Loyola Schools is the development of a *community of learners* among our students. By this is meant the formation of our students as persons who love and take joy in learning, who take responsibility for their learning under the guidance of their teachers, who are reflective, analytical, critical, and strategic in their thinking, and who are resourceful,

creative, and motivated lifelong learners."[5] Schools, founded on a different system of value, would not be eager to adapt this kind of pedagogy.

Moreover, I believe that critical thinking movements shouldn't only focus on training individual teachers. Rather, they should generate department-wide or even university-wide appreciation for the value of critical thinking. I believe that instilling the value of creative and critical thinking should be a departmental effort, so that each individual faculty could build on the strengths and compensate for the weaknesses of another.

[5] Rodolfo Ang, et.al., Elements of Student-Centered Learning (Quezon City: ADMU Office of Research and Publications, 2001), vii.

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**PS 141 (CS) - Course Syllabus**
**Tristan H. Calasanz**

## 1. Course Content

The course content will cover the interesting aspects of analog and digital electronics as perceived by the participants, and will cover all the required learning elements.

## 2. Objectives and Methodology

2.1. This is the only electronics course in the CS curriculum. With this in mind, the course design and its conduct will be a carefully guided interactive process to set the stage for the participants to enjoy the discovery of electronics.
2.2. The first session is designed for the teacher/facilitator to gain an appreciation of the individual and sub-group interests of the participants. The course and experiments will, then, be designed to cater to these interests.
2.3. The learning elements of the curriculum are given, and are fixed. However, their sequence and treatment will have to respond to the factors discovered above.

## 3. Outline and Timeframe

3.1. The outline will be made available after the first session.
3.2. The schedules will also be made available after the first session.
3.3. The treatment of electronics in the two sections may not be identical, although each of the sections will have covered all the learning elements one approximately month before the semester comes to an end.

## 4. Required Readings.

These are specified in the lecture part of the course.

## 5. Suggested Readings

These are specified in the lecture part of the course.

## 6. Requirements

6.1. Actual personal work on the laboratory experiments.
6.2. Consultation during scheduled class days and hours, which reveal the student's learning progress

## 7. Grading System

An "A" grade is indicated by the following measurable and qualitative criteria:

7.1. Measurable

7.1.1. (50%) : Meeting the ALL the functional performance requirements of the circuits.
7.1.2. (20%) : Written reports on specific learnings related to the experiments that they have performed.
7.1.3. (10%) : Written tests.

7.2. Qualitative

The teacher/facilitator provides the remaining (20%) based on his personal appreciation of the combination of the competencies which the student and his group have gained. This will be indicated by

(a) [5%] consultations;
(b) [10%] oral presentations of their experiments, and the
(c) [5%] general diligence with which a particular student performs within the scheduled laboratory period.

## 8. Classroom Policies

The management of the classroom shall be such as to facilitate the creation of an environment conducive to the person's growth, as well as, unleash and enhance aspects of personality that are helpful to "problem-solving" situations.

Very briefly, this development is expected along the lines of "freedom to think", management of work and learning so as to achieve high levels of motivation at work within the context of group and personal interaction, and the development of participative decision-making skills. The course hopes that the participants experience the joy of being able to contribute and take accountability for a successfully completed job, within the confines of the alloted schedule.

For further details, please refer to

http://espresso.ps.admu.edu.ph/faculty/tris/pedagog.html

## 9. Consultation Hours

The conduct of the course is "hands-on". At any time, students may, and are encouraged, to ask the teacher/facilitator to come to the group's work bench to consult about any aspect of the group's experiments during scheduled class hours and days. He will, nevertheless, be moving around the different groups anyway.

**Methodology and Rationale.**

1. The course is designed to be "interactive", so that questions are provided immediate answers.
2. It is structured in such a way that the more elementary parts which are conducive to the "interactive" approach is taken up first, that is, the recognition of 1's and 0's and method of counting using them.
3. In this way, the myth of electronic components, if there is any, is immediately removed.
4. Enjoyment in the study is also induced by the fact that many "aha's" are consciously evoked.
5. As these aha's and decision-making are developed and evoked, the participants will be ready to move into the more complex area of "ANALOGS".
6. With analogs, the world starts to be seen as a "continuum" and no longer as "back-and-white", as in 1's and 0's.
7. Finally, the enjoyment is capped with tricks on how to "play" with the interaction between analog and digital components.