

The Executive Summary

Introduction

This report summarizes the essence of the complete version of the research report, presenting the 6 parts of the content as follows:

1. Why ... does brain-based learning have to be created?

1.1 The origin of the study

This project was started from examining the problems issued from the circumstances of higher education learning management, especially that of social science. Prominent characteristics of the problems are:

(1) The design of course description / outline for the learning of students depends on the individual teachers or team and is a pattern that has been formerly set quite rigidly. The teachers have little interaction with students and answer for them what the objectives for learning the subject matter are, whether they must have factual knowledge about the subject matter, or whether that subject matter relates to what they have already known, what use there is in knowing.

(2) The “teaching” is mostly focused on conveying knowledge in the form of information conveyed through lecture-based process. Therefore, teachers are the knowledge providers; learners are receivers. As a result, they become note takers or they have the lecture notes photocopied to read in preparation for the exam. With this condition, the learning efficiency of students is tied to the teaching efficiency of the teachers, and the education involves resorting to the knowledge reservoir of the teachers *more than* other sources of information and knowledge that exist around them.

(3) The learning evaluation consists of quizzes, participation in class, attendance, and midterm and final exams, the answers of which the students reply mainly with what they remember from the lecture or texts that the teachers suggested them to read. Moreover, the teachers usually focus on training research skill by assigning content-based term papers or term projects which give pretty much limitation to generating the kind of understanding that should integrate different sorts of sciences. One reason for this situation is Thai students nowadays have very small knowledge base and very little experience. Therefore, we often hear that most of research papers that students submit are the product the cut-and-paste process or copied papers.

Under such circumstances, there are many staff of teachers and educationalists who turn to pay attention to the kind of education management that is more open than before and try new concepts in managing higher education sporadically. Until the last decade, there issued the new concept of Brain-Based learning or brain compatible learning which has partly manifested from the development of 2 kinds of scientific novelty, PET – Position Emission Topography – and MRI - Magnetic Resonance Imaging. This concept yields the kind of explanation for the learning process in each human brain that is more detailed than the traditional kind that is based on outside observation, for with this explanation it is possible to answer how the brain works. And it seems that the BBL has integrated this education management and has offered more challenges about *the consequential keys that leads to learning*

Preliminarily, the BBL called the attention of the staff of teachers to review at least 2 tenets:

One - are students who receive low grades and neglect attending class “dull students” with bad quality and poor brain? When neuro-scientific researches indicate that each human brain is designed to be equipped for learning and that teen brains are still in their prime for learning again before reaching adulthood, which means those students are not stupid. They are just unlearned.

Two – if students have not gone through learning process, there should be no one left behind other students who have succeeded through traditional learning.

The learning of students can be examined with the Brain-Based learning concept and briefly enumerated as follows:

(1) The brain of each student has the inborn learning nature. Every brain generates just about a hundred thousand million cells to be equipped for every possible kind of learning because the definition of learning in the context of neuro-science is the brain cell’s automatic generation of linking network resulting in millions of “circuits” in the brain. Since students’ brains contain cells that are designed to be *equipped* like this, the question is are teachers *equipped* for this sort of learning management?

(2) Human brains are living organism with the physiology of learning. They need to learn, and the brains naturally realize *how to learn* as seen from the way they *know how to learn* surviving skills since childhood, for this kind of learning does not automatically spring from the automatic nervous system. Instead, the brain owner learns how to “do it” himself. However, it is curious how college classrooms are full of drowsy, spiritless students. These give us the wake up call that perhaps we have not assumed the role of the construction of the tools and environment fit for their learning process.

(3) The brains learn through practice. This means we may make a mistake in the beginning and then try correcting it. The brain will use the right data packet to erase the wrong pattern and when it encounters more complex knowledge, some guidance or aid may be needed for the brain to learn quicker. So far in colleges, students usually know only the “output” of the pattern that they have practiced, which are transformed into grades and usual reprimand (as well as compliment). The question is how many students are there who have the chance to learn how to build the right pattern? How many students receive the guidance and support for the brain to learn faster?

(4) The brain learns through practice because practice is the process in which at least 2 cells connect. Dendrites, which are nerve branches, will gradually grow nerve fibers in all directions and connect with the axons of other brain cells. This point is called synapse genesis. This process is called dendritic proliferation, which is considered learning process. Therefore, practice is necessary for keeping learning activated. A question at this point is for each day of school time, for each semester, how much opportunity do students have for learning through practice, if we still keep learning limited only to having them listen, watch, or disposing them to collecting only auditory and visual experiences that are completely different from the world outside the classroom?

(5) Learning takes time because it is the consequence of the growth and connection of the brain cell network that results in circuits or pathways. The key word of pathways is the beginning or putting upright because new knowledge that comes each day will be filed by the

brain to find out which pathway that knowledge should be connected to. Once the circuits are solid and stable *skills develop*. At the same time, it must be remembered that different people learn at different rate and rhythm and tend to use and like different styles of learning. The challenge we encounter upon this point of discovery is how to manage higher education in the way that involves *learning time*. With this accomplished the brain circuits of students should have good beginning and stability and solidity to accommodate new data that will come in the future and the people responsible for learning management should recognize the *differences* in terms of both pace and learning style between individual students. (Different brains different learnings)

(6) Emotion is the most important factor to the capacity for learning, thinking, and building memories, which belongs to emotional brain. When one has doubt about what one is doing, fear, antipathy, apathy, the brain will not learn, causing thought processing and long-term memory building to be blocked. Vice versa, if one has confidence, interest, enthusiasm, curiosity, these emotions will stimulate the connection of brain cells. Therefore, whether students will become more lethargic or adapted into fervent active and knowing learners is a matter inextricably entangled with the teachers who must cooperate in investing their energy and effort into building comprehension and organizing good learning-process for them.

(7) If the brain cells or neurons in the brains are not exercised for instance, if one does not continually practice the knowledge that one has received, the neurons will enter the pruning process, the dendrites and synapses will gradually vanish and the generated circuits will enter the state of low efficacy.

Four years in college are the critical point for the development and future of our nation, because if we cannot help students cross over from the state of passive learners, in the future we may see passive workers and passive families abounding all over Thailand.

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The above notions and questions instigate us as university teachers to seriously assume the duty of managing education in the way that facilitates the students' brains' aptitude for creative learning to be continually developed to their full potential and efficacy.

Meanwhile, universities as important education management institutes should participate in designing and creating Brain-Based learning so that our Thai youth can become "active learners" both in the sense that they learn happily and that they spend their brain energy creatively so that they can improve the nation in the future.

Before the "BBL4U" or Brain-Based Learning for Universities came into existence, the principal research team had cooperated with the staff of teachers of Thammasat university Lampang center to modify the learning style in some courses of the second semester of the academic year 2004. The pre-test and post-test revealed that there has been wakening and response to learning in the process that has been managed.

Thus, the principal research team coordinated with the staff of teachers in other universities and asked them to travel to observe the education and attending knowledge exchange forum at Lampang center of Thammat university in February 2005. So there was an agreement that a pilot project should be conducted in the name of "BBL4U" with the cooperation between the Knowledge Network Institute of Thailand and 3 Thai universities: Lampang center of Thammasat university, Ubon Ratchathani university, and Silpakorn university. That way staff and those who are interested can take part in the continually and concretely creating and

extending the output of Brain-Based learning (BBL) in the higher education system of Thailand and truly benefiting society on the local and national level.

- (1) The pilot project motivates higher education institutions in Thailand to cooperate in designing and creating the Brain-Based learning process for youth.
- (2) Youth can have access to learning and continually and truly develop the potential for their learning process.
- (3) Youth, teachers and concerned staff in different institutions can develop the cooperation in reorganizing new learning process which is the search for the direction for reforming the learning system in universities in Thailand to be on a par with those in other nations.

BBL4U’s question

The BBL4U project is a field work research with the aim to answer an important question on the management of social science education in the three universities, which is *“Can the doctrine of*

Brain-Based learning be applied to the development of the learning process for higher education students? If so, how effectively and under what conditions and contexts?

The main question leads to 4 concrete questions below:

First question – Can the project apply the Brain-Based learning principle to education in order to change learners from being passive to active learners? If so, how?

Second question – Can the project generate the process of modifying the attitude of learners from being knowledge receptacles to constructive learners? If so, how?

Third question – Can the project help students to become skilled learners and apply knowledge on their own? If so, how?

Fourth question – Can the project induce in students potential for controlling their own emotional intelligence? If so, how?

Research term

1 year and 6 months (from academic year 2005 to 2006/1)

Define target group

The BBL4U project does not select the special group of students to become target group because the learning problem among male and female youth is a common problem in the higher education of Thailand. If there is some kind of target group selection, it is the students under the care of the staff of teachers who are willing to apply the principle of Brain-Based learning, which consists of:

The 3 academic institutions: Lampang center of Thammasat university, Ubon Ratchathani university and Silpakorn university. There are 5 teachers who participate and the main group of students whose learning result will be followed up consists of 180 students as presented in the details below:

1. Lampang center of Thammasat university:

Miss Yinglug Kanchanaruek	Instructor from College of Interdisciplinary Studies
Mr. Santipong Changpuek	Special instructor from College of Interdisciplinary Studies and instructor from

- Miss Jarupa Sriwichai
A group of third year students
- the Institution of Ethnology, Chiangrai
Rajabhat university
Teacher assistant from College of
Interdisciplinary Studies and secretary of the
BBL4U project
from College of Interdisciplinary Studies,
94 in numbers
2. Ubon Ratchathani university:
Mr. Surasom Krishanachuta
Mr. Thawat Maneepong
A group of second year students
- Instructor and representative dean of the
faculty of Liberal Arts
Instructor from the faculty of Liberal Arts
from the department of Social Development,
50 in numbers
3. Silpakorn university:
Mr. Damrongpon Intachan
A group of third and fourth year students from the department of Anthropology,
- Instructor from the department of
Anthropology, faculty of Archeology
faculty of Archeology

There are 9 courses in BBL4UI

Institution	Course	Instructor	Number of students
Lampang center of Thammasat university	1. Environmental Ecology and Social Development(compulsory)	Miss Yinglug Kanchanaruek Mr. Santipong Changpuek Miss Jarupa Sriwichai	95
	2. Basic Resource Development Project Management and Analysis(elective)		18
Ubon Ratchathani university	1. Media and Development (elective)	Mr. Surasom Krishanachuta Mr. Thawat Maneepong	53
	2. Basic Development Theory (compulsory)		53
	3. Local Wisdom and Development (compulsory)		55
Silpakorn university	1. Mass Communication for Anthropology (elective)	Mr. Damrongpon Intachan	42
	2. Ethnicity (elective)		19
	3. Anthropological Research Methodology (compulsory)		37
	4. Ethnological Research Media Production Technique (elective)		17

Research methodology

The BBL4UI project regards the conduct of this field work research as a methodology consisting of 4 related parts:

First part – Developing the potential of the research teams

Since the main theme of the project is the attempt to apply the science of neuro-science to the science of education management with a staff of teachers and target group students being in the field of social science in all the three institutions. The staff of the project fully realizes that Brain-Based Learning is a new issue, not a fixed set of knowledge that can be instantly applied under all conditions. Therefore, it is necessary for the project to have the reinforcement process

for the research team to learn in order to continually and concretely develop their potential as “Brain-Based learning teachers” according to the working scheme as follows:

1. Hold a workshop among the members of the research team, among the research team and advisers and/or the Knowledge Network Institute of Thailand regularly
2. Review literature on Brain-Based Learning
3. Creating channels for follow-up, information exchange, methodology, outcome and solution for problems that may arise in Brain-Based Learning education in each institution.

Second part – Developing the Brain-Based Learning approach

The project will begin with applying the concept of Brain-Based Learning obtained from preliminary survey and the first part of the work to the education in courses through the following steps:

1st step: Posing learning objectives

The staff of teachers in each institution will create the “learning objectives” in each subject¹ with the attempt to make them correspond with the main objectives of the project. At the same time, the learning objectives must be sufficiently flexible to modification and open up the way for students to participate in posing their own learning objectives to the highest degree possible.

2nd step: Designing process

Under the main learning objective (which may be divided into sub-objectives) the staff of teachers from each institution will design the outline of the learning process (procedure, learning pattern, activities). That way it is possible to get the overall picture, imagine what sort of tools and learning environment must each step involve, and how.

1. **The tools of learning that are effective for brain activation** Each instructor has at least 3 chief criteria for selection: first – whether the tools are suitable for the disposition of the students’ brains; second – whether the tools are suitable for the content; third – whether the tools are suitable for the process, and how.

For the utilization of each type of tools, the staff of teachers of each institution also have to consider the rhythm for using – when, how, and with whom to use it.

Examples of tools of learning

- **Smart and compatible media** such as photographs, music, motion pictures, short movies, documentaries, news, and so on. There are at least 2 types of these media, the type that is commonly available and exposed to students and the type that is produced as a result of the learning of the teachers/students. (The project will create a network for the circulation of the media among institutions.)

¹ For the selection of the courses for the project, the teachers from each institution will propose the course titles and contents for which they are responsible in the conference as well as assess the education management, learning evaluation, the students' response, obstacles, solutions that have been practiced, and consider the curriculum of each department to estimate whether the teachers can organize the Brain-Based learning education for the target students within the period of time scheduled for project. (The summarization of the conference on the *BBLAU* arrangement, the Lampang center of Thammasat university, February 19, 2005.)

- **Supplementary documents / lecture summaries** in full length, abridged, summarized and adapted forms. These may be constructed to fit the learning environment. For instance, documents may be posted on the classroom wall. While a student is discussing in front of the class and some students encounter the question that requires them to find out additional meaning, they may learn through connecting what is going on in front of the class room and the supplementary documents on the wall.

- **Workshop or general dialogue** depending on the conditions in which the students from each group are interested and the issues they want to find out deeper than what have been presented in the classroom.

- **Field Trips** are both tools and environment for learning. The kind of field used in the BBL project is not the static kind that lets the students' brains find out the meaning on their own. Instead, it is a kind of "lively field" favorable for answering the learning questions, self-discovery, and getting to know others more. Examples are fields with landscape, economy, and culture different from what students are familiar with, fields on which important events are going on, rituals are taking place, or even fields that appear commonplace, but the substance of which the brain never finds out, until some learning questions arise.

2. **Enriching learning environment** In the project the environment is categorized into 2 types: physical environment and emotional environment.

3rd Step: Examining the output of the students' learning

Among what the teachers who participate in the project must examine carefully about the various outputs of the students' learning each time, there are at least 2 related things:

1. Comprehending in order to categorize the learning modes of students' brains, which can be broadly categorized into 3 groups:

-**Auditory brain** The part of the brain that is mainly apt for learning through listening.

-**Kinesthetic brain** The part of the brain that is mainly apt for learning through actions and expression through organs.

-**Visual brain** The part of the brain that is mainly apt for learning through pictures.

Comprehending the features of the brain as shown above will allow teachers to be able to follow up on the learning mode of each student, to access the progress, and show students the potential and limitation of their own learning mode, as well as direction for future progress.

2. Re-designing the process and / or adding more information or re-making, after the teacher has considered from the output or from evaluation through different methods and *find out* that students have not accomplished the learning objectives and have not gotten to the heart of the matter of that learning question. Instead, if it is found that the learning of the brain is stable, the teacher should add more complex and challenging questions.

Third part – Developing indicators and follow-up on BBL

The project categorizes indicators into four concrete criteria:

1. **Change in learning behavior** For instance, the number of students who are absent, ask for leave and fall asleep decreases. The spiritless learning behavior is changed to enthusiastic participation, with boldness to think, pose questions and respond to the learning process that has been devised.

2. **Adjustment of attitude towards learning as constructive learners** For instance, the ability to adjust – construct – develop their own “attitude” from the learning process, the ability to pose antithesis to the question. Adjustment can also be crossing over from one question to a new one / crossing over from producing elementary level of output to one that requires more creativity.

3. **Skills for learning and applying knowledge** such as

- The ability to use tools significantly, for example, knowing how to use map-reading along with reading the actual field, knowing the angle of presentation.
- The ability to select and search for information in order to construct one's own knowledge.
- The ability to interpret. Students must have deep understanding of that subject.

4. **The potential for emotional intelligence** such as the ability to manage one's emotion to fit the environment or adjust one's emotion from being negative to being creative.

For that matter, the project staff are aware of the indicators of the project, both the shared characteristics of the whole project and the specific characteristics of each institution.

As for the **research follow-up**, the staff of teachers in the project will systematically record the process and the content (the input) used in the performance of the research team and those used with students and will follow up on students who participate in the project (the output) as follows:

1. *Individual follow-up* The point is to indicate in what style of learning and under what conditions can each student learn most effectively.

2. *Group follow-up* The point is to indicate that the learning of students may involve applying team work learning and practice both in the same institution and cross institutions, such as visual education in areas of different visual cultures. It is also learning through the content and process that involve a variety tools and learning areas.

Fourth part - Summarization and extension of output

The project's summarization and extension of the output will involve holding forums for sharing experience and constructing the "body of knowledge" for the organization of Brain-Based learning education as follows:

- small forum for the summarization of the project research.
- big forum for presenting research to party organizations and the public.
- other small forums or producing public media according to the favorable conditions.

Expected result

1. Youth, teachers and concerned staff will contribute in the invention and development of the new process of learning, which is a search for a direction for reforming the learning system of Thai universities in the future.

2. The pilot project with the process of Brain-Based learning education on higher education level will be created systematically and with the potential for extension to other institutions or agencies.

3. The process of learning management in this project will contribute to providing inspiration for and building potential in students with the awareness that it is not necessary that everyone reaches the same level of learning. Everyone just learns to his or her own full potential.

Factors that support learning management

According to the research result, the research team has compiled at least 3 important factors that are likely to promote the application of the brain-based learning concept in the three academic institutions:

(1) Stating questions and common goal clearly

In stating the questions of the project, there are 3 related points:

1. The questions must be relevant to the societal reality mentioned above and that is expected to show more negative signs in the future.
2. The questions must be relevant to the development of the brain-based learning theory, which must be seriously adapted, applied and experimented in order to find out the potential, condition and limitations.
3. The questions must lead to setting “*the common goal*” of the research team, counselors, and budget supporters who want to see the concrete form of solving the learning problem.

The research question which aims to solve the problems is therefore the important factor affecting the research team’s mode of conducting the research. For instance, the teacher’s ego has to be reduced. From being “**bearer, teacher and conveyer of knowledge**” s/he becomes “**co-learners**”. The education design must be taken care of with consistent serious concern about the diversity of learners, the learning of learners and crossing over from merely learning inside the classroom.

(2) The quality of the rapport between the research team and support machinery

Good quality of the rapport between the research team and the counselor - veteran team – In a way this is the consequence of the interpersonal relationship background, but it can happen while this research is being conducted because

- The research questions and objectives are challenging and impossible for the research team to achieve on their own.
- The BBL theory is a novelty, very radical for applying in the higher education level.

Good quality of the rapport between partite organizations and the research team –

The rapport between the research team and local and translocal partite organizations is very important for *creating options*, creating a variety of concrete forms of environment and excellent learning tools for students. This can be seen in the case of the community organization in the Moon river area during cross-ecocultural learning, the museum of Poo temple at Champasak in the Lao People's Democratic Republic during the cross-university learning in Champasak, or the case of the Lampang Center of Thammasat university, which has many partite organizations in support of both inside and outside classroom learning. For example, there were the economical-cultural upper northern area research project, the Hakchiangkhong villagers’ 100 years Mae-Cham historical research project and

schools in the urban and suburban areas of Lampang.

(3) The co-management machinery

The difference in target groups, contexts, supporting partite organizations among the three institutions that are situated in three regions, the distance between the advisors and the research team, or the amount of researchers that differ in each institution and other factors will not become points of comparison that show strength and weakness or details that may lead one to jump to a conclusion if the research team lacks the machinery to bring each researcher to have

access to and take part in project management so that everyone has the group spirit as partakers in “our project”.

The significant factors of learning limitations

The research result shows that the research team could not achieve all the objectives of this research due to some limitations, which have been analyzed and summarized as follows:

(1) The discontinuity of the application of BBL

The research team acceded that in the present context most students tend to choose using *the least brainpower* in their learning. Many others hold the attitude that education is passport or, like the saying, “study because it is duty”. Thus, a great number of students give little time to the learning process and save their brainpower for other matters that appear more exciting.

(2) Learners’ background

Learners’ background has been formed from uterus to the present stage, which here can be categorized into 3 features:

One – the environment of the university

The environment of the university with the classroom or building design that is not favorable to the principle of managing the environment to be suitable for the brain’s learning. For example, the color of the classroom has direct affect on the learners’ behavior; exposure to the natural light will stimulate the students’ enthusiasm more than neon light does; or classroom decoration, acoustic, as well as desks and chairs position. Besides physical environment, managing study schedule is another factor in learning process promotion. For instance, the schedule setting that stretches too long for the capacity of the brain will produce the opposite reaction, that is, boredom, cheerlessness, unwillingness to learn and the brain’s refusal to register or memorize the information

Two – pre college education

The education management for the elementary, primary school and secondary school levels is considered knowledge-foundation laying. Therefore, with the classroom education process in most schools that puts emphasis on and gauging the students’ scholastic capacity by data memorization, the

learning atmosphere in which the teachers are the conveyors of knowledge to students, the culture of confidence in the nation’s role models induce students to rely on teachers’ morale, ethic, knowledge and ability, and also to believe that opinions and criticism that are different from teachers’ are inappropriate.

Three – environment and family background

Family background, nurturing, upbringing, as well as the surrounding society all have a part in shaping the ground for students’ learning, thinking, and deciding, such as handling problems, points of view towards certain matters, emotional control and proper behaviors and so on. Some reflections of students’ behaviors may partly be the imitation or absorption of conducts and styles of the parents and custodians.

(3) The power of disorderly stimuli

With the attempt to develop all kinds of technology, the world is changing rapidly because everyone can have easy, convenient and quick access to the information both screened and unscreened, economical, societal, cultural, and ethical. All sorts of subjects that in the past

were circumscribed for certain groups of people become more public, especially romantic relationship, which in the past had to go through social tradition's screening process.

(4) Effective and challenging tools and media

Purchasing effective smart media and tools as well as paying attention to the continual and orderly maintenance of these items will activate the circuits in the brain to work and produce understanding and to progress to long-term memory. This may be a fact neglected by higher education teachers, including the research team. Formerly, attention was usually given to purchasing media that were interesting and relevant to the subjects without concern for the management of those media, when in the academic world not many good media were offered to choose from.

(5) Higher education teachers' ego

Most higher education teachers go through the selection process by the gauge of academic achievement. Therefore, interest is given more to catching up with the changing ideas and theories as well as discussion on societal phenomena than to *the students' educational process*. Moreover, the style of handling problems tends to be individualistic. Because these values have been upheld for a long time, higher education teachers usually have high self-confidence.

Policy suggestions

There are 6 significant policy suggestions offered by the project research team.

(1) curriculum design

New curriculum design or curriculum modification mostly relates to the social contexts, especially setting marketing as the dominating factor. What is usually neglected is the kind of curriculum design or modification in which attention is given to examining the learning problems of students, as well as relating the curriculum with the brain's learning and the continuation from the basic education system.

(2) Pre-college education system

Higher education is the continuation of the former knowledge, the experience accumulated from the fundamental level of education. Comparing the learning in higher education which covers the period of only 3-6 years to the pre-college education system which covers the approximate period of 15 years in terms of the accumulation and root-taking of knowledge, thought processing, points of view, attitude and absorption of the education system, it can be stated that education in the elementary, primary and secondary school level is considered the heart of pursuing education in the higher education level.

(3) Staff of teachers and learning tools

Creating the procedure for higher-education teachers to be able to understand and be mindful of the learning procedure should go hand in hand with scholastic efficiency. In most cases the system of selecting higher-education teachers only focuses on scholastic efficiency demonstrated through scholastic achievement or academic result. The orientation for new teachers mainly concerns comprehending the relevant order, regulations and techniques, which are all basically information of the material matters, for example, introducing administrators, constructions, welfare, teaching techniques and so on. Meanwhile, teacher ethics, instigation of the understanding of the learning process relevant to the students' age and the objectives of learning under the students' real-life conditions are neglected.

(4) Sharing resources by creating network – This comprises

- Creating a network of teachers.
- Improving the production and development of effective and challenging tools in the forms of texts, smart media and so on.
- Creating shared learning field between universities. The field is considered both the learning environment and tool effective for elevating the mind.

(5) Survival skill development

Physical, social, and emotional factors all affect learning and life's success more than genetic intelligence. Thus, the students' survival skill accumulated through all media, for instance, television and Internet, has a part in shaping and directing behaviors and emotions, as well as forming the students' identity.

(6) Budget support

Supportive budget should be provided for people interested in the brain-based learning principle or people who notice the present problems of students so that they can have the opportunity to act on their own, exchange information, discuss ideas, as well as cooperate in creating and developing tools applied in constantly generating learning.

Research content

The 1st chapter explains about the causes and the seriousness of the learning problems among social science students, then move on to posing questions and designing pilot field work research project in the name of "BBL4U" to discuss about research methodology.

The 2nd chapter opens with examining the problem in learning management for example, the learning of students, the teaching of instructors, the academic institutions and the body of knowledge used in education management, followed by examining the knowledge about Brain-Based learning so that Brain-Based learning can be conceptualized.

The 3rd, 4th and 5th chapters are the methodology and findings obtained from applying the Brain-Based learning policy in the context of 3 higher education institutions: Lampang center of Thammasat university, Ubon Ratchathani university and Silpakorn university respectively.

The 6th chapter is the summary of the discussion of findings that answers the research question, as well as policy recommendations gained through the application of the BBL4U project's Brain-Based learning principle.