ENHANCING AND ENRICHING STUDENT LEARNING STYLES AND PERFORMANCE THROUGH WHOLE BRAIN LITERACY AND APPRECIATIVE INQUIRY INTERVENTIONS: A CASE STUDY OF ETHICS CLASSES

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Abstract: The main objective of this action research is to investigate the impact of Whole Brain Literacy (WBL) and Appreciative Inquiry (AI) as instruction and organization development interventions (IDI/ODIs) on students' learning styles and performance in Ethics classes at Assumption University (AU) in Bangkok, Thailand. On that basis, a new learning process model was developed to raise standards and the quality level at AU. Action research was conducted with two main variables; student learning styles, with the WBL/Kolb learning process model; and student performance, described on the WBL template. At the developmental stage, WBL and AI were used as OD tools for a positive change from within. Students with potential learned effectively and grew holistically. Two Ethics classes with IDI/ODIs formed the experimental group while three other classes served as the control group and were conducted in accordance with traditional teacher-centered method. Both qualitative and quantitative measurements were used for data triangulation. The research instruments consisted of a self-assessment questionnaire, and a set of pre- and post-tests. To obtain qualitative data, focus group interviews and direct observations were conducted. The results show that WBL and AI had a positive impact on three student learning styles (feeling, doing, and thinking styles) and all aspects of performance (academics, self-esteem, sense of responsibility and creativity). However, it was found that there was no significant difference on student watching learning style.

Keywords: Instruction and Organization Development, Brain-based Learning, Learning Style, Learning Process, Whole Brain Literacy, Appreciative Inquiry, Performance.

1. Introduction

"Education for all and all for education" has been the famous National Education Act motto since 1999. In the fast-changing and ever more competitive world in which we live, this motto has been gaining relevance. The role of education in preparing the next generations for the challenges ahead cannot be overstated. Higher education is no exception.

This article focuses on one higher education institution in Thailand; Assumption University (AU), one of the leading institutions in the country. Now in its 42nd year of existence, AU has been keeping pace with the exponential time and strengthening its identity as a pioneering organization. It continues to be an open system and respond to the many driving forces that keep shaping it such as the 15-year plan on higher education (2008 – 2023) and the national standard and quality assurance. Another such driving force is, the upcoming ASEAN Economic Community (AEC), which represents another challenge - and an opportunity - for all higher education institutions.

Since AU is playing a key role in Thailand's educational sector, changes are essential not only for sustainable growth, but also for stakeholders' satisfaction. The initial sense of change took place during class observation. The data collected as a part of AU quality assurance process, also revealed some interesting facts. The Research Institute of Assumption University (RIAU, 2010) indicated that the top three dissatisfactions of students in terms of instruction and lecturer were attractive teaching styles, student-center basis, and teaching efficiency.

In 2010, the General Education courses were modified under the Thai Qualifications Framework (TQF) for teaching and learning effectiveness. This was an opportunity to redesign programs and courses for higher

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education qualifications. Educational reforms have been implemented in many schools as an on-going process to keep pace with these rapid changes.

AU has continued to put quality assurance (QA) and TQF into its system with the focus on its identity such as ethics, international community and entrepreneurship.

Ethics, as a general educational (GE) requirement, is one of the main components of AU's identity as well as the first TQF domain. So, instructional strategies and a learning process model need to be explored to determine the best practices. Therefore, GE at other institutions was studied in order for GE courses at AU to meet the same standards as those at ASEAN and European higher education institutions. It was suggested that teaching and learning in ASEAN and European schools focus on thinking processes of criticism, analysis and synthesis. Therefore, students need to acquire ethical reasoning so that they possess life skills to be ready to practice in the real world. In the Thai context, student-centeredness and lifelong learning are widely practiced so students can live life with ethical awareness and generic skills related to real-life situations. Students, therefore, need holistic development in learning practices and more creativity to apply their knowledge and experience in their careers and lives.

Given the challenges these issues raise and the situations of the focal system, a SWOTAR analysis of the organization was conducted first in order to diagnose the current situations and articulate a strategy for the organization's improvement.

2. SWOTAR Analysis

With positive OD perspectives, weaknesses or problems are viewed as new opportunities. General education classes, in this research, Ethics, under the School of Arts, as the organization of choice, is analyzed in terms of strengths, weaknesses, opportunities, threats, aspirations and results as follows:

- *Strengths*: Ethics as AU's identity is one of the basic courses required for all students. Teaching and learning activities are fully supported by the administrators. All classrooms are equipped with IT facilities. Most teachers have extensive teaching experience.

- *Weaknesses*: Some classes are conducted in a traditional Thai style. A lecture-based approach inhibits students' creativity and impairs lifelong learning. Negative attitudes and a fixed mindset in both students and teachers lead to low engagement and ineffective learning.

- *Opportunities*: The new standards introduced by the Office of Higher Education Commission present an opportunity to modify courses and to reform education so as to be more student-centered. With more systemic and strategic changes in the teaching and learning processes, AU graduates with ethical characteristics will meet the demands of the employment market.

- *Threats*: Stakeholders' satisfaction in terms of instruction is low whereas in the meantime, competition with other local and global institutions is growing stronger.

- *Aspirations*: To raise the bar of AU's standards and quality. To emphasize a student-centered approach so as to allow more creativity among students and help them develop life skills and experience a holistic growth.

- *Results*: Development of a new learning process. Students have a variety of learning styles with a higher awareness of strength in learning. Additionally, their performance is improved.

3. Literature Review

The relevant theories supporting the main variables of this study are explained and discussed below:

- *Organization as a System*

The organization existing in the environment is in an open system. It is interacting with the social, political, technology and economics environments. In a critical stage, inputs like the customers, services, and capitals are transformed to deliver the outputs. Interdependent activities are performed when the inputs are transformed and discharge the outputs to the external environment (Cumming & Worley, 2009). As Owen (1998) stated, a classroom is also an open system and many subsystems are interrelated to produce the

output. Changes in one subsystem may influence changes in other subsystems. So, an organization in a fast changing world can be in both chaos and order. This revolutionary approach, which is discontinuous, causes new paradigms and practices to emerge.

- Organization Development (OD)

Organization development aims to search for ways to improve performance for more effectiveness and sustainable growth. The common OD processes are diagnosis, interventions and evaluation. Porras and Robertson (1992) stated that OD is a set of behavioral science-based theories, values, strategies and techniques for a planned change in the organization. However, the postmodern approach to OD viewed the organization as a social construct. So, the change is non-linear and self-organized. People's mindsets are focused to improve the organization's effectiveness. Therefore, members in the organization need to be developed so that the organization itself also develops. This is a holistic change in terms of human development.

- Learning Organization

Senge (2006) pointed out that a learning organization develops the capacity to adapt and change for its sustainable growth. It can be defined as a group of people continually enhancing their capacity to create what they want to create (Senge, 2006). Members in the learning organization share vision. The old thinking is removed. The processes, activities and functions are interrelated. They communicate openly across the boundaries. Finally, they work for shared vision to sublimate their self-interests.

To build a learning organization, the learning process needs to be concentrated. Teachers, as leaders with new skills, build shared vision to challenge traditional mental modes. The more vision is shared, the more responsible people are for the whole. The initiatives are introduced to test mental modes and the worldview of others is expanded. Then, the transformational change takes place. Therefore, people must be involved in team learning. They learn how to learn and mutually create desired results (Senge, 2006).

- Learning Process

It is believed that individual learning is necessary for organizational learning. Under the single loop learning, people understand how to do things effectively for improvement. Sets of rules are implemented to achieve a purpose. Intention, decision, action, feedback and evaluation are involved. On the other hand, people with double loop learning are engaged in the analytical process. Self-questioning and reflection are involved in gaining insight for a deeper understanding of why it works. Traditional assumptions are challenged when people see the world in new ways. In this way, mental modes are used to evaluate the situation and this is how people can give reasons for their own behaviors and do things in a new way (Argyris, 1976)

- Instruction Development: An instructional strategy is one of the crucial factors in the teaching and learning processes, for its effectiveness. Teachers develop various techniques to grasp students' attention and finally achieve the learning objectives. There are many ways to do so:

- Pedagogical Learning: It is a teacher-centered approach which assumes that learners know less while teachers know best. The typical learning process is very linear.

Teachers start the introduction, give contents, do assignments and have examinations. However, this is a deductive method where recall of contents is responded over a short period of time and learners are not able to construct new knowledge (Ortigas & Perez, 2009).

- Self-directed Learning: It can be called andragogy, an inductive method of the learning when learners are active players in learning process. Knowles (1990) stated that it is an art of teaching to responsible adults who can learn through a discovery process. It is believed that they come to class with their own experiences, feelings and beliefs to learn. Learning contract is usually given to understand objectives and tasks to be self- organized.

- Lifelong Learning: This is believed to be an effective teaching and learning process in this century. Stauble (2005) proposed four stages in the learning model. Firstly, "self-awareness" is the beginning of learning in which learners are

autonomous. They understand their prior knowledge, motivation, and attitudes. Secondly, "self-management" is encountered when learners plan their learning projects with their specific goals. Thirdly, "meta-learning" paves a way to understand the different learning approaches and styles. Learners understand how to learn. Finally, "self-monitoring" happens when learners are responsible for constructing their own meanings.

- *Action Learning*: This is called learning by doing (Dilworth, 1996). Learners are in small groups to work on assigned projects. They not only act, but also engage in some reflections to gain insights. This is the cyclical process of learning where learners develop action plans, set up meetings, share responsibility and solve problems.

- *Problem-based Learning*: This is similar to action learning. It is started with problems or crisis to be solved. Students seek to answer three questions: What do we know? What do we need to know to solve problems? How do we learn this? Downing, Ning & Shin (2011) suggested that problem-based learning should take place in a discovery-oriented environment where learners are interacting with group members. Later, a new constructive and potential solution will be applied to the reality.

- *Experiential Learning:* As a reflective constructivist view, Smith (2004) noted that the learning process focuses on students' experiences as learning sources. Learners practice learning by doing. Kolb (1984) conceptualized four stages of the experiential learning cycle: concrete experience; reflective observation; abstract conceptualization; and active experimentation. Learners actively participate in many learning activities both inside and outside classrooms. As a holistic approach of learning, learners are engaged in simulations, role play, seminars, workshops, internships, service learning and the like (Benecke & Bezuidenhout, 2011).

- *Brain-based Learning:* As the brain functions in many different ways, so people learn in different ways. Gardner (1991) postulated that there were seven learning intelligences accounting for learning from different functions of the brain. However, it is believed that people prefer a variety of learning experiences which reflect the different functions of the brain. Up until now, the instruction was likely to be brain-based when all parts of the brain were connected to get the whole meaning (Tayko & Talmo, 2010). For greater learning, Duman (2006) concluded that learners favor many learning styles and multiple intelligences. Academic achievement is increased in brain-based learning groups. Different teaching strategies such as active learning, creative drama, field trips and so on should be developed. Each learner may have different intelligences but all are encouraged to learn together as a whole (Tayko & Talmo, 2010).

- *Learning Styles*

To tap students' strengths and build the capacity to learn, learning styles have been studied for many years. Kolb (1984) noted that the transformation of experience creates knowledge in the learning process. Concrete experience and abstract conceptualization are two poles of knowing the happenings while reflective observation and active experimentation are two different ways of understanding the transformation of knowledge. The main basic learning styles include:

(i) A divergent style: Learners who are called reflectors prefer learning by feeling and watching.

(ii) An assimilating style: Learners who are theorists are likely to learn by thinking and watching.

(iii) A converging style: Learners who are pragmatists learn by thinking and acting.

(iv) An accommodating style: Learners are activists who learn by acting and feeling.

Since each learning style holds its own strengths, both facilitators and learners need to be aware of different learning styles to develop more learning effectiveness (Kolb & Kolb, 2005). Most western learners are found to be assimilators, learning well with analytical tasks whereas eastern learners show peak performance with group work, verbal tasks and holistic thinking (Stage & Muller (1999). Many scholars (e.g. Vunnasiri, 2003; Min, 2009; Vongbunsin, 2010) presented diverse learning styles in their studies, thereby underscoring the fact that different teaching

styles are necessary to match diverse learning styles for more learning effectiveness.

- Appreciative Inquiry (AI)

As one of the instruction and organization development tools in this study, AI is a positive OD focusing on strengths and opportunities rather than weaknesses and threats. While Cooperider & Whitney (2000) suggested that the combination of both "Appreciate" and "Inquiry" elements is very powerful for the organization change, the "Appreciate" is the act of recognizing the best in people and the world. An organization's success, strengths, and potentials as the affirmation of the past are acknowledged. "Inquiry" is the act of exploration and discovery. Asking the right questions opens the door to new opportunities. When peoples' voices are shared, the inquiry for changes can function at its best (Bush, 2005).

All parts of the organization are recognized and the wholeness brings about the best out of it. The organization members are in AI process so that the desired future is co-created by the cooperation of people (Cooperider & Whitney, 2000; Yballe & Conner, 2004).

Watkins and Stavros (2010) presented the Appreciative 4-D model. First, the affirmative topic is selected. Then, success stories are shared in the discovery stage. People in the organization reflect on their peak experiences which are high moments in their lives. Next, people are asked to imagine the possibilities of the future (dream stage). With their creativity and commitment, they contribute ideas to co-create the organization's future. In the design stage, they list specific actions for what might be done in the future. Lastly, concrete plans and statements are made. This is a cooperative process in which people in the organization are programmed to have positive mindsets for positive consequences.

- Whole Brain Literacy (WBL)

Tayko and Talmo (2010) presented WBL as a tool for leaders, managers, executives, and supervisors to manage their thoughts, feelings, tasks and time in order to be more creative and productive for their sustainable system. The four-brain model, referred to as the thinking styles of brain functioning, can be analyzed as follows:

- I-control: thinking about certainty and stability:
- I-explore: thinking about ingenuity and creativity:
- I-pursue: thinking about results and productivity;
- I-preserve: thinking about relations and integration (Lynch (2006).

Two complementary combinations can be formed (I-control and I-preserve; I-explore and I-pursue) and be supportive of each other. Not only the twin operating system, but also the iteration/wending process are the ways human brains work collaboratively for better learning when all quadrants of the brain functions are connected. Therefore, the "I" as the individual and the "I" as the institution are connected when thinking through and moving from one quadrant of the brain to others. In the iterating and wending processes, learners connect meanings of information with the flow in and out of each quadrant (Tayko & Talmo, 2010).

WBL is a tool for change in many settings where learners with non-linear thinking patterns develop their potentials to perform tasks. As Soponkij (2010) concluded, as ODIs, WBL and AI significantly change leadership styles, shared values, skills and employee satisfaction. In the same vein, Vongbunsin (2010) argued that, as an OD tool, WBL had a positive impact on the performance of the individual rather than the group.

To understand how people think, what they think and to leverage positive change, WBL and AI are mapped on the same template as a new brain-based instruction design to tap learners' potentials with an inside out learning process.

4. Conceptual Framework

Based on the literature reviewed, the conceptual framework is composed of the complementary WBL and AI process models as a tool to help students discover their potential and become aware of their strengths. When the potentials are unfolded through the non-linear learning process, students reach the peak of

their performance and live life happily as a whole. It should be noted that this is an inside out learning process where learning activities are designed to facilitate students to reframe thinking patterns and expand meaning with a positive discourse and dialogue.

Figure 1: Conceptual Framework
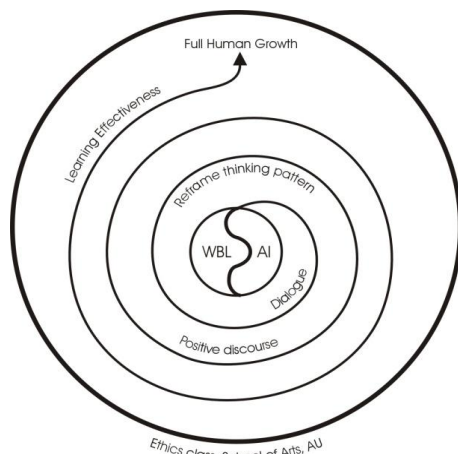
Source: Created by the author for this study

The action research within the above framework involves three phases of planned change: (i) pre-IDI/ODI; (ii) IDI/ODI; and (iii) post- IDI/ODI.

The two main variables in this study are student learning styles and student performance, each of which comprising four sub-variables. The first sub-set includes four different learning styles (concrete experience, reflective observation, abstract conceptualization, and active experimentation). The second one, each of the four quadrants of the brain function: academic, creativity, sense of responsibility and self-esteem.

5. Research Methodology

Five Ethics classes under the General Education Department, School of Arts, at AU were used for this study, which was implemented in 2/2011 semester. While two of the classes (sections 417 and 419) served as experimental groups with interventions, three (sections 421, 422 and 901) served as control groups with no interventions applied.

- IDI/ODI design

The instruction is designed with the complementary of WBL/AI. A variety of learning activities representing each quadrant of brain function together with positive discourse and dialogue were established to facilitate a holistic approach to learning. Additionally, team-based learning with the use of hexagon and metaphoric expression as the thinking through process were utilized to urge learners to connect and engage with one another.

Figure 2: Class Activities on the WBL/AI Template

I-Control	I-Explore
▪ Formal lecture ▪ Textbook reading ▪ Terminology defined	▪ Dream by using AI questions ▪ Brainstorming ▪ Mind mapping
I-Pursue	I-Preserve
▪ Journal writing ▪ Structured assignments ▪ Step by step activities	▪ Self-reflection ▪ Story telling ▪ Group discussion

Source: Created by the author for this study

Both quantitative and qualitative measurements were used for this study. There were 185 respondents: 114 in the experimental groups 71 in the control groups.

- Research Instruments

To assess the student learning styles and performance in terms of creativity, sense of responsibility, and self-esteem, a six-point rating scale questionnaire was designed. It is a modification of both the Kolb learning style inventory and the WBL analysis. A set of twenty items for learning style was arranged. As to the WBL analysis, another five items were set to assess the awareness of strength in learning and fifteen items for student performance. The pilot test was conducted in another Ethics class. The overall reliability coefficient was 0.94 showing a highly satisfactory result. So, the same questionnaire was administered to the respondents in five Ethics classes at the pre-IDI/ODI and post-ODI/

ODI stages. The paired t-test in the SPSS program was employed to analyze the data and determine the impact of the IDI/ODIs. The confidence level of statistical significance was set at 95% or $p \leq 0.05$ (2-tailed).

To assess student performance in academics, a twenty-item pre- and post-test multiple choice was designed. Its reliability was tested by Kuder Richardson Coefficient Scale (KR-20). The result was 0.723. Also, an interview guide and an observation checklist were created for the qualitative data. Twenty-three students were drawn from the population for focus group interviews while direct observations were conducted on a team-basis.

The purpose of the pre-IDI/ODI was to diagnose the current situation and determine "how students learn and perform". The data collection included questionnaires, focus group interviews and observations during the first two weeks of the semester.

The IDI/ODI activities aimed to transform students from inside out. The WBL/AI-based instruction was designed to enhance students learning styles and performance. And the learning process moved from one quadrant of brain function to another. Starting from I-preserve/Discovery, they were engaged with AI dialogue and storytelling to share meaning of the affirmative topic. Then, with the I-explore/Dream thinking lens, students expanded meaning with metaphoric expression when brainstorming on how the future might be. AI questions were asked to help them recognize their strengths while projecting themselves into their desired future. The next stage, the I-control/Design is where they exercised logical thinking to conceptualize theories. A project work proposal with a concrete plan and a clear goal was written. Students with I-pursue/Destiny perspectives then worked as a collaborative team for action plan implementation. Moreover, hexagon and ethical leadership were added to facilitate experiential learning experiences. Finally, they were brought back to the purpose of the course. Students learned the meaning of Ethics holistically and finally upheld ethical values for their own fulfillment and happiness.

To summarize, the WBL/Kolb learning process model as a cycle involved different activities moving around the core purpose in a counter clockwise way (Tayko & Talmo, 2010). In this study it started from concrete experience (feeling style with I-pursue/I-preserve), reflective observation (watching style with I-preserve/I-explore), abstract conceptualization (thinking style with I-control/I-explore) and active experimentation (doing style with I-control/I-pursue). Not only the learning activities, but also teaching materials were prepared in relation to the notion that students learn from all thinking quadrants. Also, they possess potentials to develop themselves. The teacher was a facilitator guiding them to inquire peak moments and to appreciate themselves as well as others.

The same set of research instruments was utilized at the post-IDI/ODI stage to evaluate the impact of the IDI/ODI on students' learning styles and performance. The data was analyzed, interpreted, and compared to the pre-IDI/ODI data.

6. Discussion of Findings

The quantitative pre- and post-DID/ODI findings are discussed first. The qualitative ones are considered next.

(1) Quantitative findings

Using the independent t-test, the results at the pre-IDI/ODI stage show that there was no significant difference between the control and experimental groups in terms of overall learning styles, awareness of strength in learning and performance. Furthermore, a paired sample t-test was used to compare the variables before and after the respondents engaged in the IDI/ODIs.

- *Learning Styles*: At the pre-IDI/ODI stage, students' preference on learning styles was at a high level. In the experimental and control groups, their learning preference was found to be concrete experience (CE-feeling), active experimentation (AE-doing), reflective observation (RO-watching) and abstract conceptualization (AC-thinking), respectively. In the experimental group, the results show a CE mean value of 4.72 out of 6, an AE mean

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value of 4.54, a RO mean value of 4.50 and an AC mean value of 4.42. The results on students' learning styles in the control groups point to similar findings. The CE is the highest with a mean value of 4.57 out of 6, followed by AE (4.44), RO (4.40) and AC (4.31). The pre-IDI/ODI results regarding students' awareness of strength in learning reveal a high perception on all brain functioning perspectives: core purpose, I-control, I-explore, I-pursue, and I-preserve. In the experimental group, the highest was I-pursue learning strength with a mean value of 4.74 while the highest in the control group was I-preserve with a mean value of 4.72.

At the post-IDI/ODI stage, it was found that students' learning styles were positively changed. With a mean value of 4.97, the CE-feeling of the experimental groups was still the highest, followed by AE-doing (4.81), AC-thinking (4.63), and RO-watching (4.52). It should be noted that the RO learning style became the lowest preference after the intervention. Additionally, the awareness of strength in learning was found to be much higher in the experimental groups than in the control groups. The dominant strength in learning after IDI/ODI was I-pursue/AE-doing and I-preserve/CE-feeling, respectively.

With regard to hypothesis testing, the analysis of the paired samples t-test shows a significant difference on AE, CE and AC learning styles. After the intervention, the highest impact was found to be on AE, with a probability value of .002, which is lower than the significance level of 5%. It should be noted, however, that there is no significant difference on RO learning style (.856>.05). The overall students' learning strength awareness was also statistically different (.014<.05).

- *Performance:* At the pre-IDI/ODI stage, students' performance was found to be high in creativity, sense of responsibility and self-esteem, respectively. The results of the experimental groups are as follows: 76.5% in creativity; 74.33% in sense of responsibility; 73.5% in self-esteem; and 66.3% in academics. Likewise, the control group performance was

high in creativity (76.5%), followed by 76% in sense of responsibility, 73.83% in self-esteem and 61.4% in academics.

At the post-IDI/ODI stage, the data on students' performance, drawn from the experimental groups, has the highest statistical difference. Self-esteem stands first (81.33%), followed by creativity (81.16%), academics (80.2%), and sense of responsibility (79.5%). The results increased in all aspects of performance (creativity, $t = -3.458$, $p = .001$; sense of responsibility, $t = -3.721$, $p = .000$ and self-esteem, $t = -5.352$, $p = .000$). Regarding academics, students showed 2.78 mean value difference (13.26 to 16.04 out of 20).

All in all, there was a positive impact after the series of IDI/ODI in Ethics classes on the overall learning styles and awareness of strength in learning and performance. However, the control groups with no interventions had a negative impact on all the aforementioned variables. With an independent sample t-test, the comparison of the mean values shows that there were significant differences between control groups and experimental groups in all the variables, except for the RO-watching learning style.

(2) Qualitative findings

In addition to five interview questions designed to assess the in-depth data pertaining to the variables, an observation checklist was also used to evaluate students' behaviors on a team-basis.

At the pre-IDI/ODI stage, the qualitative results showed that students were people-oriented. They preferred learning in groups with small group discussions and role play. They reported that teachers and friends were important for their studies. However, their creativity was quite low. Although they had some questions or doubts, they were not encouraged to express them. As for responsibility, they were dependent on friends and loved to conduct activities in groups. Lastly, they reported a moderate level of happiness. While, on the one hand, they felt stressed from much class work, they also had much support from their family and friends.

Based on the direct observations in the

classes, the findings with the team-based evaluation were lower in all variables when compared to the quantitative findings. Out of 28 teams, 17 were from the experimental groups and 11 from the control groups. Generally, they were in the forming stage of team development. They were not very open to discussion and thought-sharing. They just watched how teachers performed and tried to complete the assignments. Answers were from the textbook and they showed an attempt to hand in assignments in class. Lastly, they were doubtful and reluctant to volunteer for class activities.

At the post IDI/ODI stage, learning preferences became diverse with the dominant one shifting from people-oriented to projects and hands-on activities. Moreover, they reported that activities could help them understand lessons the most. Group discussions, self-reflection, and lectures with examples were still in need. Most of them preferred integrated learning methods to understand the subject contents. With regard to performance, creativity was expressed by questioning. They had more new ideas and more connectivity. Their sense of responsibility was reflected more in activities such as doing homework, tutoring, doing projects, etc. Lastly, they a reported higher life satisfaction and happiness.

When learning in teams, students with multiple learning styles were observed to be higher performers at the post phase. They were open to new learning possibilities. When calling for activities, most of them were active and enjoy class participation. They were also more attentive and engaged. In addition to questions in class, text messages were sent to the researcher. Project work proposals showed more focused thinking and a better flow when connecting ideas. They showed more analytical ideas to expand their meaning with AI dialogue.

During the hexagon session, they achieved high performances in terms of collaboration and strong teamwork. The creativity manifested itself as the meanings of each cluster were connected. Colorful pictures were drawn to give more meaning to the cluster of ideas. All in all,

students learned by themselves and solved their own problems.

7. Conclusion and Recommendations

People really learn when they are engaged in a learning environment and aware of how they learn. The conclusion reached in this research is consistent with that of the WBL and AI and complement it with a new instruction design to help to increase learning effectiveness in Ethics classes. When the experimental group is compared to the control group, the research findings indicate that student learning styles and performance are enhanced and enriched through the WBL/AI interventions. With the help of the IDI/ODI, student awareness of learning is strengthened. They learn to learn by themselves in a holistic way and achieve higher performances. On the other hand, the results from the control groups point to negative changes with regard to the same variables.

It can be concluded that students' perceptions on learning styles: CE, AE, and AC rose significantly. Interestingly enough, students used AC-thinking learning style more than RO-watching learning style, which is in keeping with Min's (2009) findings. It should be noted though that the limited time of each class period may partly account for it as RO activities could not be completed.

Moreover, the highest impact of the IDI/ODI was on AE, the opposite of RO (Kolb & Kolb, 2005), something which may impede the power of RO learning. In summary, students overwhelmingly preferred the multiple use of learning styles to study Ethics as the facilitator provided WBL/AI-based learning activities with a non-linear learning process.

One's awareness of one's strength in learning was another area where the intervention had a positive impact. The highest significant difference pertained to awareness of strength in CE-feeling while AE-doing was the highest learning strength. Students learned at their best when doing activities in small groups. Team-based learning, especially for open discussion and idea-sharing, was found to strengthen their class learning.

Regarding student performance, there were

significant differences in creativity, sense of responsibility and self-esteem. The most significant change was seen in terms of self-esteem. Students showed more creativity and enjoyed working with friends. All in all, they loved having classes and became more positive towards themselves and life.

With the complements of WBL and AI, this brain-based learning is student-centered learning recognizing that students learn in a holistic way (Tayko & Talmo, 2010) and it is an inside out learning process with high engagement in knowledge construction through a variety of learning forms.

Students in general were found to be accommodating learners who prefer learning by doing and feeling from I-pursue and I-preserve thinking lenses. They enjoyed class activities with peers rather than lectures.

This study has helped a number of educators and facilitators prepare a variety of teaching and learning methodologies and strategies that match students' multiple learning styles. This matching can improve teaching and learning effectiveness, both of which having a positive impact on students' performance. Lastly, they grow holistically and function fully.

- *Recommendation and Implications*

The learning process is recognized as one of the important aspects of school administration. Teachers as well as school administrators should therefore consider how students learn and develop an instruction model in such a way to facilitate learning effectiveness. The new learning process in this study is being practiced to serve as the basis to enhance the quality of instruction, both with the General Education Department and for the entire AU. The new WBL/AI-based teaching and learning model and a new instruction design are integrated through the 5Es as follows:

Figure 3: The 5Es: WBL/AI-based Instruction Model
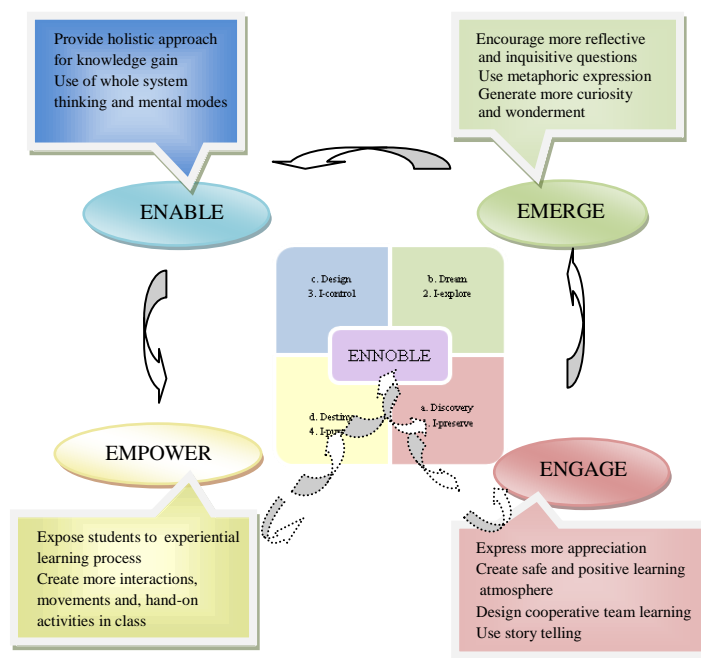
Source: Created by the author for this study

The 5Es stand for:
- *Engage*: Students preserve the value of open-mindedness and self-discovery.
- *Emerge*: Students dream to achieve personal goals and the vision of the organization. The unknown self is explored and the future image is projected.
- *Enable*: Students think logically to understand

the contents and goals to achieve. Concrete plans and goals for the projects are written and committed.

- *Empower*: Students consciously participate in ethical activities and learn by themselves through their own actions.

- *Ennoble*: Students integrate all learning experiences from four quadrants of brain functions as the whole. Ethical people with self and other respect are transformed. They incorporate ethical values in whatever they do.

In this way, the holistic teaching and learning practice is more student-centered. As they learn to expand meaning, parts are connected for the greater whole. Students do not just learn from the outside such as through reading textbooks and searching tools, but from the inside of themselves with whole brain functions.

Further research should be conducted on the RO-watching learning style, an area which, in this study, needs improvement.

Moreover, the 8.65 percent of the non-Thai respondents, with the delimitation of this study, deserve further studies on the cultural difference aspect of learning. This purposive sampling could help better understand the power of WBL/AI in intercultural groups.

This study and its findings have implications in two areas: teacher selection/preparation and teacher development. Recruitment should focus on hiring people with student-centered mindsets and proper skills for this approach. The annual teacher orientation should provide new comers with a new paradigm of instruction. The paradigm shift calls for teachers to develop insightful questions and skills while students are active and independent.

Finally, another important point on the topic of teacher development is that in-house workshops and training with WBL and AI frameworks should be offered to allow teachers to experience the best practices and create their own effective teaching and learning processes in the future.

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