

# Designing and Organising Experiential Learning Activities in Math Teaching at Secondary School in Northwestern Viet Nam

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Received: 10 Oct 2021

Revised: 16 Dec 2021

Accepted: 22 Dec 2021

**Abstract:** Experiential learning (EL) has always been an appealing research topic among educators. In Viet Nam's 2018 General Education Program, EL is included as compulsory educational activities with a specific time allowance in every subject. This article presents a procedure to design and organise Experiential learning activities (ELA) in teaching Math at secondary school. The proposed ELA procedure is adapted from David Kolb's experiential learning cycle with several modifications in accordance with local students' characteristics. The findings show that learners were capable of constructing the concept of 'percentage' through ELA by examining and evaluating local produce prices before and after the Covid-19 pandemic (in Son La province). It is shown that organising realistic ELA promote the initiative and enthusiasm of minority ethnic students in mountainous Northern areas in learning, to eventually construct new math knowledge and develop communicational competencies.

**Keywords:** Experiential activities, Kolb's experiential learning cycle; math teaching; percentage; Northwestern Viet Nam.

## 1. Introduction

On the 26<sup>th</sup> December, 2018, Vietnam Ministry of Education and Training (VMET) issued the new General Education Program including the global curriculum and 27 subject syllabi and educational activities (VMET, 2018a, b). Experiential learning activities (ELA), as a highlight of the GEP, is defined as educational activities oriented, designed and instructed by educators to create opportunities for learners to approach practice, experience positive emotions, exploit prior experiences and mobilise interdisciplinary knowledge and skills to fulfil assigned tasks or solve age-based practical problems at school, in the family and society; thereby transforming the previous experiences into new knowledge and skills to ultimately enhance learners' potential creativity and adaptability to their future life, environment and career. It is also asserted that ELA are compulsory, accounting for 105 periods of the curriculum which can be conducted either integrated to different subjects or separately. (VMET, 2018b)

Despite the inclusion of the guidelines and recommendations for ELA educational methods and organising approaches in the 2018 GEP, ELA designing is still a demanding task for most teachers due to its novelty in the teaching practice (Dao & Nguyen, 2018; Le, 2018).

Dewey argued that education should be conceptualized and operated as a process of continual reproduction of experience through physical interaction with the physical and social world and then transformed into reflective thought and learning (Dewey, 1938). This implies that learning is an active and constructive process in which learners engage in shared activities by considering each other's tools, materials, ideas, and capabilities. According to Dewey, this can be done in classrooms that foster independence, cooperation, democracy, cognitive conflict, real-life experience, and reflection. Dewey's philosophy played an important role in shaping a unique and historical perspective on learning and development, known as experiential learning (Kolb 1984; Kolb and Fry 1975). Experiential learning views learning as a process that is constructed and transformed through systematic reflection of experience.

Ideas about experiential learning had been mentioned a long time before David A. Kolb presented the experiential learning cycle in 1984 to mark an important milestone in organising learning activities (Kolb, 1984). Specifically, EL emphasizes the learner's initiative, enthusiasm, personal experience and interaction with the environment. Consequently, EL can promote learners' competency development. Experiential learning is defined as the process by which knowledge is constructed through the transformation of experience, which is the result of a combination of capturing and transforming experience (Laura et al., 2016).

Experiential learning will help students better understand the world when combined with critical thinking approaches (Petkus, 2000) by involving learning from experience or learning by doing (Dewey, 1938). Researchers have shown that students' past experiences, inside or outside the classroom, are prominent in the learning process, and they learn most effectively when they are in direct encounter with the phenomenon being studied instead of just thinking about the encounter or just considering the possibility of doing something about it" (Borzak, 1981, Laura, 2016).

Viet Nam's Northwestern region, Centrals Highlands and Southwestern region, home to many minority ethnic groups, are disadvantaged areas in terms of economic and geographical conditions, yet play a critical role in the national development (Dang, 2020). The local teachers and students generally encounter manifold challenges in teaching and learning, especially the teachers in the Northwestern region with distinct disadvantages (Dang, 2020, Thanh, 2019). Therefore, it is essential to design ELA in Math teaching in particular and all school subjects in general for Northwestern learners in order to, first and foremost, facilitate teachers' successful implementation of the new GEP.

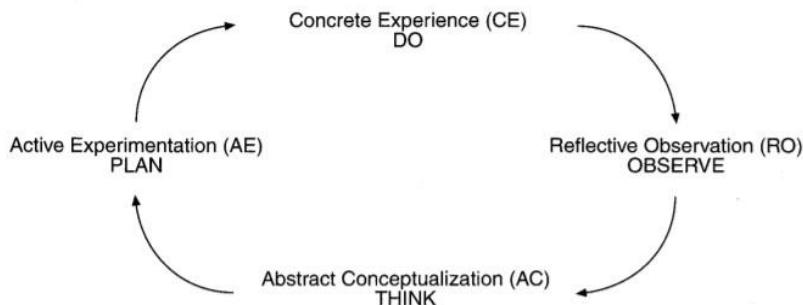
This research reviews the psychological and cognitive characteristics of secondary school students in the Northwestern region in Viet Nam and presents the experiential learning cycle of David A. Kolb as the framework to design and organize ELA for learning in Math teaching. Then, the preliminary procedure and findings applied for a pilot group are presented and evaluated to propose some implications for the appropriate ELA implementation with learners in the mountainous Northwestern region of Viet Nam as well as disadvantaged learners regarding languages and cultural environment.

## 2. Experiential Learning Cycle

In the world, education based on learners' background experiences has been studied by many psychologists and educators such as John Dewey, Kurt Lewin, Jean Piaget, etc. (Reijo, 2000). Influenced and inspired by these previous research on experiential learning, David Kolb introduced the Experiential learning theory in his 1984 publication

(Kolb, 1984). Kolb's EL theory has been recognised as an effective learning approach to develop learners' competencies and widely applied in plentiful countries across the globe at various levels, ranging from primary to tertiary education (Mick Healey & Alan Jenkins; 2000; Reijo, 2000; Andrea E. Weinberg et al., 2011; Mutmainah et al., 2019).

According to David Kolb, learning is the process of constructing knowledge through the transformation of the experience of the perceiver (Kolb, 1984). Kolb's four-stage model is a learning cycle that shows how experience is translated through reflection into concepts, which in turn are used as guides for active experimentation and the choice of new experiences (Mick Healey & Alan Jenkins; 2000). Kolb refers to these four stages as concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE). They follow each other in a cycle (Figure 1). Moreover, this cycle may be entered at any point, but the stages should be followed in sequence. Learners should go through the cycle several times, so it may best be thought of as a spiral of cycles. It is important to experience all four phases of the cycle in order to maximise learning.



**Figure 1. Kolb's experiential learning cycle (based on Jenkins (1998, p. 43)**

The four stages of EL operate in a continuous spiral cycle. The key idea in Kolb's EL theory highlights the learners' much-needed reflection, which means one's revisiting and analysis of his own existing experiences to generalize and formulate them to create concepts which, in turn, are applied and verified in practice. These newly-created experiences, then, serve as the input for the following learning cycle, until the learning objectives are achieved. In other words, EL is the formation of new experiences through the interaction between existing experiences and newly-perceived pieces of knowledge, thanks to the subject's reflection in a closed cycle.

Weinberg et al. (2011) pointed out that learning motivation is boosted by math and science experiential learning activities. Mutmainah et al. (2019) indicated that the experiential learning-based teaching material in Mathematics is effective to improve the student's Mathematics cognitive ability. There were several preliminary studies on organising experiential theme-based teaching (Tuong, et al., 2017) and organising ELA in Math teaching (Le, 2018). However, in no studies has the situation of organising ELA in the Northwestern region of Viet Nam been mentioned yet. These local learners also require suitable approaches of organising learning activities due to their specific cognitive characteristics, linguistic competency (Vietnamese language), thinking, lifestyles, and cultural attributes.

### 3. Methodology

Methodology regarded mixed methods. The study aimed to clarity enhancing Vietnamese teachers to design and organise experiential learning activities (ELA) in teaching Math at secondary schools. The study consists of two phases including 1) situation of implementing ELA in Math teaching and 2) teachers' designing and organizing ELA in teaching math at secondary schools.

### 3.1 Situation of implementing ELA in Math teaching

#### *Participants*

Participants included 90 secondary Vietnamese school teachers who were teaching mathematics in northwestern secondary schools in provinces of Son La, Dien Bien, and Lai Chau.

#### *Data collection and analysis*

To evaluate the situation of implementing ELA in Math teaching at Northwestern secondary schools, the participants completed the questionnaire of situation of ELA in math teaching. The questionnaire provided 10 questions to represent the strength and weakness of ELA in math teaching. The data was analyzed by descriptive statistics.

### 3.2 Enhancing teachers' designing and organizing ELA in teaching math at secondary schools.

#### *Participants*

Participants included 14 key teachers in provinces of Son La, Dien Bien, and Lai Chau. The key teachers referred to competent teachers who are appointed as trainers in the local teacher training programs at district level.

#### *Data collection and analysis*

In order to clarify how teacher design and organize ELA in teaching math at secondary schools, the participants were interviewed on their experience in designing and organizing ELA in teaching math. The interviewing was asked about procedure of designing lesson plans and details of ELA used in math teaching. Then, data was categorized procedure of designing lesson plans and highlighted the learning activities of ELA in math teaching.

## 4. Findings

The findings revealed Vietnamese teachers' designing and organising experiential learning activities (ELA) in teaching math at secondary schools. These issues included 1) Situation of organising ELA in Northwestern of Viet Nam, 2) Procedure of designing ELA in Math teaching, and 3) example of designing and implementing ELA in math teaching.

### 4.1 Situation of organising ELA in Northwestern of Viet Nam

Secondary school years witness the transition from naïve and carefree primary school children to almost grown-up young adults, which is a critical stage in one's psychological development. In this period, students are appealed to the self-monitoring activities organised by the class and school as well as complicated learning materials and capable of self-designing cognitive activities beyond the school's level (Vo, 2015). Therefore, organising experiential activities outside school can provide good opportunities for students to engage more actively in learning and to prove themselves. Yet, students are unable to master the implementing approaches and forms of the new learning activities (Vo, 2015).

A learner's intellectual and emotional development is driven by the ethnic culture to which they belong (Martí-Vilar et al., 2019). Due to the distinctive social and cultural environment, students in northwestern Viet Nam possess unique learning styles and cognitive characteristics apart from the general attributes of this age group. As the primary languages used in their families and villages are minority local ones rather than Vietnamese, these students' Vietnamese vocabulary is limited, creating language and communication barriers in their learning. The linguistic incompetence also impede their cognitive processes due to difficulties in expressing and understanding scientific

concepts. These students generally either are inferior to or achieve poorer academic performance than their peers in the plains (Anh, 2021; Phuong, 2021).

Situation of implementing ELA in Math teaching at Northwestern secondary schools could be showed in the table 1.

Table 1: Situation of organising ELA in Northwestern area in Viet Nam

No	Statement	Result (%)
1	I myself research and initially implement ELA in my teaching practice.	100%
2	I haven't been trained on designing and organising ELA in Math teaching.	100%
3	I usually organise ELA for my students, mainly in the form of Math games.	36,67%
4	I agree that there are manifold difficulties and limitations in organising ELA for my students.	100%
5	It is time-consuming for me to prepare and organise ELA.	66,67%
6	I lack financial resources to organise ELA for my students.	43,33%
7	It is difficult for me to manage my students when organising ELA.	30%
8	I have difficulties in evaluating my learners' competencies when implementing ELA.	30%
10	I frequently implement ELA closely relevant to learner's real life (in the mountainous Northwestern region).	13,33%

Thus, the initial findings imply that Math teachers in the Northwestern area face various difficulties and limitations in designing and organising ELA in their classes. The content and form of ELA previously conducted are not diverse and connected to learners' real life in the region. The majority of participating teachers encounter difficulties in designing and organising ELA in teaching, including Math teaching.

#### 4.2 Procedure of designing ELA in Math teaching

Based on the practice and teacher's survey results, the researchers, together with 14 key teachers and the research group devised a three-stage procedure which consists of 8 steps to design and organise ELA in Math teaching as showed in the table 2.

Table 2: Procedure of designing ELA in Math teaching

Stage	Step	Notice
<b>Stage 1: Creating a plan to organise ELA</b>	<i>Step 1: Determining teaching contents and objectives</i>	Teachers should select the contents suitable with learners' capacities, demands, background knowledge, social background and real life, etc. in the mountainous region; and practical conditions of the school. For instance: Collect the prices of local produce before and after the outbreak of covid-19 pandemic. Then, give comments on the influences of the pandemic on produce prices; Examine and calculate the percentage increases and decreases in the price of a product or a manufacturing and sales plan of a local collective, etc. When identifying the objective, it is advisable to take into consideration the learner's cognitive level and relevant conditions as well as the school' specific context. For example, in case of learners in the mountainous areas, the objective 'can creatively apply certain Math knowledge to solve a problem' should be accordingly adjusted as 'can apply the learnt knowledge to solve a problem'.

Table 2 (Cont')

Stage	Step	Notice
	<i>Step 2: Determining the form of organising ELA</i>	It's better to focus more on home practice and projects (small-scaled ones), which can encourage students to communicate, cooperate and interact with the outside world; learn how to create a plan to fulfill learning tasks and proposed problems. Consequently, learners have more opportunities to develop their linguistic, communicational and collaborational competencies, while boosting their self-confidence and initiatives.
	<i>Step 3: Designing ELA using David A. Kolb's four stage cycle</i>	In designing ELA, it is advised that teachers employ scaffolding technique to divide the activities into smaller chunks, together with detailed and specific instructions to support learners' engagement, especially with new activities.
	<i>Step 4: Developing criteria and tools for learner assessment and evaluation</i>	In case of mountainous students, it is important to evaluate learners' competencies of collaboration and communication in the process of problem solving, together with their Math competency. Teachers also need to employ formative assessment throughout the problem solving process and concentrate on their processed progresses to evaluate their level of task completion. Students' self-assessment and peer-assessment within and between groups should also be encouraged.
<b>Stage 2: Organising ELA</b>	<i>Step 5: Reviewing relevant Math knowledge to prepare for potential use during the experiential process</i>	As it is common for students in the mountainous Northwestern region to be forgetful and uncertain of the learnt knowledge, it is important that teachers revise and systematise the relevant basic Math knowledge prior to the ELA or any Cognitive activities. This would facilitate learners to recall and apply the knowledge into the ELA. Teachers can decide the extent of knowledge revision or ELA preparatory activities based on the contents and requirements of the ELA as well as learners' levels.
	<i>Step 6: Organising ELA using David A. Kolb's four stage cycle</i>	As for mountainous students, teachers need to assign specific tasks to each individual learner and each group with meticulous and relevant instructions and consultation. The guidances and suggestions should be in question forms which strictly follow the implementation process to support learners to successfully solve the problem and develop a process to tackle similar tasks. As a result, learners can handle future tasks with greater autonomy and less teachers' support. Also, teachers need to mold learner's word choice and language expressions to develop their linguistic competency. In the CE stage: students are required to work in small groups, conduct the activities and interact with surroundings to complete the learning tasks. In the RO stage: learners collect and process the data to gain a better insight into the issue and partly complete the task. In the AC stage: Learners construct the new concepts and are appointed to present the new concepts, new rules, etc. based on the experiential process and results. In the AE stage: Learners apply the learnt knowledge and principles to solve similar problems and questions.

Table 2 (Cont')

Stage	Step	Notice
<b>Stage 3: Evaluation after the experiential process</b>	<i>Step 7: Analysing and Evaluating learning process and outcomes</i>	Based on learners' outcomes, teachers' processive obsevations and facilitations together with the results of learners' self-assessment and peer-assessment, teachers make objective and precise judgements and evaluation. The assessment of mountainous learners require special attention to the capacities to grasp the knowledge, express their ideas and their progress throughout the whole process rather than merely the acquired knowledge and approaches of acccomplishing the tasks. It is important to acknowledge even minor progress of learners to provide timely encouragement and support in order to promote their self-confidence and engagement in learning. Through assessment and self-assessment activities, teachers need to aim to help students adjust their knowledge and towards the practice of corresponding skills.
	<i>Step 8: Analysing and evaluating designed lesson plans to draw experience lessons and adjust current lesson plans and others.</i>	Revising the whole process of ELA, from designing, implementing to the strengths and weaknesses, limitations, difficulties, appropriateness or points for improvements from teachers and learners' perspective to achieve greater results in future activities.

Based on the aforementioned procedure, the researchers and the 14 key teachers developed and implemented a plan to organise ELA. In order to visualize what and how the ELA math teaching was developed and implemented through 8 steps of teaching as showed in the table 2, next section will provide an example of Grade 6 ELA math teaching in concept of percentage.

#### 4.3 Example of designing and implementing ELA in math teaching

This section showed the case of Grade 6 ELA teaching and learning about the concept of percentage. Each stage of teaching and learning will be clarified as following.

##### *Stage 1: Creating a plan to organise ELA*

Step 1: Designing the lesson plan for Lesson 'Percentage' (second term, Math subject, grade 6, after Lesson 16: Identifying ratio of two numbers, until the completion of Lesson 17: Percentage Chart (Grade 6 Math textbook, second volume).

Local context: Due to the complicated development of the Covid-19 pandemic, various social distancing measures have been taken in the selected areas, which has negatively influenced the local consumption in general, including local produce demand. Consequently, the prices of local produced have been greatly affected. As local farmers, most students' families would experience hardship due to the fluctuations in produce prices. Therefore, the local students would find the experiential activities topical and relevant to their own life.

Due to the low population density, less trade interaction, along with the initiative and strong in epidemic prevention, in general, in many northern mountainous provinces, Vietnam, schools and students are not severely affected by the pandemic. The economic influence is certainly there, but it is also less than that of provinces in other regions.

Lower secondary schools in the area with a high percentage of ethnic minority students. The ability to communicate in Vietnamese is generally low. They also have a lot of difficulties in math. Many of student might consider slow learners in Math. Another fact is, many junior high school students in general do not go to the market, do not care or know about the prices of local agricultural products.

These theme-based lessons offer students the opportunities to examine the concept of percentage, mathematical statistics and application to solve practical problems; raise their social awareness, evoke sympathy for local farmers' struggles; and exercise the communicating and collaborating skills to tackle problems in learning as well as in real life. To be specific, In terms of knowledge, students are able to calculate and perceive the meaning of percentage; In terms of skills: students are able to collect and categorise data; calculate the percentage differences in produce prices (before and after the Covid-19 pandemic) based on the collected figures; evaluate the impacts of the Covid-19 pandemic on local produce prices; In terms of attitude: students are able to recognise the applicability of Mathematics in real life; develop the earnestness and carefulness while undertaking an assigned task; promote their passion and motivations in learning; appreciate the values of farmers' labour; In terms of opportunities to develop learners' competencies: students are able to develop the competencies of calculating, problem-solving, math modelling, communicating and collaborating.

#### Step 2: Selecting the form to organise ELA

Title of the Experiential Learning activity: "Impacts of Covid-19 pandemic on local produce prices"

- Duration: 1 week
- Location: Outside school
- Form of organisation: groupwork, 5 to 6 students per group

#### Step 3: Designing ELA based on David A. Kolb's four stage cycle

Activity 1: Taking on the group task, assigning duties to each group member and conducting survey

- Dividing students into groups. Appointing group leader and assisstant.
- With teacher's instructions, the groups decide on the subject of the survey, for example: produce sellers, farming families, local farmers, etc. in Son La province. They identify the sub-tasks such as collecting selling prices of certain kind of produce (preferably common produce), comparing the increases or decreases in prices, evaluating and discussing the price changes.
- Group leaders assign specific duties to group members (concerning knowledge revision, facilities, implementation, etc.)
- In groups, students prepare the survey questionnaires (using teachers' template) and distribute to each member.

#### Data collecting form

Market	Seller's name	Produce: .....		Produce: .....	
		P1: Price before Covid-19 pandemic (unit: VND per kg)	P2: current price (at the time of the survey) (unit: VND per kg)	P1: Price before Covid-19 pandemic (unit: VND per kg)	P2: current price (at the time of the survey) (unit: VND per kg)
...	...				
Mean price		P1:.....	P2:.....	P1:.....	P2:.....
Price difference P = P2 - P1					
Percentage price difference					

- Each member (or in pair as assigned) collect the information on the prices of the farming produce in question by talking to their families, relatives and farmer acquaintances in the assigned markets.

- Filling in the form with the collected information (the final price is the overall mean price)

Activity 2: Processing data and forming the concept ‘percentage’

- The groups work together to process the collected data from the survey (with the given form). An important notice is that both the before and after prices are the mean values of the collected figures.

- Looking at the tables, students are able to recognise the changes (upward or downward) in the mean prices. Yet, it is impossible for them to answer the question ‘Which kind of produce experienced bigger increases/decreases in price compared to the pre-pandemic price?’ Then, it is necessary to calculate the percentage price differences as the figure of price differences  $P = P2 - P1$  (if  $P2 \geq P1$ ) or  $P = P1 - P2$  (if  $P1 > P2$ ) cannot reflect these ratios or the increase/decrease values.

Accordingly, the students propose the formulate to calculate the ratio. However, teachers need to anticipate two possible alternatives of students’ ideas:

Option 1: The ratio  $P2/P1$ . Students can argue that whether this ratio is smaller or bigger than 1 means a specific produce price increased or decreased.

Option 2: The ratio  $P/P1$  shows the increase or decrease in the price of a specific produce.

Both options are acceptable, and teachers need to encourage students to propose other approaches if possible. Furthermore, as the lesson objective is to introduce the percentage concept, teachers are expected to guide students to write these ratios “in a different way”. For example, if the pre-pandemic price of the produce was 100,000 VND/kg, and current price is 120,000 VND/kg, there is an increase of 1.2 times (or an 0.2 percent increase). This is a different way to describe the ratio of two number.

Activity 3: Completing the data collecting form with calculated figures and discussing the results

Subsequently, the students completed the tables with the calculated ratios and percentages; and commented on the impacts of the Covid-19 pandemic on the prices of local produce. Teacher might ask some eliciting questions such as: What does the percentage price difference imply about the increases/decreases (small or large) in the produce prices? How have the Covid-19 pandemic influenced (positively or negatively) on the market price and farmers’ life?

Activity 4: Reporting project results

- The students discussed in group to write a project report, select the form of project reporting and assign specific presenting duties to each member as required by the teachers.

- The groups presented the project results in class.

Step 4: Developing the criteria and tools for learners’ assessment and evaluation.

The teacher instructed and accompanied the students in distributing the questionnaires and evaluated students as individuals and groups.

### *Stage 2: Organising ELA*

The ELA on the topic ‘percentage’ was implemented in the class 6A1, at Hua La secondary school, in Ban Sang village, Hua La community, Son La city. The school is located in the suburbs, 5 km from Son La city where 5 ethnic groups inhabit together (including Thai, Kinh, H’Mong, Muong and Tay people) with Thai people accounting for the majority of the population.

The Hua La secondary school was selected by the researchers for ELA implementation as the majority of the students here are minorities with typical

characteristics of mountainous students, including difficulties in communication in Vietnamese due to language barriers and uneven cognitive levels. However, the transportation to local markets and farming households is not too challenging for the students, which is an advantage in the researcher's process of observation and evaluation.

Step 5: Reviewing relevant Math knowledge to prepare for potential use during the experiential process. Teachers asked every student to perform activity 1 (before Lesson 16: Finding ratio of two number)

Step 6: Organising ELA using David A. Kolb's four stage cycle

Task 1: (CE activity) After finishing Lesson 16, the teacher divided the students in class 6A1 into 5 groups (based on students' competencies, academic performance, ethnic group, etc.) of 5-6 members. The students executed the plan previously presented. Teachers and the students agreed on the kinds of local produce as follows:

Group 1: Examines the prices of sweet corns and fresh cassavas

Group 2: Examines the prices of sweet potatoes and potatoes

Group 3: Examines the prices of chayotes and kohlrabies

Group 4: Examines the prices of carrots and tomatoes

Group 5: Examines the prices of cucumbers and guavas

Each group was divided into 3 teams (pairs), each team explored the prices in several assigned markets in Son Lan province and the produce trading in some farming households in their home villages. Dividing students into pairs or teams of 3 (within a bigger group) helps to guarantee all students' involvement in the process of data collection to complete the assigned task. Otherwise, it's likely for shy and passive students to merely observe rather than actively engage in communicational and collaborative activities to collect data and tackle the group task.

Task 2: (RO activity) Calculating the price difference  $P = P_2 - P_1$ , commenting on the increases or decreases, comparing the increases or decreases in the prices of different kinds of local produce. (Instructions: It is possible to calculate the price difference  $|P|/P_1$  using the collected figures). Also, it is acceptable if students calculate the ratio  $P_2/P_1$  to illustrate the increase or decrease in prices (for instance, a bigger-than-1 ratio means a price increase while a ratio of 1 means an unchanged price and a smaller-than-1 ratio means a price decrease).

Task 3 (AC activity): Based on the comments on the increase or decrease ratio, students were able to point out the differences in the ratios, which imply different values of the increases or decreases. It is possible that as for a certain product, the price increase was small while the increase ratio was big. Moreover, teachers needed to use simplified instructions to support students as ratios generally result in decimal numbers, etc. Accordingly, students presented the concept 'percentage' with the relevant symbol, formula and meaning.

Task 4 (AE activity): Discussing and analysing to make judgement about the impacts of the Covid-19 pandemic on the price of local produce (writing and presenting a group project report) and completing several exercises in the textbook.

Stage 3: Evaluation after ELA

Step 7: Analyzing and evaluating the experiential process and learners' achievements in the ELA

In group, the students completed the data collecting form using teachers' template and discussed the forms of presenting the project reports, and wrote the reports on A4 paper. (as required by teacher)

Based on student's individual assessment forms, group assessment forms and the process of observing and instructing, the teacher evaluated the groups using the criteria proposed in the marking sheet and made comments.

Here is the activity outputs of group 4:

Phiếu Tổng hợp số liệu điều tra					
Đội 1 - Nhóm 4					
Tên chợ/bán	Tên người bán	Tên nông sản: Cà chua	Tên nông sản: Cà rốt		
		Giá bán trước Khi có Covid-19 (đơn vị đ/kg)	Giá bán tại thời điểm khi có Covid-19 (đơn vị đ/kg)	Giá bán trước khi có Covid-19 (đơn vị đ/kg)	Giá bán tại thời điểm khi có Covid-19 (đơn vị đ/kg)
Chợ Răng Sách phường chiềng lè	Đỗ Thị Boun Hoàng Thị Ngân Phan Thị Hà	20000 20.250.00 20000	15000 18.000 12000	20.000 20.000	15000 15000
Giá trung bình		$P_1 = 21.666$	$P_2 = 15.000$	$P_1 = 20.000$	$P_2 = 15.000$
Chênh lệch giá $P = P_2 - P_1$		-6666		-5000	
Phản tream chênh lệch		30,46 %		25 %	
Nhận xét: Giá cả hai loại nông sản cà chua và cà rốt đều giảm nhiều. Giá cà chua giảm 30,76 %, giá cà rốt giảm 25 %.					

Figure 2: Data collecting form of Team 1 – Group 4

Phiếu Tổng hợp số liệu điều tra					
Đội 2 - Nhóm 4					
Tên chợ	Tên người bán	Tên nông sản: Cà chua	Tên nông sản: Cà rốt		
		Giá bán trước Khi covid-19 (đơn vị đ/kg)	Giá bán thời điểm covid-19 (đơn vị đ/kg)	Giá bán trước Khi covid-19 (đơn vị đ/kg)	Giá bán tại thời điểm covid-19 (đơn vị đ/kg)
Chợ Chiềng An - Phuông Chiềng An	Hà Thị Nưa Quang Thị Thanh Lù Thị Hắc	20.000 25.000 26.000	10.000 13.000 10.000	18.000 18.000 18.000	12.000 12.000 10.000
Giá trung bình		$P_1 = 23.333$	$P_2 = 11.000$	$P_1 = 18.000$	$P_2 = 12.000$
Chênh lệch giá $P = P_2 - P_1$		-12.333		-6.000	
Phản tream chênh lệch		52,85 %		33,33 %	
Nhận xét: Giá cà chua và cà rốt đều giảm. Giá cà chua giảm 52,85 %, giá cà rốt giảm 33,33 %.					

Figure 3: Data collecting form of Team 2 – Group 4

# Thiếu tông hợp số liệu

## Đài 3 - Nhóm 4

		Tên nông sản: Cà chua	Tên nông sản: Cà rốt
Tên lâm	Tên người Bán	Quả lâm	Quả lâm
		trước khi	trước khi
		tại thời	tại thời
		có dịch covid19	có dịch covid19
		điểm khảo	điểm khảo
		(đơn vị đ/kg)	(đơn vị đ/kg)
Bán chau	Hi Chi Nha	18.000	10.000
Bán Nha	Bac Chi Huong	15.000	7.000
Coóng			
Giá trị trung bình		$P_1 = 16500$	$P_2 = 8500$
Chênh lệch giá $P = P_2 - P_1$		- 8000	- 6000
Phần trăm chênh lệch		48, 48 %	40 %

Nhận xét: Giá cà chua và cà rốt đều giảm đi nhiều so với trước. Giá cà chua giảm đi 48,48%, giá cà rốt giảm 40%.

**Figure 4: Data collecting form of Team 3 – Group 4**

## Phieu tong hop so lieu dieu tra nhom 4

Tên chủ / bán	Tên người bán	Tên nông sản: Cà Chua	Tên nông sản: Cà rốt
		Giá bán trung bình bán rai	Giá bán trung bình bán tai
		khi có dịch	khi có dịch
		thời điểm	thời điểm
		Covid-19	Covid-19
		khảo sát	khảo sát
		(đơn vị đ/kg)	(đơn vị đ/kg)
		(đơn vị đ/kg)	(đơn vị đ/kg)
Chu Trang	Chu Thị Bích	20.000	15.000
Tết - Thương	Hoàng Thị Ngan	25.000	15.000
Chang Lè	Phan Thị Hà	20.000	12.000
Chợ Gia Phượng	Nguyễn Thị Dần	25.000	13.000
Phường Tô Hiệu	Hà Thị Duy	18.000	10.000
	Cùm Thị Lười	20.000	10.000
Chợ Chiềng An -	Hà Thị Nhu	10.000	20.000
Phường Chiềng An	Quảng Thị Thành	25.000	13.000
	Lý Thị Lão	22.000	10.000
Bản Chảm	Hà Thị Số	18.000	15.000
Bản Nà Cống	Bạc Thị Thương	15.000	7.000
Giá trung bình	$P_1 = 20727$	$P_2 = 11363$	$P_3 = 18250$
Chênh lệch giá $P = P_2 - P_1$	-9.364	-5.750	
Phản ánh chênh lệch	45,17%	31,50%	

Nhận xét: Giá cà chua và cà rốt đều giảm. Giá cà chua giảm 45,17%  
và giá cà rốt giảm 31,50%

Kết luận: Dịch Covid-19 đã làm cải thiện hàng nông sản và мяat giá, người nông dân chịu thiệt hại về kinh tế, giá thú khan cho đến tăng.

**Figure 5: Data collecting form of Group 4**

- Teacher's comments: All groups completed the tasks on schedule; the data was collected objectively; All groups precisely performed the calculations and made proper comments as requested; Most students were active and enthusiastic in carrying out the tasks; The students were generally able to collaborate to solve the assigned missions effectively; Many attempted to take the initiative in communicating to collect the data; Group 2 were rewarded for collecting information from more locations, thereby obtaining more comprehensive data; All group representatives reported the group project outcomes clearly and completely.

All groups had price surveys before and after the covid pandemic, at the markets in their area, with specific information about the seller and where to sell. The data in the table give the general information that the prices of two types of agricultural products have decreased. Students in each group were able to explain (by answering questions) how to calculate the percentage difference of each group. However, the groups did not come up with another way to determine the percentage of the discount, such as dividing the post-sale price by the pre-pandemic selling price. After the teacher's instructions, students understand, for example, in Figure 3, that although the price of carrots has decreased by VND 6000/kg, it is half the discount of 1 kg of tomatoes, but the discount percentage of the two items is not the same. From there, students better understand the meaning of the ratio expressed more clearly through this experiential activities.

Limitations: Team division in group 3 was not reasonable as one team consisted of two close friends who both were reserved and unable to support each other during the project, which caused difficulties for their communication, data collection, and eventually more time to complete the tasks. Some teams in different groups who calculated incorrectly need more training on calculating. Group 2's Math language use and expression were not appropriate. For example: the comment "the tomato price decreased by 45.17% while the carrot price decreased by 31.50%" should be adjusted as "the mean tomato price decreased by 45.17% while the mean carrot price decreased by 31.50%".

#### Step 8: Analyzing and evaluating ELA for adjustments in future ELA

Through the well-designed and well-organised ELA for learners, the students have the chance to experience, construct the concept of 'percentage' together and apply the knowledge into practice. Thus, they are acquainted to collecting data from real life, analyzing and processing practice data; eliminating irrelevant data; perceiving the practical significance of learnt Math knowledge. Students grasped the fundamental knowledge of percentage and successfully achieve calculating competency. Besides, they can get used to Math modelling activities, train linguistic competencies, interact with peers and strangers during the process of data collecting; develop Math competencies as well as communicational, collaborational and problem-solving competencies.

However, there were still certain limitations in assigning duties to group members and managing group activities to ensure the highest effectiveness in students' groupwork. Some students lacked calculating skills, language and communication competences as well as discipline. It is important that teachers maintain adequate attention to these students to assign them with appropriate duties and offer effective support in the upcoming activities.

## 6. Conclusion

Based on the previous studies on EL, characteristics of secondary school students in the Northwestern region of Viet Nam as well as the practice of organising ELA in Math teaching in secondary schools in this area, the research authors propose a procedure of designing and organising ELA in Math teaching with secondary school learners in Northwestern Viet Nam. Piloting this procedure with 6th graders at the Chieng An Primary-Secondary School at Hua La Primary-Secondary School in Son La city initially proves its appropriateness and feasibility in practice.

This study revealed that, the experiential learning about agricultural product prices, in the context of the pandemic, from which to learn Math is a very new and interesting activity for students. This study initially found students' ability to understand the concept of percentages along with its use in life. The experiential learning process is designed to help students construct mathematical concepts but also develop communication skills in Vietnamese, cooperation skills and interest in learning for students.

With only one class in the selected school as the subject of the study, the research is still limited. In future research, it is necessary to combine qualitative research methods with quantitative ones and broaden the scale of the study to achieve more comprehensive evaluation of the effectiveness and approaches to organised ELA in Math teaching in the mountainous Northwestern area of Viet Nam.

**Acknowledgements:** This paper is a part of the project entitled: 'Designing experiential learning activities in Math teaching at secondary school in Northwestern Viet Nam, Code: B2020-TTB-04.

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