การเรียนรู้โดยใช้ปรากฏการณ์เป็นฐาน: การบูรณาการภาษาอังกฤษในแนวทางการสอนแบบสหวิทยาการ
(Phenomenon-based Learning: Embedding English in an Interdisciplinary Teaching and Learning Approach)

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บทคัดย่อ

ในวัยเยาว์ เด็กจะเรียนรู้สิ่งต่าง ๆ ในชีวิตประจำวันจากการบูรณาการทักษะและความรู้ที่หลากหลายเข้าด้วยกัน ซึ่งเป็นวิธีการเรียนรู้ทางธรรมชาติของเด็กที่จะรวบรวมองค์ความรู้ในการส่งเสริมพัฒนาการของเขาในทุกด้าน อย่างไรก็ตาม เมื่อถึงวัยเข้ารับการศึกษาในโรงเรียน ระบบการเรียนการสอนส่วนใหญ่จะจัดในระบบการเรียนแบบแยกรายวิชา ในประเทศไทยนั้น นักเรียนในระดับการศึกษาขั้นพื้นฐานจะเรียนประมาณ 5-8 วิชาในแต่ละวัน ที่มีการจัดระบบแบบแยกรายวิชาเช่นเดียวกัน ธรรมชาติการเรียนรู้แบบแยกรายวิชาในระบบการศึกษาอาจทำให้เกิดข้อจำกัดในการเชื่อมโยงความรู้ การประสานเหตุผลองค์รวม และการบูรณาการทักษะต่าง ๆ ในการแก้ไขปัญหา บทความนี้มีวัตถุประสงค์ในการนำเสนอวิธีการเรียนการสอนโดยใช้ปรากฏการณ์เป็นฐานเพื่อส่งเสริมการบูรณาการความรู้องค์รวมและแนวทางการเรียนการสอนแบบสหวิทยาการ ในรูปแบบการเรียนการสอนนั้นจะมีการดำเนินการสำหรับผู้เรียนให้เกิดการเรียนรู้ข้ามศาสตร์จากผู้คนและแหล่งข้อมูลที่หลากหลาย และสร้างโอกาสในการเชื่อมโยงหลักการและการประยุกต์ทักษะในบริบทที่หลากหลายตามหลักการที่สำคัญของการเรียนการสอนโดยใช้ปรากฏการณ์เป็นฐาน โดยในบทความนี้จะเน้นการนำกิจกรรมเสนอแนะที่สามารถประยุกต์ใช้ในห้องเรียน และในตอนท้ายจะได้วิเคราะห์กระบวนการเรียนรู้ตามรูปแบบการเรียนรู้โดยใช้ปรากฏการณ์เป็นฐานและการสอนแบบสหวิทยาการ

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Abstract

At a young age, children learn by incorporating various skills to in their daily activities. These skills show an organic method for children to learn skills in all areas of their development. However, when considering a school education, the arrangement for learning has mostly been organized into separate subjects. In Thailand, students in basic education levels study five-to-eight disconnected subjects per day. The disconnected nature of basic education may lead students to have difficulties in transferring their knowledge to other ideas, connecting reasoning concepts, or integrating skills to solve problems. This article is purposed to present an approach known as phenomenon-based learning that helps foster whole knowledge and highlights interdisciplinary teaching and learning. In this framework, not only do learners engage their knowledge of various subjects with different people and diverse resources, but they also provided the learning opportunity to connect disciplines and develop transferable skills into diverse contexts. This article articulates five underpinning dimensions of phenomenon-based learning. It will shade light on possible practices that can be applied into a language classroom. At the end, the process of learning following the integration of phenomenon-based learning and interdisciplinary approach will be analyzed

Keywords : phenomenon, phenomenon-based learning, interdisciplinary learning, English language learning, Finnish Education

Introduction

Connecting the learned concepts from several ideas to one's experiences should be promoted since it is a natural way of learning for people. It occurs in our daily life that every new situation brings about new knowledge to associate with our existing knowledge. In the classroom, students commonly study each subject content in isolation from one another. Instead, they should be given the opportunity to study content across subject areas. The essential reason is obvious that solely one subject would not be adequate when confronting with their daily life problems or obstacles. Students will be able to achieve a course of learning successfully when multiple skills such as computing skills, language competence, technological abilities, and more. According to the National Education Act, in Chapter 4, National Education Guidelines, Section 24(4) identifies the organization of the learning process that "[e]ducational institutions and agencies concerned shall achieve, in all subjects, a

balanced integration of subject matter, integrity, values, and desirable attributes" (Office of the Prime Minister, 1999, p. 11). Therefore, learning at school should assist students to deal with those difficult situations with thorough understanding of the whole knowledge. As a matter of fact, applying the integrated knowledge should be encouraged to teach the students to visualize the learning as a whole in order to promote problem solving skills, reasoning and critical thinking skills, relationship between knowledge, practice, and affection.

This article intends to present the possibilities and feasibilities of practices to integrate language skills with subject content, and lesson learned from the practice in Finnish education known as "Phenomenon-based learning." It is inspiring to learn that students in the Finnish education system learn more with less time, stress, homework, and tests (Juusenaho, 2017). A lot of questions arise about what innovative approach could be learned from their practices that can benefit learners and other stakeholders as a whole. Regarding the background of Phenomenon-based Learning in Finland, in the 1960s, Finland's education attainment was at a very low level as only about 10 percent of the Finnish adults studied more than the required nine-year national basic education. In contrast, at present, 99 percent of young adults graduate the compulsory level (Sahlberg, 2011). Symeonidis and Schwarz (2016) state that Finland achieved the first rank of the world's best education systems by Programme for International Student Assessment (PISA) in 2000. Even though the test scores of the Finnish students have decreased in the later years, Finland still remain in the top part of the list. Sahlberg (2011, pp. 128-131, as cited in Symeonidis & Schwarz, 2016, pp. 32-33) highlights that the success of Finnish comprehensive education system lies with five main reasons: "(a) Peruskoulou – the nine-year compulsory school—offers equal educational opportunities for all; (b) teaching is an inspiring profession that attracts many young Finns; (c) Finland has a smart policy for accountability; (d) people trust schools; and (e) the Finnish education system has sustainable leadership and political stability." Finland continues developing their education system grounded on these five principles that can be catered to the needs of the learners and the community. In 2014, The Finish government renewed and reformed pre-primary and basic education levels to stay consistent with global technological changes in how children develop their information processing skills rather than just focusing on test scores (Sahlberg, 2015). Under these contexts, the Finnish education has replaced learning subject content with interdisciplinary lessons that based on phenomenon-based projects.

Several problems occurred in Thailand that should be learned and be a challenge to improve. For one thing, teaching profession in Thailand is viewed in different perspectives from Finland. Although it is the occupation of high dignity, the income for teachers in public schools in Thailand is relatively lower than average comparing to working in business sectors. It has become one of the causes of lack of teachers. For another thing, education should promote equal opportunities. Children should not be placed in different schools based on socio-economic factor. Instead, different learners coming from different families should learn together to share ideas and knowledge among them. They can learn how to live in a diverse community with respects for each other's differences of competence and learn how to help one another. Resources including human and learning devices should also be provided equally to foster learning for all children. Promoting equality can be through the increase in the cooperation between teachers from different fields and learners, and among learners and learners. Not only from Finnish education but also the global education trend, interdisciplinary approach can be beneficial in learning as a whole. Interdisciplinary approach explores a topic or an issue from multiple disciplines with the effort of integrating, analyzing, and synthesizing perspectives (Goldsmith, Hamilton, Hornsby, and Wells, 2018), concepts, ideas, methodologies (Goldsmith & Kraiger, 1996), and evaluation (Sorrentino & De Marco, 2009) to structure and conceptualize the knowledge of a more thorough understanding. It gives an opportunity for children to improve the process of learning management for critical thinking skills leading to problem-solving skills (Mathison & Freeman, 1997; Staples, 2005). Visualizing the big picture will allow learners to come up with creative variety of solution. Different practices through cooperative projects can reduce the gap of inequality while promoting learner-centeredness, essential 21st. century skills, and sustainable education for all.

The following section presents concepts of phenomenon, PhBL, and interdisciplinary approach that entail the meanings and the background of each discipline.

Determining Phenomenon (or Phenomena) and Interdisciplinary Approach

The term phenomenon is determined as a shared notion that has an association with teaching and learning. In philosophy, phenomenon is generally defined as the lived meaning of events that people experience in particular situations (Tam, 2016). In education, phenomenon is a thing appearing around us as they do (Sokolowski, 2000). It can be experienced and investigated as a specified topic or subject in a curriculum where learners

learn through or about it in ways that connect real-life situations (Symeonidis & Schwarz, 2016). Each individual can experience or perceive a phenomenon differently. For instance, Sokolowski (2000) uses the action of a salutation that is an act of an arm being moved to exemplify the perception and experience of the individuals. It illustrates that the salutation is experienced and perceived differently by the person saluting and the person being saluted. There are several studies that investigate phenomenon in the philosophical and educational realm including language awareness and competence enhancement (Marsh, Pérez, & Morales, 2019) and agroecology learning through phenomenon-based education in higher education (Østergaard, Lieblein, Breland, & Francis, 2010). Phenomenon- or phenomena-based learning (PhBL or PhenoBL) is determined as gaining knowledge or realizing facts in a holistic and cross-curricular approach. That is to say, students do not learn in a traditional way with each subject taught in isolation. Instead, they learn across subjects in interdisciplinary learning modules to understand things in the whole entities (Symeonidis & Schwarz, 2016). Learning also occurs through real-world phenomena, where leaners take active roles in creating and understanding the phenomenon with an authentic context. Moreover, they are required to seek answers for questions and solutions to problems (Valanne, Dhaheri, Kylmalahti, & Sandholm-Rangell, 2017). Overall, one can conclude that phenomenon, a term derived from Greek, refers to something obvious or an appearance of a fact or an event that is meaningful, authentic, and possibly uncommon. From that, someone can learn from experiences and the realization of that particular truth.

Interdisciplinary approach is grounded on integration of more than one disciplines to understand a particular issue for coherent framework of analysis. Valamis (2019) refers PhBL as a "learner-centered, multidisciplinary instructional approach that is based on student inquiry and problem solving" (p. 1). Some posit that multidisciplinarity and interdisciplinarity are two different terms particularly on the connection and consultation between or among disciplines (Kapila & Moher, 1995). Whereas Nancarrow, Booth, Ariss, Smith, Enderby, and Roots (2013, p. 1) found that the "terms such as interdisciplinary, interprofessional, multiprofessional, and multidisciplinary are often used interchangeably in the literature to refer to both different types of teams and different processes within them." In this article, the term interdisciplinary will be mainly used to elucidate the interrelationship across disciplines. With regard to the core principles of interdisciplinarity, Kapila and Moher (1995, p. 8) posit three Cs as—Collaboration, Cooperation, and Communication. Similarly, Styron (2013)

addresses four Cs including critical thinking, creativity, collaboration, and communication. It is agreed that learning should foster connections across subject content. The teacher should connect the classroom learning to the real-world situation. Thus, there can be more opportunities for the students to develop critical thinking skills and their creativity to solve real-world problems as well as their communication skills to get information from people in the real-world contexts for deep understanding of a particular situation. This illustrates the natural way of learning from an issue or topic of a situation that one occurrence can be viewed and examined in various perspectives. In the same way, it could be analyzed, synthesized and solved by the integrated information, ideas, and disciplines. In the classroom, the interdisciplinary education should be encouraged to become a practice for students to see one issue from different angles. Rather than limiting the learning to a single discipline, the combined subjects should be promoted for students to learn how to employ and apply multiple skills to encounter the changing situations of the present real-world contexts (Styron, 2013).

To sum up, phenomenon is an occurrence around us in our daily-life situation. The key concept is the perception and experience that each individual realizes and interprets it differently. In terms of teaching and learning, phenomenon-based learning draws the importance of realization of the real-world context to gain the holistic understanding of it from diverse perspectives. Interdisciplinary approach plays the significant role of making the connection among those multiple disciplines, which is the authentic ways of learning naturally to find logical reasoning, solve problems, and/or create innovation. These processes of learning give opportunities for all learners to develop their various skills, reduce bias, learn to accept differences in points of view.

Applying Phenomenon-based Learning and Interdisciplinary Approach into Practices

During a Finish conference in 2017 at the beginning of the educational reform, I attended a session that illustrated PhBL that presented the reforms more clearly. The main principles of the PhBL were initially stated. Then, the modern-day ideas on education were highlighted that they needed to be dependent on students' interests and related to developing skills for work. Interactions with all age-groups are necessary because they promote critical thinking skills (Gustafsson, 2017; Juusenaho, 2017). Contradictory to the traditional instruction, PhBL intends to combine multiple types of knowledge and skills from interdisciplinary learning modules that are derived from a central theme of a real-world

phenomenon such as Movies and Media, Mastering Computer Skills, My Future, Different Religious Identities and Worldviews in the Tampere Region, and Economy in Teams (Leikkanen, 2017).

The following section exemplifies practices in online course development, a weekly lesson plan, and a classroom activity that are designed in line with the dimensions of PhBL and the concept of interdisciplinary approach for English language classrooms. In designing the lesson plan, the local context is considered where the procedures involved in PhBL and interdisciplinary approach are described in each stage.

Project 1: Virtual English Exhibition (Course Development)

Theme: Virtual Exhibition for the English Language Learning

Academic disciplines: Art Education, Early Childhood Education, Elementary Education, English,Lifelong Education, Mathematics, Physics/Science, Psychology, Teaching Social Studies, Sports Science, and Educational Technology

Time: One semester (15-16 weeks)

Procedures:

A. Holisticity

1) The teacher introduces principles of PhBL and interdisciplinary approach that is grounded on Sociocultural theory, progressive inquiry learning, and problem-based learning.
2) Students work with their group to brainstorm for a phenomenon topic of their interest at present by employing the phenomenological method. They choose four content subjects that the topic is related to. Then, the English virtual exhibition for each group is outlined and planned. The lists of topical statements of their learning as follows:

    i. More than Anime: To what extent can we learn beyond only watching *the Demon Slayer Anime*?

    ii. What factors affect purchase decision via *food delivery service*?

    iii. How does *world cuisine* affect the way of people's daily life?

    iv. How do *air-purifying plants* benefit our lives?

    v. How can *online learning*'s problems be turned into the solutions?

    vi. What is the evolution of *games and education*?

    vii. How disruptive technologies affect the education sector?

viii. How can we enhance and/or develop *self-directed learning*?

B. Authenticity and contextuality

3) The teacher helps coordinate with four experts of the content subjects for each group.
4) Students make appointments to interview the experts to gather intensive and interesting information needed to correspond with the topic content.
5) Moreover, students gather additional information from other sources such as online articles, online newspapers, books, video clips, and so on. Various sources of information are purposed for reliability, validity, and a more complete content.
6) Virtual exhibition is a vague context for many students. The teacher and students learn with each other what programs can be used to create the virtual exhibition. Experts of educational online game and online presentation programs are invited to introduce and teach interesting and feasible programs. It is important to delve into those programs before producing the designed virtual exhibition.

C. Problem-based inquiry

7) Students work around the topic and the gathered information from various sources to find solutions or answers for their topic of interest. They negotiate their understanding with their teammates and analyze what information is relevant or irrelevant for the exhibition. The content is categorized, analyzed, and synthesized for four virtual exhibition rooms. It is important to group information into appropriate parts to be easy for audiences to explore.
8) Students create English language activities for each exhibition room for the audiences to learn the English language, participate, and engage in the English virtual exhibition actively.

D. Processing learning

9) Once all essential information and the program is selected, the production of each room based on the planned structure is initiated. Students learn both language and other skills through breadth and depth of learning that require them to analyze and synthesize information from different sources.
10) Students present their English virtual exhibition for the first time.
11) Each team learns to give and receive feedback from the teacher, expert, and peers from other groups.

12) Editing and revising according to the comments and feedback is a scaffolding of learning.
13) The processes of presenting, giving feedback, and editing are repeated three more times in order for each group to present the progress of their work and learning through the virtual exhibition, keep improving their thinking process, learn from others, learn to give comments and constructive feedback, and improve their innovative work. The content has been edited and the layout of each exhibition room has been improved after ongoing revision process. This process can imitate the real-life situation where work or project always needs to be adjusted and improved multiple times.
14) Not only the content but also the English language is proof-read. Students contact experts for the language edition.
15) The registration is also an add-on information that students create more tools to get the audience information.
16) Promoting the English virtual exhibition is another task before launching the exhibition to inform ways to visit the exhibition. Students exploit skills of art and technology to create advertising posters and online tools to communicate with the public.
17) Piloting the English virtual exhibition is conducted with internal groups of peers to check and recheck what might be technical problems or confusing for the audiences.
18) Visiting the English virtual exhibition can be through tour guides or by the audiences themselves. Thus, for the first option, the tour guides of each group prepare their written script and speaking skills to take the audiences around the virtual exhibition. For the second option, the audio that explain key information for each room is added into the English virtual exhibition.
19) Students launch the English virtual exhibitions through an online conference program.
20) Reflection after the English virtual exhibitions is conducted including reports of audiences' learning results and opinions towards the virtual exhibition.

According to the first project, the integration of PhBL and interdisciplinary approach were initially introduced. Phenomenological process was exploited for students to obtain the phenomenon topic they were interested in delving into. Authenticity plays the significant part

in putting students into the real learning environment including the current topic or problem and gathering knowledge from experts and other resources. Information from multiple areas was analyzed and synthesized to find the appropriate link in order to be placed in the exhibition rooms. Not only the content subjects but also multiple skills for various tasks were integrated such as note taking, online collaborative learning, negotiating, designing advertising tools, technology skills in publishing the virtual exhibition. And these learning processes were organic and trained naturally weekly. Students became familiar with different learning devices in wide aspects and led to automatically and independently employ their new skills and learning tools.

Project 2: Gift Exchange (Weekly Plans)

Theme: History of gift exchange between Thailand and another country Academic Disciplines:Social studies, English, Arts, History, Politics, Oral skills

Time: 2-3 periods/week

Procedures:

Holisticity:- Creating a poll

1. Students are divided into several teams and asked to conduct a poll to find out about what gifts foreigners want at present. For this, students should make a list of relevant questions to ask the participants.
2. Students present the facts collected from the polls to the class in English.

Contextuality:- Making a story timeline of a cultural gift exchange

3. Students watch a cultural film or read a written text of a gift exchange between Thailand and USA in the past. Materials are in English and Thai.
4. Students choose a foreign country that has exchanged gift with Thailand to study about its historical culture of gift exchange.
5. They take different roles to search for information about different aspects of the gift exchange between Thailand and that foreign country from online or offline resources, for example, interviewing Thais and foreigners, reading texts, sources from the Internet.
6. Make a story timeline to display how the gift had been exchanged between Thailand and the assigned foreign country.

7. Present the cultural aspects of the gift exchange between Thailand and the foreign country. List vocabulary of the foreign language they learn.

Problem-based Inquiry learning and Learning process:- Creating a gift

8. Students are asked to answer a question, “If you had to give a gift to a foreigner, what gift would you create and for what purpose or occasion you would give it?”
9. Based on the information from the poll (the holistic stage), students adjust or modify the gift to be proper for giving it to the foreigner of their assigned country.
10. Based on the cultural information from the story timeline (the contextuality stage), students assign meaning for the gift that they create associated with the appropriate cultural aspects and/or occasion.
11. Students make a prototype, which can be from any materials such as toys, clay, dough, realia, etc. Present their prototype gift in English.
12. Students collect feedback for improvement from teachers of different subjects, experts in the fields, parents, older adults, peers, and related people.

Extension—Authenticity:- Making the actual gift

13. Students present their actual gifts created and modified from the original prototype in English language in the following class.
14. Students give the presenters feedback about the content and the presentation skills. The presenters submit the self-reflection and peer-assessment reports.

This suggested lesson can be elucidated in the PhBL and Interdisciplinary dimensions as follows:

To begin with holisticity, students can simply determine the topic of study. The information is not from their personal presumption, instead collected from facts derived from people’s life experiences from different resources. Polls can be created digitally. So, they could develop subject content, technological, and language skills simultaneously. Next, in the stage of contextuality, students are assigned to construct knowledge from what is far from their familiar contexts. Authentic instruments such as video clips or reading texts from reliable sources can be used. The following stage include problem-based inquiry learning and learning process because both intertwine in working around the assignment. The students can also find assistance and guidance from teachers and the more knowledgeable others throughout the task. They will incorporate with authentic tools and multiple skills to create a prototype of a

gift for their foreign friends. They need to create their gift based on the knowledge and principles or concepts learned from the previous stages. The whole process intrigues them to learn the phenomenon of gift exchange in breadth and depth by enhancing multiple skills organically and simultaneously. The plans require collaboration from many people including the Thai and foreign participants that they need to communicate to their network. To analyze various sources, students develop their critical thinking skills to find connection among all content information as well as cultural aspects and make them relevant and meaningful to their understanding.

Project 3: Cell phone (classroom activity)

Theme: An ideal cell phone for learning a foreign languageAcademic disciplines: English, Technology, Mathematics, Art, Oral skills (optional)

Time: 60 minutes

Procedures:

A. Introducing a holistic and authentic theme of a phenomenon

1) The teacher introduces the content of the topic for today including themes, sub-themes, and assignments.

B. Posing inquiry questions, problems, or scenarios

2) The teacher presents problems of foreign language learning.
3) The teacher poses a question to the class, “To use technology to help learn a foreign language in the class, what an ideal cell phone could you create? In creating an ideal cell phone for learning a foreign language, students need to consider that it can cope the problems and has proper specification in terms of network, display, memory, camera, sound, battery, and price. Further related specifications can be suggested.

C. Constructing vague contextuality from different authentic perspectives and tools

4) Students work in teams and assign the roles for the team members. In each team, make three sub-team. Sub-team one, list out the problems that they want to solve, and specify existing contexts and the vague ones for them on a given flipchart paper. Sub-team two interview language teachers. Sub-team three search for information from the Internet.

D. Processing learning through collaboration

5) Students analyze the information collected from different perspectives.

6) Work around the theories and the collected information to create the ideal cell phone use for learning.
7) Students present their ideal cell phone created in English.
8) Peers listening to the presentation write comments on what they like and what can be improved. Students presenting the project collect all comments and submit them with their self-reflection report.

The above example activity can be analyzed that, firstly, holisticity is introduced in the entity of cell phone phenomenon. Students need to find facts that the teacher poses on problem-based inquiry regarding the creation of an ideal cell phone to assist learning a foreign language. As per contextuality, students are assigned to construct their knowledge around the theories from ambiguous contextuality. To elaborate, they receive brief and vague information from only one source. In this way, students may lead their knowledge and skills from some unclear information to the known one. According to the learning process, students gather information and create the ideal cell phone for learning a foreign language by working with their teammates and other language teachers. Students can learn from peer assistance and meaningful negotiation that scaffold their knowledge and understanding. They can also consult their teachers or other experts during the process. Authenticity can be seen throughout the activity in aspects of authentic theme, various learning tools, experts, and community in order to solve authentic situation. Collaboration with different people are found. The lesson directly shows the instructions for students to create an ideal cell phone, which illustrate ways to bring about their creativity based on various sources of information promoting not only critical thinking skills but also skills from other disciplines.

PhBL and Interdisciplinary Approach for Classroom Learning

Specific to the educational reforms in Finland, PhBL is applied to classroom teaching at all levels throughout the country. PhBL is grounded in the concept of holistic knowledge building especially when finding solutions to a problem. Interdisciplinary approach views similarly that there is no one best method in teaching yet rather eclectic. It is that multiple disciplines offer virtue of authentic learning to develop multiple skills suitable for learners in the 21st century for the real-world situations. Both ways of teaching and learning are underpinned by theories and learning models leading to the language classroom practices.

Grounded Theories and Pedagogical Models

According to Silander (2015a, as cited in Symeonidis & Schwarz, 2016), Ültanır (2012), and Valamis (2019), PhBL and interdisciplinary approach are commonly grounded in constructivism, progressive inquiry learning, and problem-based learning. These processes require a team of learners and other stakeholders to construct meaningful learning from individual's information relevant to social contexts.

Vygotsky's (1987) constructivism perspective highlights social interaction, cultural factors, contexts, and cognitive development in language. That is to say, learning is developed by the process of the learner's internalization of what occurs from the social interaction of external mediations including diverse community, cultures, human supports, learning materials, artefacts, and many more to scaffold learning. In their earlier years, children use non-verbal communication to convey their thoughts. After interacting with other people and searching for various sources of information, their private speech is constructed and transformed into verbal thinking, which is articulated by language to represent their thoughts. Besides, Cook (2000) cites the Vygotskian learning theory and variable competence models in aspect of children's play that it is displayed as a phenomenon of child's learning and development. Children learn the whole knowledge by interacting with adults and authentic objects like toys. They construct and reconstruct their understanding while playing around them. They shape new knowledge along with transferrable multiple skills by moving from the actual toward the potential developmental levels in the individual's zone of proximal development.

Another fundamental learning model is progressive inquiry developed by Kai Hakkarainnen and his team, the University of Helsinki, as "the sustained processes of advancing and building of knowledge characteristic to scientific inquiry" (Muukkonen et al., 1999, p. 2 as cited in Symeonidis & Schwarz, 2016, p. 38). It focuses on the learning process that students are engaged with questions and answers with explanation about them. And, this process illustrates the procedures of a research study. The first step is to create assumption of the new knowledge by posing research questions, finding support from theories, and conducting deep inquiry referring to the search for new information that becomes a gradual steppingstone toward the answers of the research questions.

According to problem-based learning, learners construct knowledge and strategies through the process of solving problems, especially from the real-world, by using experiential

learning. Learners are encouraged to cultivate active, flexible, and spontaneous learning to search for academic information. They learn with their peers to carefully consider the inquiries that are vague and negotiable. Learning and communication skills occur during the process as they need to discuss, state the results, draw conclusions, express their opinions of the learning process experience (Nguyen, 2018). It is important that the problem is ambiguous as it requires collaboration to encounter a complex and unclear context to handle, manage, and untangle the problems from their factual experience along with conceptual theories.

PhBL starts with selecting the phenomenon of the learner's interest. It is interesting that one phenomenon includes a lot of possible aspects to study. The learner can specify the scope of learning to the question s/he wants to search into details. The problem-based learning plays the important role of the learning process. Interdisciplinary plays the main roles of integrating different types of knowledge, skills, information from various sources and learning devices. Both offer students to foster their authentic and capabilities for one's learning. Normally, teachers are told to make everything clear for the learner to learn things. On the contrary, PhBL and interdisciplinary approach intrigue the learners to learn from questions or vague situations that requires findings for explanations from multiple resources. During the process of exploration, s/he may come across other information that scaffold their learning in various aspects. What is focus can be extended both in depth and in breadth, which is supported by progressive inquiry and constructivism framework. Comparing to the traditional method of learning, teacher is the center of learning that provide clear information. The learners take the main role of remembering what the teacher says, which is opposite to PhBL allowing the learner to have direct experience through exploring process. Interdisciplinarity clearly promotes learning from different perspectives and distils the information to conclude their understanding from various kinds of knowledge. Therefore, the integration of PhBL and interdisciplinary approach is ensured to benefit today's education as the students learn through the interactive learning process of the big picture and analysis to the smaller parts and vice versa.

Dimensions of Phenomenon-based Learning

Five main dimensions of PhBL are worth discussing. It involves holisticity, authenticity, contextuality, problem-based inquiry learning, and learning process (Silander, 2015b).

Firstly, as for holisticity or a holistic approach, Silander (2015b) presents the topics of phenomena and the real-world context that must be holistic. It is the work of team teaching.

Holisticity is articulated as the multidisciplinary environment that learners learn to find out the facts and truths of current events systematically and comprehensively. Valanne et al. (2017) specify that studying of the entire entity of a phenomenon allow learners to study across subjects so that the whole skills, abilities, and information are required and linked.

Next is authenticity, which refers to the use of real tools, methods, materials, theories, information, people like experts and professionals, and the environment. These authentic tools and processes are significant to assist learners to solve problems in real-world situations using real culture and practicing in a real community rather than being in a traditional classroom. Valanne et al. (2017) add that authenticity in the overall learning process is not limited to a conventional set of rules.

Another dimension is contextuality. It refers to the holistic setting and context that can be vague and ambiguous. Commonly, learners are required to pose their questions and construct knowledge around theories and hypotheses from different perspectives for their learning process. Related to authenticity, tasks and tools are also learning contexts that are natural and meaningful for them to foster awareness and spontaneity of their learning in wide contexts.

Problem-based inquiry learning refers to the way to work around questions posed by the teacher to find solutions. Learners take control of their own learning by negotiating to set the main goal. They connect theories and apply them in practical situations or phenomena that are relevant to them. Moreover, they need to be engaged with various teachers from different subjects to design their instructional practice. Then, evaluation is used as a tool for self-analysis. Valanne et al. (2017) advance that problem-based inquiry learning benefits learners' creativity and critical thinking skills for an innovation.

Lastly, learning process focuses on deep learning and how to acquire new information. New information can be found during the learning situations, which can be derived from theories or practices. Learners learn to be aware of and plan for their learning by individually and collaboratively with others to scaffold the existing information to the new one. Valanne et al. (2017) emphasize that collaborative work can be successful when considering the learning qualities such as interdependence, accountability, supportive interaction, interpersonal skills, leadership, and trustworthy atmosphere. As for teachers, they can guide, facilitate, and motivate learners to identify problems and come up with solutions through holistic tasks and situations instead of feeding knowledge or facts (Silander, 2015b).

The teaching team should also work collaboratively in planning methods, time, and other resources. The collaboration can be divided into three levels. Firstly, the district-level planning aims for staff development where teachers are supported by resources and design in a broad sense of the whole district. Building-level planning refers to designing short-term and long-term instructional plans by the group of administrators collaboratively. Lastly, classroom-level planning is the collaborative team of co-teachers who work together to establish mutual understanding on teaching and evaluation, relationships, and communication (Walther-Thomas, Bryant, & Sue, 1966, as cited in Valanne et al., 2017).

To conclude, PhBL can be characterized by several dimensions. The important point is that this approach requires a collaborative work between teachers and students. In this way, it promotes learner-centeredness where students play important role to instruct and construct their learning from holistic and real-world phenomena. Team teachers are encouraged in PhBL to bridge the gaps between subjects (Al Kilani, 2016 as cited in Valanne et al., 2017). They also facilitate their learning physically and emotionally along the way when they encounter difficulties.

Steps in implementing interdisciplinary approach

Goldsmith et al. (2018) present six key steps to implement interdisciplinary classroom including pre-instructional planning, introduce the methodology to students, take it to the classroom, practice interdisciplinary thinking, provide feedback, and assessment. According to the examples showed in the three aforementioned practices, steps two and three were combined to introduce the methodology in the classroom along with the hands-on experience during lectures. Step six has adjusted to reflect and report learning. Similar to assessment, self-evaluation is structured with the addition of peer- and the teacher-assessment. In this section, the adapted five key steps are explained.

Step one, pre-instructional planning—It is important to cooperate with experts from other disciplines and set up a team to discuss the content, clarify scope, goals and objectives of the work, negotiate understanding with all stakeholders, discuss roles of each individuals, and schedule time of the implementation. The plans for the course development, weekly plans, or a lesson plan should be developed at this stage to outline the entire pictures of learning nature.

Step two, introduce the methodology to students—interdisciplinary approach can be new ways of teaching and learning for the colleague teachers and a lot of students. This step

allows all stakeholders to get into the same pace of understandings of the objectives of the approach, its framework, and key roles of each one. The teacher needs to model the implementation using hands-on practice, so students can directly experience the processes of acquiring the topic, asking questions, shaping up their understanding, working with team. The teacher takes the integrated roles of teacher and facilitator. As the team set up, the teacher should learn from the students what they want to explore and may invite guest experts or organize a workshop (Nancarrow et al., 2013). In this step, Repko & Welch (2005) suggest sub-nine steps of preparation including define problem, present rationale, identify disciplines, conduct a literature review, develop a command of each relevant discipline, study the problem, identify conflicts and insights from each discipline, create framework, and combine disciplinary insights.

Step three, practice interdisciplinary thinking—students working with their team to apply what they learn incorporate with their questions or project. They gather information, bring it to discuss, analyze, synthesize, reflect, adjust, integrate, and other learning process. Critical thinking skills and creativity are fostered throughout the process. Students can be assigned to use different technique to gather information, to talk to many people to learn different viewpoints, to discuss with the team for the analyzed findings, answers, or solutions. Then, they will be presented at this step.

Step four, provide feedback—not only the content but also learning process and strategies should also be provided. Feedback can be from the teacher, the experts in the field, other stakeholders, and peers. The teacher can emphasize on constructive feedback that is helpful, positive, and efficient for goal achievement. Steps three and four are recommended to set back and forth for the better dynamic learning.

Step five, reflect and report learning—after the finished project or task is presented, students should be allowed to reflect what they learn in aspects of the content or solutions that answer the topical questions and the skills they have improved such as language, social, and technological skills. Besides, teacher can guide their awareness on how they learn, different processes of learning, strategies used during the project implementation. The reflection can be reported in both oral and written construct.

Caveats

- It can be difficult to set up a team that recruits members from different fields. The hard work can be on the lead teacher in the first step where s/he needs to collaborate with all stakeholders in different time manners. It is suggested to allow enough time for the planning stage before the teaching hours.

- Time consuming is another issue for teaching PhBL and interdisciplinary approach. The teacher should prepare extra hours outside of the class to give consultation. During gathering information, analyzing, synthesizing, students commonly have questions and request guidance to which direction they will take. The new process of learning can be confusing for the most students who never experience these ways of learning (Newell, 1994). Orientation, consultation and feedbacks become the key ongoing processes that facilitate and scaffold students' learning.

- Problem is encouraged to pose as the topic statement as the start of search for the results, solutions, or simply answers. It can be learned from the examples above that PhBL and interdisciplinary approach are grounded on the scientific process of learning that you want to seek for understanding in depth and depth of a particular phenomenon (Kubat, 2020). The topic and processes of learning can be initiated by the students themselves, which is the main aim for learner-centeredness leading to autonomous learning. They are encouraged to be critical over different issues that are found in genuine sources such as news, social media, and so on.

- These alternative teaching and learning approaches contain various different steps from the traditional instruction. Students are not evaluated by examination but alternative authentic assessments. They are not instructed to follow only one textbook. The teacher should be prepared and allow time to study and plan before the beginning of the course or the lesson.

Conclusion

In order to comprehend someone or some event, one piece of information cannot provide a person with comprehensive knowledge of a topic. In the same way, PhBL is an instructional approach that allows learners to gain entire knowledge in a broad and deep form, which is a key notion of interdisciplinary learning. The main dimensions display the underpinning qualities of learning and the nature of gaining knowledge about a particular phenomenon. Learners construct their knowledge from a holistic theme about the

phenomenon, authentic materials and experts, ambiguous contexts, problem-based inquiry situations, and the collaborative learning process (Silander, 2015b). Integrated with interdisciplinary approach, not only learners' creativity and critical thinking skills can be enhanced, learning process by exploring the facts for problem-solutions through different perspectives is also evident of the foundation of an innovation (Styron, 2013; Valanne et al., 2017). PhBL and interdisciplinarity also reflects the genuine practice of learner-centeredness that pinpoints the active roles of learners for their own learning. Teachers across subjects take challenging roles to guide, facilitate, and motivate the students' learning, and foresee the suitable learning strategies and tools. Last but not least, this article suggests the activities and the lesson plans based on the lessons learned from Finnish education system and classroom practices to exemplify how PhBL and interdisciplinary approach can be applied into practice. These approaches, therefore, should be taken into account to reveal a new face of an alternative classroom teaching and learning approach, as it highlights the entity of knowledge construction from the true nature of learning and the fact of meaningful contexts and students' real-world experiences.

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