Curiosity-based learning (CBL) program

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Abstract: This paper describes a series of experiential educational exercises developed to better engage and more effectively educate master degree students in the necessary foundation skills that comprise a true scholar. It was developed from the atmosphere of viewing the initial disengagement of my students while at the same time recalling, as a student, my own boredom and frustrations with traditional educational methods. As a Chulalongkorn University instructor with over 23 years of classroom experience, the author would like offer the colleagues this effective program that has been fine-tuned over the last 6 years. The program is a 6 step process that includes multi-modes of student self-expression and processes. They are expected to represent their ideas orally, in writing and diagrammed visually while learning the effectiveness and appropriateness of each. The example described in this paper was developed to prepare students entering Chulalongkorn's ethnomusicology program on anthropological theories, but its core activities were already generalized and easily applicable to most subject areas.

Key words: co-learner; curiosity-based learning; educational methods; facilitator; inquiry-based learning; learning methodology; teaching methods

1. Introduction

Human newborns have a strong natural curiosity towards their surroundings. As a non-verbal infant, they explore objects interactively physically, paying attention to the cause and effect relationships as they play. Instinctively it is human nature to ask a question when one wants to know something, but as a toddler, it will be some time before they are able to ask verbal questions about their world. When they are a bit older, they listening and asking questions to their parents is a natural form of learning as it is independently observing a phenomenon and then positing as to how or why it occurred.

As society grew larger and more specialized, the education of children was formalized into a public system away from the family with a separate school and teacher. Due to the number of students per instructor along with the traditional model of respect for authority, they together put restrictions on the original child-to-parent question and answer educational relationship. This model resulted in an essentially one-way transfer of knowledge pattern from the instructor to the student with the resulting effect of diminishing the students natural curiosity. The emphasis was on memorization from "chalk and talk" lectures. In this regard, Albert Einstein wrote, "It is a miracle that curiosity survives formal education".

2. Why curiosity?

While learning is even more important in today's intensely competitive and complex society, it is curiosity

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that provides the motivational fuel for learning at each step of the educational process. When students have curiosity, they learn more and more about their world and as a result, are closer connected to it. They have a deeper understanding of the interactions and the relationship between the various elements. Furthermore, the more one knows, the more one has to be curious about. Maria Mitchell wrote, "We have a hunger of the mind which asks for knowledge of all around us, and the more we gain, the more is our desire; the more we see, the more we are capable of seeing".

Curiosity is defined as a disposition to inquire, investigate or seek after knowledge. It is simply the frame of mind in which you want to learn more about something. It also provides the source of internal motivation that comprises the foundation of education. The profound benefit of internal motivation is that it avoids the insidious problem of rebellion caused by externally applied motivators, i.e., parents, instructors, peer groups and society.

The author's own motivation for developing the curiosity-based learning program was a multifaceted combination of some of her negative experiences as a student and later as a fresh college instructor 23 years ago.

As a student, the author found the traditional classroom was not very engaging. The teacher would talk and students were expected to absorb and memorize. In Thai society, the teachers are respected authority and role model figures which the students are obligated to obey. As a student, the author profoundly remembers her teacher responding as if deeply insulted when she asked a question in class. She surmised that the teacher must have viewed himself as an failed instructor if any student ever needed to ask a question about his presentation. At that time, student participation was neither expected nor desired. This is in contrast to western classrooms where instructors routinely ask students for questions. In the old traditional Thai classroom, the students were conditioned over their educational years to be just receivers of knowledge as opposed to active participants.

Then early on, as a new instructor, the author was bothered by the disengagement of her students and queried them about the qualities of their ideal teacher. They responded with the following list of desirable characteristics: sense of humor, energetic, cheerful, easy to understand voice (clearly audible and projects well), and creativity in presentations.

In a research article titled *College Teachers Who Stimulate Curiosity* by Stewart R. Jones, he examined the characteristics of 30 University of Illinois college teachers judged to be best at stimulating student curiosity based on interviews and results of student evaluations of teacher performance. The commonly stated characteristics ascribed to these teachers by students to open-ended questions on course evaluation questionnaires were: humor, enthusiasm, willingness to listen, ability to stimulate student thinking, and questioning techniques.

There is a match of humor and enthusiasm or energy levels factors. The Jones study further stated that the single key feature that the students held as very important was regarding questions in the classroom, specifically, "the teachers' encouragement of students' questions and the instructor's use of rhetorical questions in their lectures".

Although a rhetorical question is a figure of speech often posed for its persuasive effect without the expectation of a measurable or concrete answer, it can also be used as a thought provoking technique. For instance, "This is not just an ice cream stick, is it?" relates to the example of curiosity-based learning described later in this paper. Rhetorical questions can be used to stimulate the discussion further by "widening" the topic or in other words, increasing the level of curiosity in the classroom. "Rhetorical questions encourage the listener to reflect on what the implied answer to the question must be" (Wikipedia.com). The Jones study found that the best teachers' used, "... teaching methods (which) emphasized problematic content that stimulated curiosity, thought, and interest". The term "problematic" can describe any new idea, concept or one that produces a measure of cognitive

dissonance for the students. It could be something viewed as controversial, a challenge to a previously held understanding (belief) or in contrast to their personal experience. Additionally, from Ken Bain's book *What the Best College Teachers Do* (Harvard Press, 2004), an effective use of questions was described in this manner. "Rather than telling students they are wrong and then providing the 'correct' answers, they often ask questions to help students see their own mistakes". He also highlighted the point that, "Knowledge is constructed, not received", which corresponds to the fact that education should support the building of students internal models that accurately depict the external real world (see constructivism).
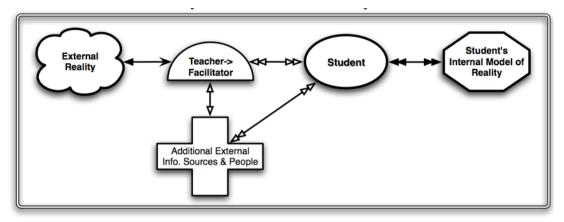

Figure 1　External reality to internal model of reality via education

Many years ago as a beginning instructor, the author recalled her own sleepy struggles in what she termed the "death" classrooms along with the feedback from her students regarding their preferred instructor's characteristics was inspired to create a new model of education (see Figure 1). This new model would activate her students to be happy, more curious and personally involved in the discussions. After reviewing a collection of learning theories (inquiry-based, problem-based, student-centered, etc.), it was clear that curiosity is the foundation that provides the internal motivation fuel for learning and in that regard it has been said that it is a leading indicator of intelligence.

> Curiosity is the fuel that provides the motivational energy for functional learning and understanding. Curiosity is the source of internal motivation .... Internal motivation avoids the problem of rebellion caused by externally applied motivators, i.e. parents, instructors, peer groups and society.

Consequently, the author was both inspired and determined to host a classroom where her students' education would be born in an atmosphere full of energetic participation. It would be a class where students' curiosity appetite would grow large and the tools to satisfy that hunger were bestowed.

However, the formal education system in Thailand has conditioned most students into being unresponsive receptors of "chalk and talk" rather than encouraging a self-initiated series of inquires. The author asked herself, what would be needed for students to create their own questions and enjoy the process? It is clear that a question comes from what one wants to know or in other words, what one is curious about? But before one can formulate a question, they must have a working concept in their imagination of how something an entity or phenomenon in the real world functions. On the subject of imagination, Albert Einstein wrote, "Imagination is more important than knowledge. For while knowledge defines all we currently know and understand, imagination points to all we might yet discover and create".

When the author was thinking about all those things not yet discovered or created, her focus was directed to the issue of how could one discover and create if one has no curiosity at all? The author believes that higher education pedagogies should incorporate and encourage teaching methods that increases students curiosity while the instructor fosters the motivation and inspiration for it to continue to grow within them.

The author's innovation in developing the curiosity-based learning program was to focus on building up the students' own curiosity level in order to help focus their attention on the courses' subject matter from the beginning through its completion.

3. Curiosity-based learning objectives

3.1 Introduction of curiosity-based learning

With the realization of the need to develop students' curiosity and classroom involvement paired with the key qualities of a scholar the core learning objectives of the curiosity-based learning took shape. The importance of scholarship in a country's leadership was emphasized by President John F. Kennedy who reminded Americans in the following quote: "Remember that our nation's first great leaders were also our first great scholars".

This curiosity-based learning consists of a simple series of exercises focuses on experiences to increase the students investigative curiosity, critical thinking and skills of self-expression. Its initial activity draws the students' attention to their own baseline of self-limiting preconceptions and then with that motivational awareness, guides them progressively into developing the key skills of a scholar. The main qualities of a scholar are that one can read, listen, think and communicate well. With the addition of the role change of the instructor from a director to a facilitator, the overall curiosity-based learning objectives are as follows:

(1) Read well and listen well—informational input: comprehension and understanding of information.

This objective includes comprehension and understanding of information from all available sources, not just journals, books and the internet, but leaders in the field, industry or market place.

(2) Think well—informational processing: analysis, problem definition and multiple solution generation.

This is an important goal for increasing understanding by using analysis along with additional modes such as visual diagramming or brain storming techniques, testing problem definitions and multiple solution or hypothesis generation.

(3) Communicate well—informational output: This end-process goal consists of verbal self-expression, multiple explanatory methods and skills as well as audience awareness, appropriate feedback techniques and rapport building.

3.2 A Comparison of inquiry-based learning and curiosity-based learning

When reviewing the various learning theories from the west which have been adopted for use in the Thai educational system, such as: student-centered learning, student-based learning, project-based learning, constructivism, problem-based learning and inquiry-based learning, etc. the closest related theory to curiosity-based learning is inquiry-based learning with its common characteristic of the teacher as a facilitator and (see Figure 2).

3.2.1 General characteristics of inquiry-based learning

(1) The teacher does not communicate knowledge, but assist students to learn for themselves;

(2) The topic, problems to be studied and methods used to answer this problem are determined by the student, not the teacher;

(3) Inquiry-based learning emphasizes the constructivism framework of learning, i.e. knowledge is built in a step-wise fashion or "assembled from parts";

(4) Learning process works best in group situations.

3.2.2 General characteristics of curiosity-based learning (see Figure 2)

(1) Students initiate their direction in the course's topic based on their own interests;

(2) Teacher and students assist each other acquiring knowledge from various sources;

(3) The teacher assists the students in learning a general educational model that can be easily applied to their future study in any topic;

(4) Students learn to explain as well as defend their research and positions verbally, visually and in writing via a peer review process;

(5) Teachers are afforded the opportunity to gain more knowledge as a result of their students' research.

3.2.3 Unique and common elements of curiosity-based learning

(1) Common elements of inquiry-based and curiosity-based learning:

(a) Student centered;

(b) Instructor as a facilitator;

(c) Investigative and explorative;

(d) Requires an interactive group.

(2) Unique additions of curiosity-based learning:

(a) Activities designed to make the students aware of their initial self-limiting baseline of curiosity;

(b) Activities designed to increase the student's self-awareness of the importance of curiosity;

(c) Activities designed to increase the student's level of curiosity;

(d) Experience with multimodal methods of representing and defending ones research findings;

(e) Experience with a model method of research that can be generalized for later use with any subject.
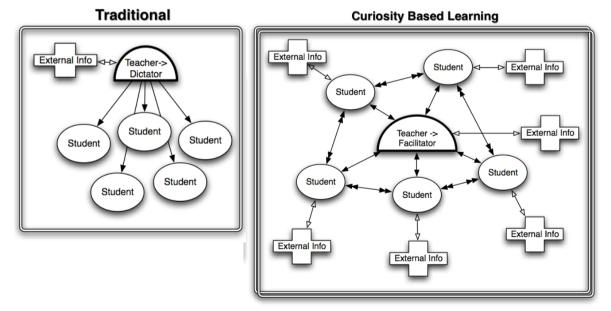

Figure 2   Charts comparing traditional and curiosity-based learning

3.3 Instructor as a facilitator, peer and co-learner

A key shift in curiosity-based learning is in the role of the teacher. The instructor changes from the traditional role of director/dictator to one as a facilitator of the students' learning process. Additionally they function as a peer and consequently as a co-learner in the group sessions (see Figure 3).
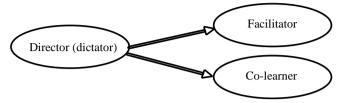
Figure 3　Instructor as a facilitator and a co-learner peer

3.4 The 6 steps of the curiosity-based learning program

The 6 general steps of the curiosity-based learning program are as follows: observe and examine, investigate, acquire, categorize and visualize, communicate, and review and discuss (see Figure 4).
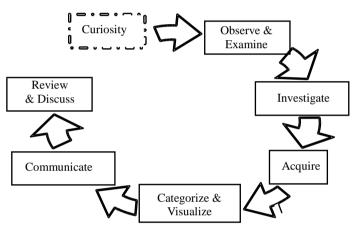
Figure 4　The 6-steps of curiosity-based learning

The program is a 6 step process that includes multi-modes of student self-expression and processes. They are expected to represent their ideas orally, in writing and diagrammed visually while learning the effectiveness and appropriateness of each. They also receive practice in explaining and justifying their views/positions as well as fielding questions from the floor in a peer-review forum as a micro-society of real world presentations. The core issues related to independent work and responsibility is an unstated focal point throughout. Furthermore, the true objectives of this experiential exercise are only disclosed to the participants and expounded upon after their final exercise.

(1) The 6 steps of the curiosity-based learning program
(a) Observe and examine the object; then compose a written description;
(b) Investigate others responses; then review the differences and similarities;
(c) Acquire more knowledge of the object from additional sources;
(d) Categorize and visualize: create a diagram of knowledge data;
(e) Communicate verbal and visual presentation with peer review;
(f) Review and discussion: instructor discloses the program's true intent.
(2) Example of the curiosity-based learning program (see Figure 5)

Session 1: Observe and examine the object

Activities: Compose a written description of the object (15min). Then exchange with another student and interview to learn about their awareness differences.

The class chooses one of the everyday objects around them. It can be any object that the students have experienced before such as a ruler, toothpick, candy, pen or cell phone, etc. In this example, an ice cream stick was selected.

Goals: Become aware of ones own baseline level of curiosity. Become aware and motivated by the fact that they missed areas found by classmates and that a simple common item can have areas of complex interrelatedness.

Figure 5   The ice-cream stick is placed on the table and then the students observe and write their own descriptions

Session 2: Investigate—Review another student responses for differences and similarities

Activities: Students explore statements made by others by exchanging their written description with a fellow student. List what they left out and interview their partners to find out why the other students included the points and factors they did.

Goals: Develop thinking, inquiry and writing skills; notice their own personal habits of omission.

Session 3: Acquire—Search for additional information and areas of relatedness

Activities: Students search for additional information from other sources, i.e. books, documents, periodicals, internet sources and leaders in the field, then compose a new more inclusive and "wider" observation paper.

Goals: Students stretch their research range by acquiring more knowledge of this object from other sources. The instructor also assists in acquiring more new information from various sources about the object to share with students.

Session 4: Categorize and visualize—Create diagrams of the knowledge and data

Activities: Students categorize all their research data into different approaches such as appearance approach, philosophical approach, historical approach, environmental approach and usage approach, etc.

Goals: Students gain a capability in the visualization of information and consequently knowledge utilization for more in-depth understanding of the object (topic). Students are "stretched" to practice changing their personal observational habits in seeing different aspects of the object.

Session 5: Communicate—Verbal and visual presentation with peer review

Activities: Students make an individual verbal and visual presentation (diagrams created in session 4) on

their ice cream stick research.

Students make a comparison to their first observational paper and the increase in knowledge gained after more research and diagramming. Students compose a few self-response paragraphs to internalize what are the benefits of a wider awareness and other items they have learned. The instructor and each student are expected to ask a minimum of one question of each presenter.

Goals: Students gain experience in public speaking with the use of visual aids along with building audience rapport, fielding questions and handling feedback. Specifically they are explaining, persuading, defending their findings, hypotheses and conclusions.

Session 6: Review and discuss—Instructor discloses the program's true intent

Activities: The instructor explains that the program's purpose was to increase the students' curiosity level, an awareness of self-limiting habits of assumptions, gain experience and comfort with visual and verbal methods of representing thoughts and data, a greater personal responsibility and independence for their own education and problem solving.

Goals: Instill both an awareness of the importance of curiosity and a learning methodology that can be generalized to any subject area the students pursues.

Functionally, the students are now personally acquainted with the benefits of a wider awareness or increased curiosity.

The tactic of not disclosing the purpose of the previous 6 sessions till the end in of itself increases the curiosity maintained by the students. Then by surprising them with the real purpose during the last session it creates a higher emotional impact which in turn increases the retention of the method and their related experiences so that they will be readily available for future use.

Throughout all the sessions, the author was conscious to not tell or teach, but only to involve the students so that they will not forget this experience nor the importance of curiosity for the remainder of their life.

Tell me and I forget. Teach me and I remember. Involve me and I learn. (Benjamin Franklin)

3.5 How does curiosity-based learning increase the students' curiosity?

In the very beginning by not informing the students about the true intention of the curiosity-based learning program and maintaining not disclosing it along the way encourages the student to wonder what is really going on and how do these exercises (on an ice cream stick in this example) relate to the course's main subject? Thai students and students in general, can pick up a self-defeating habit or a survival technique of trying to guess what the teacher "wants" and cater their work to respond and match the hypothesized instructor's expectations. Some of these students have consequently, lost the real focus of their own education. The non-disclosure of the curiosity-based learning program serves as to increase both the students' focus on the process of the program (true learning as opposed to guessing what the teacher wants) as well a general increase in curiosity. By being in a simple situation of not knowing its purpose increases curiosity much like placing a child in a hid and seek game. The students know the answer is out there, but where is it? Furthermore, it is human nature to try to explain things that are not initially or readily understood. An unanswered question sits in the subconscious and periodically reminds the consciousness it has not yet been answered.

During the last session, the student will be presented with the answer as to the purpose of the previous 5 sessions. This delay in knowing the answer increases the emotional activation and such activation has been associated with better long term retention. During the final presentation, the students compare their initial

description of the ice cream stick to their full research findings showing the complex inter-relatedness of what at first was seemingly such a simple object. This unexpected result adds additional personal impact to their learning process. They internalize the comparison of their own progress from the first session to the last. Each session is built upon asking questions and building up layers of information like climbing the steps of a ladder.

3.6 Curiosity in a flow state

From the author's own early learning experience she had a dream to be happy in the classroom without feeling remote from the teacher or falling asleep from boredom. The concept of "flow" from Dr. Mihaly Csikszentmihalyi inspired her to aware of creating a learning atmosphere where each step would engage all students at the appropriate level so that they maintained at state of "flow". "Flow" is the state where one's skills are a good match to the difficulty of the task at hand. If the task is too easy, one is bored; too hard one is overly stressed which in turn may result in depression or a student giving up (see Figure 6). The way to increase a student's skill level is to challenge the student in incremental amounts while keeping them within the "flow channel". Again see below, where the student would progress in skill level from A to E. At the E level, their skill level has increased to handle tougher tasks without experiencing the frustration created by a task too difficult or conversely bored. This is analogous to a runner progressing from 1km to 2km over the space of 10 weeks by increasing the distance just 1/10km per week.
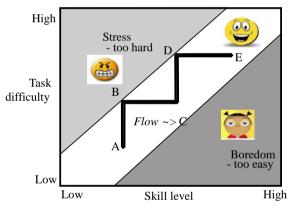

Figure 6   The "flow channel" in relationship to the skill and task levels

Each step of the curiosity-based learning program has been designed carefully to avoid the hardship of stress or the boredom of being too simple. The instructor plays a crucial role in maintaining this balance.

3.7 Student feedback

The student feedback after the curiosity-based learning program experience reflects a high level of satisfaction and increases in their scholarly self-confidence. Several former students that are now college instructors, have mentioned that they felt that the CBL program was so worthwhile that they are repeating in their own classes. Additionally, those in the workplace reported using parts of the CBL program's methodology in their professional life as a research and presentation tool.

4. Conclusion

4.1 Elements of the curiosity-based learning methodology

The curiosity-based learning model can be adopted and applied for use in most subjects. The example of the ice cream stick is just a simple object that can be utilized by students over the 6 sessions to learn about an objects

inter-relatedness to the world, society and culture, etc., in an academic manner. In the beginning session, the students' initial papers contained only 2 to 10 sentences and only 2 students over the last 6 years of have even bothered to come up and touch and turn over the selected object for closer physical examination. Most students in the first session were self-limited by assuming they already knew all about the object and did not need to touch it or turn it over to see what was on the bottom, etc.

The elements of the curiosity-based learning methodology are: (1) increases curiosity; (2) shared curiosity; (3) categorization of information; (4) searching for additional information; (5) internalize the changes through self-reflection awareness; (6) compose articles and create visual diagrams of interrelatedness; and (7) oral presentation—the act of defending ideas solidifies the meaning for the student.

4.2 Benefits of increased curiosity

Students gain knowledge and direct experience with the curiosity-based learning model impart to the significant role change they have underwent (see Figure 7). The student's role has changed in two ways. They have changed from passive receptor of "chalk and talk" to an active participant in their educational process as well transformed from a follower to a problem solver. Furthermore, the curiosity-based learning program provides the students the experience to model, practice and acquire (refresh) a new mind habit of curiosity and exploration. Then it gives them the experience with verbally as well as visually explaining and defending their research.

There is also a role change for the instructor as well. The instructor shifts from being a director to a facilitator while functioning as a peer when not actively facilitating. A rewarding side benefit of the curiosity-based learning program is that the instructors learn from the students with the information their research brings into the classroom. This helps keeps them fully engaged throughout the program.

Figure 7   Curiosity is the foundation for the 3 qualities of a scholar

4.3 Curiosity is the foundation

Curiosity-based learning is a tool of learning that applies to everyday situations and is a great method for knowledge research in students' future life since they will never see a simple object in the same way. They instead will have questions about its world's inter-relatedness come to mind.

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