การประเมินผลโดยนักเรียนชั้นมัธยมศึกษาปีที่ 6 เพื่อปรับปรุงบทเรียน STAR STEMS เรื่อง “A CHEMICAL FREE LIFE”

How to Improve a Lesson Design in STAR STEMS “A Chemical Free Life” Evaluated by Matthayomsuksa 6 Students

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บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อมุ่งประเมินปรับปรุงบทเรียน STAR STEMS เรื่อง “A CHEMICAL FREE LIFE” โดยมีผู้ให้ข้อมูลเป็นนักเรียนตามการประเมินการเรียนรู้ด้วยวิธี 5 หลาย

กลุ่มตัวอย่างของการวิจัยครั้งนี้คือนักเรียนชั้นมัธยมศึกษาปีที่ 6 จำนวน 3 ห้อง จำนวนทั้งสิ้น 56 คน ภาคเรียนที่ 1 ปีการศึกษา 2560 เครื่องมือวิจัยเป็นแบบประเมินผล แผนการจัดการเรียนรู้ STAR STEMS แผนการเรียนรู้ที่ 1 เรื่อง “A Chemical Free Life” โดยวิเคราะห์ข้อมูลของแบบสอบถามด้วยความถี่และร้อยละ และใช้เกณฑ์การผ่านของจำนวนนักเรียนที่ตอบแบบสอบถามมากกว่าร้อยละ 60 ขึ้นไป ข้อมูลนี้ได้นำมาวิเคราะห์อีกครั้งกับการประเมินการเรียนรู้ด้วยวิธี 5 หลายซึ่งประกอบไปด้วยความรู้ กระบวนการ และคุณลักษณะอันพึงประสงค์และเจตคติ เพื่อที่จะพัฒนาการออกแบบบทเรียนเพิ่มเติมสำหรับความหลากหลายในการเรียนรู้ของนักเรียน

ผลการวิจัย พบว่า แผนการจัดการเรียนรู้นี้เป็นแบบสารัตถนิยมและบทเรียนเป็นไปได้มากที่ใช้พุทธิพิสัยเป็นหลักซึ่งบ่งชี้โดย 82.29% หรือนักเรียน 50 คนในพุทธิพิสัย และบทเรียนนี้เหมาะสมกับผู้ที่เรียนรู้ทางสายตาแบบเชิงรับที่แสดงโดย 96.43% หรือนักเรียน 54 คน 94.64% หรือนักเรียน 53 คน และ 89.29% หรือนักเรียน 50 คนซึ่งเห็นด้วยว่าบทเรียนนี้สอนในห้องเรียน ในเอกสารที่ครูจัดทำ และในใบงานที่ได้รับการประเมิน ตามลำดับ แผนการจัดการเรียนรู้นี้ไม่ใช่แผนสำหรับการเรียนแบบนักเรียนเป็นศูนย์กลางที่ระบุโดย 96.43% หรือนักเรียน 54 คนในการสอนแบบบรรยาย เพราะฉะนั้นการใช้สถานการณ์เป็นฐานการเรียนรู้จึงไม่พบในบทเรียนนี้ยิ่งกว่านั้นเพื่อที่จะปรับปรุงบทเรียน ในหัวข้อของ “ใครประเมิน” “ประเมินที่ไหน” และ “ประเมินเวลาใด” ควรมีความหลากหลายของการประเมิน ในประเด็นของ “ใครประเมิน” ไม่เพียงแค่นักเรียนประเมินตนเอง แต่ให้ครูประเมินและเพื่อนนักเรียนประเมินด้วย ในส่วนของ “ประเมินที่ไหน” สามารถมีหลายสถานที่ในการประเมินได้ เช่น โรงเรียน บ้าน ศูนย์การเรียนรู้ต่างๆ และแหล่งต่างๆที่เกี่ยวข้อง ในแง่ของ “ประเมินเวลาใด” แบบทดสอบก่อนเรียนควรจะนำมาเพิ่มในฐานะที่เป็นประเภทหนึ่งของการเรียนรู้ก่อนเรียน

คำสำคัญ: STAR STEMS/ 5 หลาย

Abstract

The purposes of this research were to evaluate how to improve a lesson in STAR STEMS “A Chemical Free Life” by the students according to assessment for learning with 5 variations.

The subjects of this study were 56 high-school Matthayomsuksa 6 students of 3 classes in the first semester of 2017 academic year. The research instrument was “STAR STEM Evaluation Form Learning Plan 1 ‘A Chemical Free Life’.” The data of the questionnaire were analyzed through frequency and percentage which were above 60.71% or 34 students as the passing criterion. The data were analyzed again with assessment for learning with 5 variations consisting of knowledge, process, and attribute and attitude to develop a further lesson design for a variety of the students’ learning.

The research results revealed that the learning plan is essentialism and the lesson is mostly based on cognition indicated by 89.29% or

50 students in Cognitive Domain. The lesson also matches with visual and passive learners shown by 96.43% or 54 students, 94.64% or 53 students, and 89.29% or 50 students agreeing that this lesson taught in a classroom, in handouts, and in worksheets evaluated respectively. This learning plan is not the plan for student-centered learning stated by 96.43% or 54 students in lecture. Therefore, Situation-Based Learning (SBL) isn't found in this lesson. Additionally, to improve the lesson, Who Assesses, Where to Assess, and When to Assess should have a variety of assessment methods. In Who Assesses, not only is student self-assessment utilized, but teacher assessment and peer assessment should be also employed. There is a variety of places for assessing in Where to Assess, for example, schools, homes, learning centers, and relevant places. In terms of When to Assess, a pre-test should be supplemented as a sort of pre-learning.

Keywords: STAR STEMS/ 5 Variations

1. Background

The 21st century is the world of globalization with the evolution of information technology. Teaching in the 20th century is not appropriate and enough for students in this new world because of globalization factors (Numkanisorn, 2018 [in Thai]). The problems nowadays are students work without creative thinking skills and they don't have disciplines and responsibilities. Also, they don't know Thai culture and they are not proud of being Thai due to fragmented teaching. These failures are from the educational underdevelopment of 12 years at school with a weak integration-teaching model since students cannot think by themselves and they cannot apply their knowledge. To solve these Thai students' problems, STAR STEMS as stated in Educational System Reform Steering Subcommittee is implemented (Educational System Reform Steering Subcommittee, (2017): 19 [in Thai]).

STAR STEMS is a learning process which integrates with every learning area together to systematically create analytic and synthetic thinking skills, to know how to use English skills, to cultivate for being good people who have disciplines, morals, responsibilities, and to be proud of the nation along with Thainess and social circumstances by way of Situation-Based Learning: SBL (Educational System Reform Steering Subcommittee. 2017: 19 [in Thai]). Warangkana Kha-on (2017) reported regarding "Situation-Based Learning: SBL" that SBL is to simulate authentic learning environment as much as possible so that students can learn from the simulations to solve a lot of problems. Every student participates in the simulations to mutually think the ways how to solve the problems themselves and they are able to face the real problems or situations in their daily lives. SBL suits and matches the learning process more than teacher-centered learning (Kha-on, 2017: 23-24. [in Thai]). The learning process mentioned above is a holistic aspect called STAR STEMS (Student, Teacher, Academic, Revolution, and Scientific Thinking, Thai-Technology, English-Engineering, Moral-Mathematics, Sociogeology) (Educational System Reform Steering Subcommittee. 2017: 19 [in Thai]). In detail, the learning process of scientific thinking is critical thinking and mental model; Thai-Technology is creativity, culture, and internal motivations, English-Engineering is reading, writing, computing in Engineering, career, and communication; Moral-Mathematics is arithmetics, computing in Mathematics, and compassion; Sociogeology is cross-cultural study, internal motivation, and social learning (Educational System Reform Steering Subcommittee. 2017: 19 [in Thai]).

Panyaworakun School is one of the schools which takes the implementation of STAR STEMS from Matthayomsuksa 1 to 6. For Matthayomsuksa 6, the topic of the theme-based unit is "School without Chemicals" and the parallel integrated

instruction is employed. In this study, only English in one learning process of reading is selected for lesson "A Chemical Free Life" integrated with

Thainess. Thainess in "A Chemical Free Life" is to be self-reliant without chemicals according to sufficiency economy.

STAR STEMS is associated with the third learning area of foreign languages which is language and relationship with other learning areas: use of foreign languages to link knowledge with other learning areas, forming the basis for further development, seeking knowledge and broadening learners' world views (The Basic Education Core Curriculum, 2008, p. 221). In Basic English (E33101), concerning standard-based instruction, the material of lesson "A Chemical Free Life" is made from F1.1 M. 4-6/4: identify the main idea, analyse the essence, interpret and express opinions from listening to and reading feature articles and entertainment articles, as well as provide justifications and examples for illustration, and F3.1 M. 4-6/1: Research/search for, make records, summarise and express opinions about the data related to other learning areas, and present them through speaking and writing (The Basic Education Core Curriculum, 2008, p. 263). Based upon these two indicators, the sub-topic concept of lesson "A Chemical Free Life" is to read for understanding about living a life without chemicals and to guess the academic words from reading the contexts on the environment and English; therefore, is to know some English academic vocabulary from reading the contexts.

To develop further, the lesson of the sub-topic needs analyzing how to improve a lesson in STAR STEMS "A Chemical Free Life" in terms of assessment for learning with 5 variations (Dechakupt, and Yindeesuk, 2014: 98-99 [in Thai]). Pimpan Dechakupt and Payao Yindeesuk (2014) stated that assessment for learning has to assess every aspect such as knowledge, process/ skill, and attitude/ desired character. To assess them, it is necessary to consider what instruments are employed, how to assess, who assesses, when to assess, and where to assess. These things are called assessment for learning with 5 variations as many perspectives, many instruments, many people, many times, and many places. For instance, many perspectives are to assess knowledge, process, and attitude. Many instruments are tests, interviews, observations, scales, and self-assessment. Many people are teachers, students, and students' peers. Many times are pre-learning assessment, while-learning assessment, and after-learning assessment. Many places are students' school, their homes, and their related sites. As an assessment, assessment for learning with 5 variation is in accordance with the study of Utumporn Jamornman as for decreasing passive lecture (Jamornman, 1997: 7-8 [in Thai]). To be effective in designing a further lesson, learning plan "A Chemical Free Life" in STAR STEMS needs analyzing by way of frequency and percentage determined by the passing criterion of a number of students above 60% in accordance with terms of assessment for learning with 5 variations.

2. Objectives

This study was carried out:

To evaluate how to improve a lesson in STAR STEMS "A Chemical Free Life" by Matthayomsuksa 6 students at Panyaworakun School according to assessment for learning with 5 variations.

3. Methods

3.1 Subjects

The population of the study were Matthayomsuksa 6 students. The subjects of this study were 56 high-school students of Matthayomsuksa 6/1, 6/4, and 6/7 by means of purposive sampling which was Matthayomsuksa 6 students from one class of each different program especially selected for this lesson so that the subjects were from a large variety of programs for a wide spread of the different evaluation from the 3 classes in the first semester of 2017 academic year. The subject comprised 18 Matthayomsuksa

6/1 students from the Thai-Social Program, 10 Matthayomsuksa 6/4 students from the English-Japanese Program, and 28 Matthayomsuksa 6/7 students from the Science-Math Program.

3.2 Materials

The instrument employed to collect the data from this research was "STAR STEMS Evaluation Form Learning Plan 1 'A Chemical Free Life'" (see Appendix). It consists of two parts as follows:

Part I The first part was set to ask general information on subject code, course, the respondents' class and room, their study program, their teacher, and subject area.

Part II The second part was a new developed checklist consisting of 66 items with 8 aspects adapted from the study of several checklists, especially Bangkok Christian College's developed by the Academic Department, Bangkok Christian College, in eight perspectives: expected learning outcomes (2 items), learning objectives (3 items), learning plan integrated with (9 items), learning activities (14 items), teaching methods (6 items), learning resources (6 items), learning media (6 items), and measurement and evaluation (20 items with 4 subscales). The checklist of learning plan "A Chemical Free Life" was quantitatively analyzed for designing a further effective lesson in STAR STEMS that improves better lesson than this learning plan and develop a further lesson design for a variety of the students' learning according to assessment for learning with 5 variations (Dechakupt, and Yindeesuk, 2014: 98-99 [in Thai]).

3.3 Procedures

Evaluations were conducted through "STAR STEMS Evaluation Form Learning Plan 'A Chemical Free Life'" responded by the students after their class quantitatively analyzed to develop a further lesson design for a variety of the students' learning concerning assessment for learning with 5 variations.

3.4 Data Analysis

The analysis of data is as follows:

The data of the questionnaire showing the students' checklist with learning plan 1 "A Chemical Free Life" were analyzed using frequency and percentage, and the passing criterion of a number of students was above 60.71% or 34 students. Assessment for learning with 5 variations (Dechakupt, and Yindeesuk, 2014: 98-99 [in Thai]) was employed to develop a further lesson design for a variety of the students' learning.

4. Results

Table 1 presents what the expected learning outcomes of learning plan "A Chemical Free Life" are.

Table 1: Expected Learning Outcomes of Learning Plan "A Chemical Free Life"

No.	Items	Learning Plan "A Chemical Free Life"
1	**Expected Learning Outcomes**	
	Related to learning objectives	55 (98.21%)
	Related to learning strands	38 (67.86%)

From the table above, the result showed that 98.21% or 55 students agreed that expected learning outcomes of Learning Plan "A Chemical Free Life" were related to learning objectives and 67.86% or 38 students thought that they were also related to learning strands.

Table 2 shows what the learning objectives of learning plan “A Chemical Free Life” are.

Table 2: Learning Objectives of Learning Plan “A Chemical Free Life”

No.	Items	Learning Plan “A Chemical Free Life”
2	**Learning Objectives**	
	Cognitive Domain(Knowledge, Comprehension)	50 (89.29%)
	Psychomotor Domain (Practice, Skills)	34 (60.71%)
	Affective Domain (Virtue, Attitudes)	36 (64.29%)

From table 2, 50 students (89.29%), 36 students (64.29%), and 34 students (60.71%) of the students answers found that learning objectives of Learning Plan “A Chemical Free Life” consisted of cognitive domain (knowledge, comprehension), affective domain (virtue, attitudes), and psychomotor domain (practice, skills) respectively.

Table 3 demonstrates what the learning plan integration “A Chemical Free Life” is.

Table 3: The Integration of Learning Plan “A Chemical Free Life”

No.	Items	Learning Plan “A Chemical Free Life”
3	**Learning Plan Integrated with**	
	1 or 2 subjects	48 (85.71%)
	More than 2 subjects	23 (41.07%)
	Morals, Ethics	28 (50.00%)
	Reading, Critical Thinking, Communicative Writing	35 (62.50%)
	Occupations	21 (37.50%)
	Thai Wisdom	19 (33.93%)
	Community/ Society/ Environment	23 (41.07%)
	Others (Identify)	6 (10.71%)
	Learner development activities	12 (21.43%)

Table 3 reports that, 85.71% or 48 students regarded that Learning Plan “A Chemical Free Life” integrated with 1 or 2 subjects. Also, 62.50% or 35 students mentioned that reading, critical thinking, and communicative writing were integrated into the learning plan.

Table 4 introduces what the learning activities of learning plan “A Chemical Free Life” are.

Table 4: Learning Activities of Learning Plan “A Chemical Free Life”

No.	Items	Learning Plan “A Chemical Free Life”
4	**Learning Activities**	
	Study and Research	48 (85.71%)
	Critical and Synthetic Thinking	40 (71.43%)
	Classification and Summarization	29 (51.79%)
	Comparison and Contrast	34 (60.71%)

Table 4: Learning Activities of Learning Plan "A Chemical Free Life" (Continue)

No.	Items	Learning Plan "A Chemical Free Life"
	Evaluation	35 (62.50%)
	Creative Thinking and Vision	44 (78.57%)
	Communication Skills	36 (64.29%)
	Relating knowledge to real-life applications	37 (66.07%)
	Teamwork	38 (67.86%)
	Practice/ Experiment	26 (46.43%)
	Report	26 (46.43%)
	Project	24 (42.86%)
	Portfolio	32 (57.14%)
	Others (Identify)	5 (8.93%)

Table 4 shows that 85.71% or 48 students agreed that one of the learning activities of Learning Plan "A Chemical Free Life" mostly was study and research. 78.57% or 44 students and 71.43% or 40 students also agreed that the activities of the learning plan contained creative thinking and vision, and critical and synthetic thinking. 38 students (67.86%), 37 students 66.07%), (36 students (64.29%), 35 students (62.50%), and 34 students (60.71%) of the students answers believed that the activities of the learning plan included teamwork, applying knowledge to real life, communication skills, evaluation, and comparison and contrast respectively.

Table 5 explains what the teaching methods of learning plan "A Chemical Free Life" are.

Table 5: Teaching Methods of Learning Plan "A Chemical Free Life"

No.	Items	Learning Plan "A Chemical Free Life"
5	**Teaching Methods**	
	Lecture	54 (96.43%)
	Discussion	38 (67.86%)
	Demonstration	31 (55.36%)
	Questions and Answers	48 (85.71%)
	Student Participation	47 (83.93%)
	Others (Identify)	8 (14.29%)

Table 5 demonstrates that 96.43% or 54 students responded that the most teaching method of Learning Plan "A Chemical Free Life" was lecture. Below from the most, 48 students (85.71%) and 47 students (83.93%) thought that questions and answers, and student participation were contained in the learning plan, and 38 students (67.86%) decided that the learning plan had discussion.

Table 6 indicated what the learning resources of learning plan "A Chemical Free Life" are.

Table 6: Learning Resources of Learning Plan "A Chemical Free Life"

No.	Items	Learning Plan "A Chemical Free Life"
6	**Learning Resources**	
	Classroom	54 (96.43%)
	Learning Center	20 (35.71%)
	Library	16 (28.57%)
	Botanical Garden	14 (25.00%)
	Green Learning Room	23 (41.07%)
	Others (Identify)	5 (8.93%)

It is illustrated in Table 6 that nearly all students (96.43%) or 54 students considered that Learning Plan "A Chemical Free Life" was taught only in a classroom.

Table 7 signifies what the learning media of learning plan "A Chemical Free Life" are.

Table 7: Learning Media of Learning Plan "A Chemical Free Life"

No.	Items	Learning Plan "A Chemical Free Life"
7	**Learning Media**	
	Coursebook	43 (76.79%)
	Handouts	53 (94.64%)
	Work Samples	22 (39.29%)
	Worksheets	39 (69.64%)
	Internet/ Website	24 (42.86%)
	Innovation (Identify)	13 (23.21%)

From the table above, 94.64% or 53 students stated that Learning Plan "A Chemical Free Life" used handouts the most. A course book and worksheets were shown by 43 students (76.79%) and 39 students (69.64%) of the students answers.

Table 8 shows the measurement and evaluation of learning plan "A Chemical Free Life" are.

Table 8: Measurement and Evaluation of Learning Plan "A Chemical Free Life"

Table 8.1: Measurement and Evaluation Related to learning objectives of Learning Plan "A Chemical Free Life"

No.	Items	Learning Plan "A Chemical Free Life"
8	**Measurement and Evaluation**	
	• **Related to learning objectives**	
	Cognitive Domain	49 (87.50%)
	Psychomotor Domain	42 (75.00%)
	Affective Domain	40 (71.43%)

Concerning Table 8.1, 87.50% or 49 students determined that cognitive domain was evaluated the most in Learning Plan "A Chemical Free Life." Psychomotor domain and affective domain were next indicated by 42 students (75.00%) and 40 students (71.43%) of the students answers.

Table 8.2: Scoring Criteria of Learning Plan "A Chemical Free Life"

No.	Items	Learning Plan "A Chemical Free Life"
	• **Scoring Criteria**	
	Critical Thinking Skills	49 (87.50%)
	Communication Skills	49 (87.50%)
	Collaboration Skills	49 (87.50%)
	Performance Skills	46 (82.14%)
	Presentation Skills	36 (64.29%)
	Others (Identify)	3 (5.36%)

Pertaining to Table 8.2, the evaluation of critical thinking skills, communication skills, and collaboration skills in Learning Plan "A Chemical Free Life" were agreed by 87.50% or 49 students. Also, performance skills and presentation skills were stated by 46 students (82.14%) and 36 students (64.29%) of the students answers respectively.

Table 8.3: Evaluation Methods of Learning Plan "A Chemical Free Life"

No.	Items	Learning Plan "A Chemical Free Life"
	• **Evaluation Methods**	
	Student Self-assessment	40 (71.43%)
	Teacher Assessment	26 (46.43%)
	Teacher and Student Assessment	31 (55.36%)
	Others (Identify)	4 (7.14%)

Most of the students (71.43%) or 40 students agreed that student self-assessment was the only one evaluation method in Learning Plan "A Chemical Free Life."

Table 8.4: Quality Assessment of Learning Plan "A Chemical Free Life"

No.	Items	Learning Plan "A Chemical Free Life"
	• **Quality Assessment**	
	Exercises	48 (85.71%)
	Worksheets	50 (89.29%)
	Student Works	42 (75.00%)
	Report	17 (30.36%)
	Project	17 (30.36%)
	Portfolio	15 (26.79%)
	Others (Identify)	5 (8.93%)

According to Table 8.4, 89.29% or 50 students revealed that in Learning Plan "A Chemical Free Life", worksheets were mostly evaluated. 48 students (85.71%) and 42 students (75.00%) of the students answers pointed out that exercises and student works were next evaluated respectively.

The results from Table 1 to Table 8 are analyzed through assessment for learning with 5 variations consisting of knowledge, process, and attribute and attitude shown in Table 9.

Table 9: Assessment for Learning with 5 Variations

What to Assess	How to Assess			Who Assesses	When to Assess	Where to Assess
	Instrument	Assessing Method	Teaching Method			
Cognitive Domain (Knowledge, Comprehension) - Critical and Synthetic Thinking - Evaluation - Comparison and Contrast	- Handouts - Course book - Exercises - Worksheets	Measure Observe	- Lecture - Questions and Answers - Discussion	Student Self-assessment	While-learning	Classrooms
Psychomotor Domain (Practice, skills) - Study and Research - Applying Knowledge to Real Life - Communication Skills - Presentation Skills	- Worksheets - Products	Measure Observe Evaluate	- Discussion		After-learning	
Affective Domain (Virtue, Attitudes) - Creative Thinking and Vision - Teamwork	- Products	Measure Observe	- Student Participation	Student Self-assessment	While-learning After-learning	Classrooms

(Dechakupt, and Yindeesuk, 2014: 98-99 [in Thai])

Concerning assessment for learning with 5 variations (Dechakupt, and Yindeesuk, 2014: 98-99 [in Thai]) in Table 9, the more there were a lot of variations, the better the students learned. In this Learning Plan 1 “A Chemical Free Life”, Table 9 demonstrates that Who Assesses, Where to Assess, and When to Assess don’t have a variety of assessment methods. In Who Assesses, there should be teacher assessment, peers assessment, and teacher and student assessment. In Where to Assess, the only classroom is not enough for efficient learning. More learning resources are needed for learning efficiency. Particularly, assessment before learning should be added in When to Assess, for example, a pre-test should be put in the lesson. Therefore, students can learn more if there are a variety of people who assesses, places for assessing, and times for assessing.

5. Discussions

Regarding the results of how to improve a lesson design in STAR STEMS "A Chemical Free Life" evaluated by Matthayomsuksa 6 students, the results of the study have been discussed are as follows.

1. Related to learning objectives, learning plan "A Chemical Free Life" emphasized the head (cognitive domain) more than the heart and hand (affective and psychomotor domains). From table 2, the students would rather think than move and affective engagement (heart) was not highlighted much. The learning plan weighed in on cognitive proficiency (head).

2. From table 3, the learning plan integrated with Science based upon the reading content. Reading, critical thinking, and communicative writing were established by cognition.

3. From table 4, learning activities of this learning plan have fewer skills in practice. Most are studying, thinking, and reading activities.

4. From table 5, most teaching methods were teacher-centered. The teacher lectured the most and also asked the questions and the students answered. Student participation was to attend the class and answer the questions.

5. From table 6-7, all the activities were in the classrooms using handouts, coursebook, and worksheets. The students didn't design or invent things from other learning resources outside the classrooms. This learning plan was only designed for visual learners.

6. Because of teacher-centered approach for visual learners, there is no Situation-Based Learning: SBL showing in the lesson as reported by Kha-on (2017) in Background.

7. From table 8, measurement and evaluation were not complete. Intellectual engagement (head) was more measured and evaluated than psychomotor domain (hand) which only communicative writing was evaluated and affective domain (heart) which only paying attention to studying in the classroom was evaluated. Due to measuring and evaluating in the classroom, there was not a variety of Where to Assess. It was just evaluated from the teacher telling the answers and the students checking the answers in handouts, worksheets, and a course book in the classroom. The students' report, project, portfolio, and presentation were not performed and evaluated.

8. According to assessment for Learning with 5 Variations, what might be done is to combine a variety of Who Assesses, Where to Assess, and When to Assess.

The results of the study disclosed that learning plan "A Chemical Free Life" in STAR STEMS is a passive lecture as Utumporn Jamornman (1997) stated in her study. One thing was that following assessment for learning with 5 variations should begin before planning this lesson design in STAR STEMS "A Chemical Free Life."

6. Conclusion

Overall, Learning Plan "A Chemical Free Life" is Essentialism which is not a kind of learning by doing. For this reason, Situation-Based Learning (SBL) is not found in this lesson. This lesson; therefore, is suitable for visual and passive learners and the learning activities, the teaching methods, the learning media, and the measurement and evaluation of the learning plan are prone to cognitive mastery (head). In assessment for Learning with 5 Variations quantitatively analyzed from the students' checklist with Learning Plan "A Chemical Free Life", Who Assesses, Where to Assess, and When to Assess don't have a variety of assessment methods which a lack of it can result in reducing learning efficiency of the students. A variety of 5 variations from quantitative analysis can be vitally useful to improve a lesson design in STAR STEMS.

7. Recommendations

1. According to Discussion and Conclusion, from this kind of learning plan, a non-native English teacher can teach English based upon reading contents of Science together with Science teachers in a gifted classroom.

2. Pertaining to assessment for learning with 5 variations, a variety of people who assess can be teacher assessment, peer assessment, and student self-assessment. Also, there are schools, homes, learning centers, and relevant places as a variety of places for assessing. For When to Assess, besides while-learning and after-learning, a pre-test which is a type of pre-learning should be added in times for assessing.

3. For an example of When to Assess, in Learning Plan "A Chemical Free Life", there should be a pre-test in the reading comprehension lesson for When to Assess.

4. In Where to Assess, the students can write 50 questions on "A Chemical Free Life" for interviewing their teachers at school, their parents at home, and native speakers at tourist attractions. One example of the question is "What kind of health problems are caused by eating food which has manufactured chemicals?" and another is "Do you think people in the past ate more healthily than we do? Why? Why not?"

5. In Who Assesses, the students make a campaign poster on living a chemical free life or draw a picture of My Organic City and their posters or drawings can be assessed by their teachers, their peers, their parents, and themselves.

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Appendix

STAR STEM Evaluation Form
Learning Plan 1 Topic: A Chemical Free Life
Semester 1 Year 2017

Subject Code.....**Course**.....**Class/ Room**.....**Program**.....

Instructor..... **Foreign Language Subject Area**

No.	Items	Learning Plans											
		1	2	3	4	5	6	7	8	9	10	11	12
1	**Expected Learning Outcomes**												
	Related to learning objectives												
	Related to learning strands												
2	**Learning Objectives**												
	Cognitive Domain(Knowledge, Comprehension)												
	Psychomotor Domain (Practice, Skills)												
	Affective Domain (Virtue, Attitudes)												
3	**Learning Plan Integrated with**												
	1 or 2 subjects												
	More than 2 subjects												
	Morals, Ethics												
	Reading, Critical Thinking, Communicative Writing												
	Occupations												
	Thai Wisdom												
	Community/ Society/ Environment												
	Others (Identify)												
	Learner development activities												
4	**Learning Activities**												
	Study and Research												
	Critical and Synthetic Thinking												
	Classification and Summarization												
	Comparison and Contrast												
	Evaluation												
	Creative Thinking and Vision												
	Communication Skills												
	Relating knowledge to real-life applications												
	Teamwork												
	Practice/ Experiment												
	Report												
	Project												
	Portfolio												
	Others (Identify)												
5	**Teaching Methodology**												
	Lecture												
	Discussion												
	Demonstration												

No.	Items	Learning Plans											
		1	2	3	4	5	6	7	8	9	10	11	12
	Questions and Answers												
	Student Participation												
	Others (Identify)												
6	**Learning Resources**												
	Classroom												
	Learning Center												
	Library												
	Botanical Garden												
	Green Learning Room												
	Others (Identify)												
7	**Learning Media**												
	Coursebook												
	Handouts												
	Work Samples												
	Worksheets												
	Internet/ Website												
	Innovation (Identify)												
8	**Measurement and Evaluation**												
	• **Related to learning objectives**												
	Cognitive Domain												
	Psychomotor Domain												
	Affective Domain												
	• **Scoring Criteria**												
	Critical Thinking Skills												
	Communication Skills												
	Collaboration Skills												
	Performance Skills												
	Presentation Skills												
	Others (Identify)												
	• **Evaluation Methods**												
	Student Self-assessment												
	Teacher Assessment												
	Teacher and Student Assessment												
	Others (Identify)												
	• **Quality Assessment**												
	Exercises												
	Worksheets												
	Student Works												
	Report												
	Project												
	Portfolio												
	Others (Identify)												

Suggestions.....

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