Analyzing Students' Habits of Mind and Disorienting Dilemmas During Covid-19 Outbreak: A Preliminary Study of Developing Instructional Framework for Teaching Agricultural English (ESP)[1]

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Abstract

Students' habits of mind (HoM) and disorienting dilemmas (DD) are challenging to investigate and have rarely been explored. Yet, in the past Covid-19 pandemic, students faced many academic and non-academic problems. For example, in Indonesia, 89 million parents lost their jobs, which influenced students' emotions in their learning process. This paper applied explanatory mixed methods to address students' HoM and DD in agriculture colleges in Yogyakarta, Indonesia. Two hundred and eleven students voluntarily participated in the online closed- and open-ended survey responses. The first quantitative data were analyzed using the Rasch model of application while Nvivo12 was used for the analysis of the latter. The quantitative data were focused on how agricultural English students perceived HoM; meanwhile, the qualitative data explored a catalyst and a life crisis under the students' DD. Then, the two research questions were comparatively discussed: (1) How do Agricultural students perceive their HoM and DD during learning English; and (2) What factors influence them in learning English? As illustrated in the Rasch map, the result showed that students were positively perceived HoM. The Pearson measure value was +1.13 logit, meaning that it showed the tendency of agree. However, some extreme findings were found from the person misfit. In terms of the students' DD during this Covid-19 pandemic, the data showed that most students were frustrated in joining the English online classes. Unclear directions from teachers were one of the problems that stimulate students' DD. From the perspective of HoM and DD, students were grouped into two when learning English in the pandemic: (1) those willing to improve their condition independently; and (2) those who did not care and had no initiative to find the solution.

Resumen

Los hábitos mentales (HoM) y los dilemas desorientadores (DD) de los estudiantes son difíciles de investigar y rara vez se han explorado. Sin embargo, en la pasada pandemia de Covid-19, los estudiantes enfrentaron muchos problemas académicos y no académicos. Por ejemplo, en Indonesia, 89 millones de padres perdieron su empleo, lo que influyó en las emociones de los estudiantes en su proceso de aprendizaje. Este artículo aplicó métodos explicativos mixtos para abordar los HoM y DD de los estudiantes en facultades de agricultura en Yogyakarta, Indonesia. Doscientos once estudiantes participaron voluntariamente en las respuestas de la encuesta en línea, cerrada y abierta. Los primeros datos cuantitativos se analizaron utilizando el modelo de aplicación de Rasch mientras que para el análisis de este último se utilizó Nvivo12. Los datos cuantitativos se centraron en cómo los estudiantes de inglés agrícola percibían a HoM; Mientras tanto, los datos cualitativos exploraron un catalizador y una crisis de vida bajo el DD de los estudiantes. Luego, se discutieron comparativamente las dos preguntas de investigación: (1) ¿Cómo perciben los estudiantes de agricultura sus HoM y DD durante el aprendizaje de inglés? y (2) ¿Qué factores influyen en ellos a la hora de aprender inglés? Como se ilustra en el mapa de Rasch, el resultado mostró que los estudiantes eran percibidos positivamente como HoM. El valor de la medida de Pearson fue +1.13 logit, lo que significa que mostró la tendencia a estar de acuerdo. Sin embargo, se encontraron algunos hallazgos extremos por parte de la persona inadaptada. En términos del DD de los estudiantes durante esta pandemia de Covid-19, los datos mostraron que la mayoría de los estudiantes se sentían frustrados al unirse a las clases de inglés en línea. Las instrucciones poco claras de los profesores fueron uno de los problemas que estimularon el DD de los estudiantes. Desde la perspectiva de HoM y DD, los estudiantes se agruparon en dos cuando aprendían inglés durante la pandemia: (1) aquellos dispuestos a mejorar su condición de forma independiente; y (2) aquellos a quienes no les importó y no tuvieron iniciativa para encontrar la solución.

Introduction

Habits of mind (HoM) are a set of cognitive behaviors or attitudes characterized by critical thinking, creativity, flexibility, perseverance, and open-mindedness (Reji & Saini, 2022). Disorienting dilemma (DD) refers to cognitive and emotional discomfort questioning established ways of thinking, beliefs and creates a sense of confusion (Mabwe et al., 2023). Both of them are two important elements in transformative learning stimulating students to be critical self-reflectors (Mezirow, 2018). In English for Specific Purposes (ESP) classroom contexts, HoM and DD can support students to have a better way of thinking (Koura & Zahran,

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2017; Hong Bee et al., 2013). When students have a good understanding, they will be able to use their English competencies in future challenges. In addition, when they are aware of their strengths and weaknesses, they will be able to negotiate life-event crisis experiences (DD) like the pandemic (Mälkki, 2012).

ESP has received much attention, as this course aims to prepare students' future careers with its specifically designed curriculum for particular work purposes. A wide range of ESP issues around the world have been investigated (Işık-Taş & Kenny, 2020). Several studies have shown that the goal of learning ESP is to help learners communicate using English based on their needs. Furthermore, most of the instructors put their concerns on how to prepare learners to master English for communicating. Additionally, most ESP courses are designed to prepare learners for actual English communication purposes. However, teaching English only for attaining that target will miss other substantial functions. This idea is in line with contentions that the nature of English language teaching should not only be for communication goals. Therefore, that teaching will not disapprove the substantial function of the language (Cook, 2007). Teaching should not only train students to use English to communicate with other people having a different language, but it should touch the more ontological basis, such as to change the students' frame of reference as part of HoM and DD.

The Covid-19 outbreak showed the imbalance of a skills learning-oriented priority. The outbreak changed and suggested changes in the world, such as the transformation in academic world, from offline to online learning. Many people were unemployed caused by the impact of the post-pandemic economic recession (Walmsley et al., 2020), and many job fields were closed bringing new problems in people's lives, such as mortality and poor quality of life (Rosén & Stenbeck, 2020). The serious problems caused by the pandemic caused real learning difficulties. The question arose as to how students could take a part in future workplaces if they did not have an emotional, global, and universal understanding of life. Agricultural English, as part of ESP (AE-ESP), should be designed tor help students to reach job readiness. It is necessary to bring transformative learning into AE-ESP to help the students to obtain a better HoM and manage their DD. It is worth noting that HoM and DD could bring AE-ESP to a more strategic position because they could support the students to not only getn practical knowledge of English, but also to support them with the more up-to-date skills needed in the future workplace conditions (Mezirow, 2018).

AE-ESP should re-examine its visions by focusing more on the updating of academic content and awareness on the digital world phenomena (Kaowiwattanakul, 2020). Hsu (2014) found that the students in ESP classes can achieve a better way of thinking through the language they have learned. However, AE-ESP has rarely explored students' HoM and DD (Hong Bee et al., 2013). That lack of attention to students' HoM and DD is regrettable since those concepts are considered by many important to support their success in language learning through raising their awareness. Studies showed that by knowing students' HoM, teachers can find the best way to support students since they can follow students' feelings and awareness. With HoM, teachers are able to help students to be open-minded (Hew & Cheung, 2011). The limited conceptual and empirical knowledge of HoM based on practical studies in the sphere of AE-ESP classroom settings shold be obvious.

To respond to the demands explained above, this study tries to analyze the students' HoM and DD by using an explanatory mixed method through the combination of software analysis: Rasch model application and NVivo12. The implementation of Rasch application and NVivo in HoM and DD are appropriate to integrate in ESP. Therefore, the goal of this current study is to analyze agricultural English students' HoM and DD. In doing so, the following research questions guide this study: (1) How do agricultural students perceive their HoM and DD during learning English; and (2) What factors influence agricultural students' HoM and DD in learning English?

Literature Review

Agricultural English

Teaching ESP, including agricultural English, is different from teaching English for general purposes (Richards & Schmidt, 2002). Students in this setting must learn contextual and practical-oriented English. Furthermore, it is noted that almost 90% of higher-education students in ESP classes admitted that English is useful to support their career in future jobs (Chapelle & Sauro, 2017; Lee, 2016). However, in an ESP context, students still found problems in mastering and achieving the English learning outcomes (Hayati, 2008). The status of English as a foreign language (EFL), in fact, is also assumed as one of the factors stimulates learning failure (Gregersen & Horwitz, 2002). Thus, that unsupported condition makes students find difficulties in actualizing their competence.

The condition becomes worse because the common teaching and learning practices are more product-oriented than process-oriented. Teachers should not only focus on the students' achievement and ignore their weaknesses, since it is important to trace how students deal with external aspects in the learning cycles. Consequently, students often are not motivated since teachers do not notice their problems and help them out. Sometimes students take English classes only to kill time and complete their semester credits. Low motivation has become the norm among students that makes them in the unconducive condition or circumstances that hinder the effective learning experience. Consequently, teaching agricultural English by adjusting to the learners' future real-life needs was difficult to achieve (Jendrych, 2013). Moreover, teaching lose its significance if agriculture students are unable to answer their global needs and demands. In addition, to the effects of the pandemic, students are now required to face more challenging situations. Therefore, teaching agricultural English should encourage students to improve their thinking.

Habits of mind and disorienting dilemmas as part of transformative thinking

HoM and DD are integral parts of Transformative Learning Theory (Laros, 2017). This theory is emphasized in the field of adult education and recognizes a critical dimension of learning (Mezirow, 2018). The foundation of TLT derives from the process of shifting problematic frames of reference, such as mindsets, habits of mind, and meaning perspectives, including a life crisis triggering questioning assumptions. Mezirow postulated that the first step of transformative learning is DD where McConn and Geetter (2020) supported that transformation will only happen if present experiences do not meet the present expectations. Therefore, DD is perceived as the destabilizing situation where there is unsubstantial and empty thinking in one' mind (Laros, 2017; Sill, et al., 2009). Kaowiwattanakul (2020) also explained a disorienting dilemma as the process of finding the new ways of acting to overcome the problems, in which this process connects to the effort of building competence and self-confidence.

Integrating HoM and DD in ESP could be promising since its learning outcomes are helping students to be ready to enter the workplace. Additionally, several scholars (Kaowiwattanakul, 2020 & Roberts, 2006) have offered the solution of ESP problems through their investigations, explaining that HoM as a branch of frame of reference can be integrated into ESP since they can recognize the influencing factor to support the success of learning. Learning agricultural English as part of ESP could be more effective if the teachers integrated HoM in their teaching model to stimulate not only the needs but also to raise the awareness of their needs (Basturkmen, 2019; Hutchinson & Waters, 1987).

Integrating HoM into English for agriculture can enhance students' critical thinking and explore their potential. A study done by Kreijins et al. (2019) showed that teachers with good HoM and DD could facilitate students' learning and lead to success both in the academic outcomes and critical thinking skills. The teachers applying HoM in the ESP classes can explore how students respond to their academic progress. Teachers even can carefully observe the students' whole information and help them in upgrading their need awareness.

Studies have investigated HoM and DD but the discourse in agricultural English classes have rarely been discussed. Yet, a frame of reference or perspective used for understanding or interpreting a situation that encompasses HoM and DD, has been demonstrated by some scholars to contribute to the success of learning processes. Additionally, either HoM or DD can directly touch the students' cognitive and emotional domains, which have a close connection to their success in learning English.

The theories of *Disorienting Dilemma* and *How we Think,* pioneered by Mezirow (2018) and Dewey (1997), were used to design an instrument to discover students' HoM and DD. In as much as DD is the initiation of a transformative learning experience, before students undergo transformation, they experience some confusing moments. In this respect, a further step that has happened within students' minds is the way they perceive the world, and it is reflected in the way they think. When confronted with an abundance of knowledge and information, students never take for granted to what it takes to learn the skill of thinking and to harness their natural curiosity in a beneficial way.

Research Design: Method and Objectives

The research design of this study was mixed methods with an online survey design consisting of closed and open survey. The core of mixed methods is the integration of the two data methods, quantitative and qualitative, to obtain new insight (Creswell & Creswell, 2018). With such an endeavor, we can go beyond quantitative and qualitative. As today students' problems are increasing and become more complex, multiple methods are needed to study the case. Mixed methods were implemented to gain the information about

how the agricultural English students perceived HoM and DD in their lives during learning English in the Covid-19 crisis.

Participants of the study

This study involved 211 Polytechnic (a higher education institution that qualifies as a vocational institute) students from two classes and studying in the Agricultural study program from a special district of Yogyakarta, Indonesia. They were mostly in the first to fifth semesters. More than 70% of 148 students were male, and 63 (30%) students female. In general, students were 18 to 25 years old. They answered a questionnaire including closed and open sections. Then a total of five students were selected for the interview: four males and one female. They were enrolled in the undergraduate Agriculture and/or Plantation Study Program. Those five students were selected for the interview because they were considered to have informatio which could support the data needed in the research. Additionally, the insight about HoM and DD was gained from their information.

Research instruments

The research instrument was divided into two sections: closed and open questionnaires consisting of three issues (ESP, habits of mind and disorienting dilemmas). The closed questionnaire was designed for HoM based on the transformative theory and set in a 5-point rating scale: (1) strongly disagree; (2) disagree; (3) neither disagree nor agree; (4) agree; and (5) strongly agree. HoM in the closed questionnaires was associated with the issue of DD designed in open questionnaires and distributed in the second phase.

The aim of HoM was to understand how the students perceived their habit of thinking, and the aim of DD was to explore how they coped their emotional problems while learning English in the pandemic. Both HoM and DD were adapted from the theory of transformative learning suggested by Costa and Kallick (2009) and Mezirow (2018). Those theories were adjusted in the instruments based on the condition in agricultural English contexts. They were elaborated to investigate the degree to which students in agricultural English classes have shown their HoM and DD. The closed questionnaire consisted of 16 items deriving from some constructs. Table 1 shows the constructs and the items used in HoM, and Table 2 is for items used to know the students' DD consisting of nine questions.

No.	Constructs	Items for Close Questionnaires
1.	Persistence	I get upset when the answer to a problem is not at once known.
2.	Managing impulsivity	I make judgments before fully understanding the problem.
3.	Listening to others	I can detect emotional states in oral and body language because I understand diverse perspectives.
4.	Thinking flexibly	I can generate alternatives and consider options because I can look at ideas in another way.
5.	Metacognition	I am aware of my own actions and how my actions affect others.
6.	Searching for accuracy	I always try my best and set high standards.
7.	Challenging and problem solving	I only pose simple questions because I have a hard time figuring out what data is missing, and I do not ask questions when I must solve a problem.
8.	Adapting earlier experience to new circumstances	I do not transfer knowledge from one situation to a similar situation.
9.	Thinking and communicating with clarity and precision	I use precise language, I can define terms, and I support my statements with explanations, reasoning, comparisons, and evidence.
10.	Collecting data across all senses making	I pay attention to the world around me. I like to gather data through all my sense.
11.	Imagining and innovating,	I do not consider alternative possibilities.
12.	Reacting to wonderment and awe	I avoid any challenges because I am passive in class, and I tune everything out.
13.	Taking responsible risks	I like to venture out and try new experiences.
14.	Seeking humor	I am unable to distinguish between situations that demand compassion and those that are truly funny.
15.	Thinking interpedently	I am a team player because I can work and learn from others.
16.	Open to continuous learning are among them.	I admit when I do not know something and strive to learn because I view problems as valuable opportunities to learn. I have so much to learn.

Note: The sixteen items were used to understand students' HoM. It was started by the very general idea dealing with how students cope emotion when they cannot solve a problem. The other items exposed how they responded, acted, and managed stimulus entering their lives. The questionnaires for HoM were validated by experts in education.

Source: Adapted from Costa & Kallick (2009) and Kreijns et al., (2019).

Table 1: Closed questionnaire for habits of mind

No.	Items for Open Questionnaires
1.	Why did you choose to study in agriculture?
2.	What memories stick out most when you think back to being taught English?
3.	During your English learning, what moment/s do you remember most?
4.	What has had the biggest impact on your learning of English from?
5.	During your student moment, what moment/s do you remember most?
6.	To what extent, if any, has learned English experience met your expectations?
7.	Did your experience in learning English challenge, support, or change your beliefs about the learning English? How or why?
8.	What are your beliefs or perceptions about learning English?
9.	What challenges did you face in learning English in an agriculture study program?

Note: The nine items led the students to express their experience when they were in transition dilemma, mainly when they have to learn English in Agriculture study program.

Source: Costa, & Kallick, 2009.

Table 2: Open questionnaire for disorienting dilemma

Before distributing questionnaires to the students, construct and empirical validation were performed. Two experts on the transformative learning and ESP were| given the instruments to check their construct validity. To know the instrument reliability and validity, the Rasch model of measurement Winsteps version 3.73 was applied. The instrument was considered precise when item reliability, separation, and Cronbach's alpha were more than 0.6. Additionally, outfit mean square (MNSQ), which was less than 0,5 / < MNSQ < 1,5, and outfit Z-standard (ZSTD), which was less than -2,0 / < ZSTD < +2,0, were used to consider the item validity (Boone, et al., 2014). In terms of the DD instrument, an open survey response was used for gathering students' information and their acknowledgment about DD through their stories.

Data collection

The techniques to collect the data were using open and close surveys, which they were expected to reflect the students' information about both HoM and DD. The first activity was an online questionnaire. We collected the data through different manifestations of inquiry-based work in everyday class practices. All students' names used in this study were pseudonyms to avoid bias. An online survey developed in *Google Form* was given to the students. English teachers supervised them using *Zoom* meetings., The process was started in August and completed in December, 2020. Permission from the institution for the research legality and for the students' involvement in this study was pursued in accordance with ethical standards . For the informed consent, it was announced and outlined the purposes of the research in the *Google* form and collect written consent from all students who agreed to participate in the research.

Data analysis

Since quantitative and qualitative data were obtained from the questionnaire, we applied data-based integration by using Rasch measurement and NVivo12. The former is to analyze students' HoM and the latter is for the students' DD. The underlying reasons for analyzing students' HoM using Rasch measurement analysis were as follows:

(1) Rasch model application served a comprehensive analysis;

(2) It detected the real behavior about HoM in students' life and calculated the students who were not serious in responding the questionnaires;

(3) It assessed the ability of students as the respondents not only using the raw score but also the answer pattern through the item difficulty. With these efforts, the result of this inquiry helped us in adjusting AE-ESP activities and found the direction for teaching and learning in agricultural-English to be more insightful;

(4) Using the Rasch model application helped us to detect students who still had not attained the learning targets;

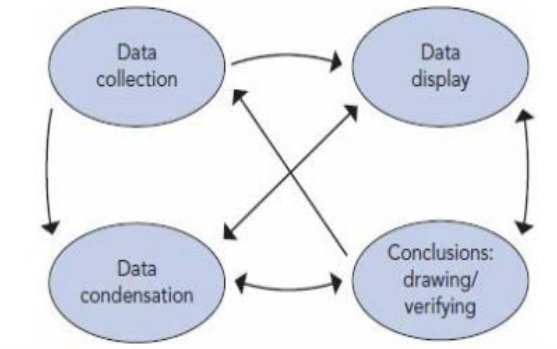
(5) It supported students in solving their problems either the academic goals or the thinking maturity; and

(6) The readiness in facing the global challenges could also be predicted based on the total score from the questionnaire they had filled out.

To analyze the agricultural English students' HoM, the person and item's reliability were taken into consideration. The reliability refers to the result of items and persons logit5, as well as its separation. Additionally, the validity was also measured by using five aspects including the logit value and the standard of error measurement. In this sense, the level of students' HoM was also considered based on how they responded to the instruments. The result of the students' response was entered and processed in the program of Winstep version 3.71. The raw results obtained were converted into logit values. If the logit value was higher and/or more than 0.0 logit, it indicated the tendency that students had good HoM as their answers mostly agree with the items.

The qualitative data about disorienting dilemmas were analyzed qualitatively by using NVivo12. Analyzing the students' DD using NVivo12 was necessary because one of the reasons of using this QDA software was that the data were abundant, and the researchers were overwhelmed. Therefore, we used it to find the effective system for managing and coding them (Houghton, et al., 2017), as well as to find their category. In addition, the result of the qualitative data from the interview were analyzed by adapting the model from Miles et al. (2018). There were four parts in their model that we adopted. They were the collection of the data after the first step was done then we reduced the data. When the result of data reduction was sufficient, we displayed them before drawing the conclusion and making verification. Figure 1 portrays the phases and data components for this current study.

NVivo12 helped us to code the qualitative data through outlining and facilitating the finding systematically and rigorously (Houghton et al., 2017). We can easily group the factors influence the students' DD, based on their categories, and support the objectivity of the text interpretation. Furthermore, analyzing the students' DD by using NVivo12 was guaranteed to be an efficient method for managing the results (Brunton & Thomas, 2012) of open-ended survey response used in this current study.



Note: Adopting interactive model of data analysis through some steps: collecting data from the interview, transcribing them, read, and reduce them using NVivo12 software, displaying the result, drawing conclusion, and verifying.

Source: Miles et al. (2018)

Figure 1: Components of data analysis: Interactive model

Results

The analysis of agricultural-English students' habits of mind based on Rasch model

To respond to the mixed-methods data analysis, we used data-based integration to find the meta inference of HoM and DD. The Rasch model of application with the Winstep version 3.73 processed the data from 211 students' questionnaires about HoM (16 items). The data from *Google Forms* were transmitted using *Microsoft Excel* before we processed them. After careful examination of the data, they were saved in *Excel* and sent to the Winsteps program to be analyzed and to obtain the measure for each participant and scale. The summary of processing questionnaire from the students using the program is presented in Table 3.

[5] Logit is a unit of measurement used to express the probability of a person's response to an item on a dichotomous (two-category) or polytomous (multiple-category) scale in Rasch Measurement.

	Logit Mean	Standard Deviation	Separation	Reliabilities	Alpha Cronbach
Person	0.39	.50	1.30	0.63	0.66
Item	0.78	.77	8.04	0.98	

Note: The data were analyzed using Rasch model of application with the Winstep version 3.73 to know both instrument (items) and person (students) reliability. Logit means, standard deviation, and separation are the other components supporting the result of reliability and Alpha Cronbach.

Table 3: The results of processing items data from 211 students

The summary statistics included: (1) reliability; (2) logit item and person; and (3) logit person. They presented in Table 3 to show the students' information. Those statistical analyses could trace whether students had positive or negative perception toward HoM. Furthermore, to adjust whether the students had serious and independent decisions while filling out the questionnaires, they could be traced through the statistics analysis.

The acceptance of the students' HoM was assessed by some considerations. One of them was from the data presented in that Table 3. The person's mean measure (logit) value was 0.63. This indicated that all students were aware of their HoM. Unfortunately, its level was still low. The normal standard value of a person's reliability should be more than 0.67 (> 0.67). Therefore, its standard deviation only achieved .50, which also indicated dispersion of the students' HoM.

However, different results showed that the item's mean measure (logit) value was 0.78 logit with a standard deviation of .77 logit and its reliabilities perfectly reached at 0.98. The result indicated that the item difficulty level metrics around the logit scale were good and fit with the Rasch model of measurement. The last part in judging the reliabilities of the measurement was from the score of Cronbach alpha. From the analysis, the result was reliable because the score reached 0.66. Another consideration in analyzing the students' HoM was from the instrument validity. To know its validity, *data fit,* according to the Rasch model, and *construct validity* were considered and presented in Table 4.

	Person Logit				Item Logit			
	INFIT		OUTFIT		INFIT		OUTFIT	
	MNSQ	ZSTD	MNSQ	ZSTD	MNSQ	ZSTD	MNSQ	ZSTD
Mean	1.06	-.1	1.02	-.2	.99	-.1	1.02	.1
S.D.	.71	1.7	.72	1.6	.26	2.5	.25	2.4

Note: Infit and outfit both from person and item logit covering MNSQ and ZSTD indicate item consistency. If the score is less than the standard one, the item is invalid and caused the potential of person' misconceptions.

Table 4: Data fit criteria according to the Rasch model

The ideal score that must be noticed in person logit of MNSQ is 1.0; meanwhile, for the ZSTD, it is 0.0.

	Eigenvalue
Raw variance explained by measures	40.9%
Raw unexplained variance (total)	59.1%
Unexplained variance in 1st contrast	2.0
Unexplained variance in 2nd contrast	1.8

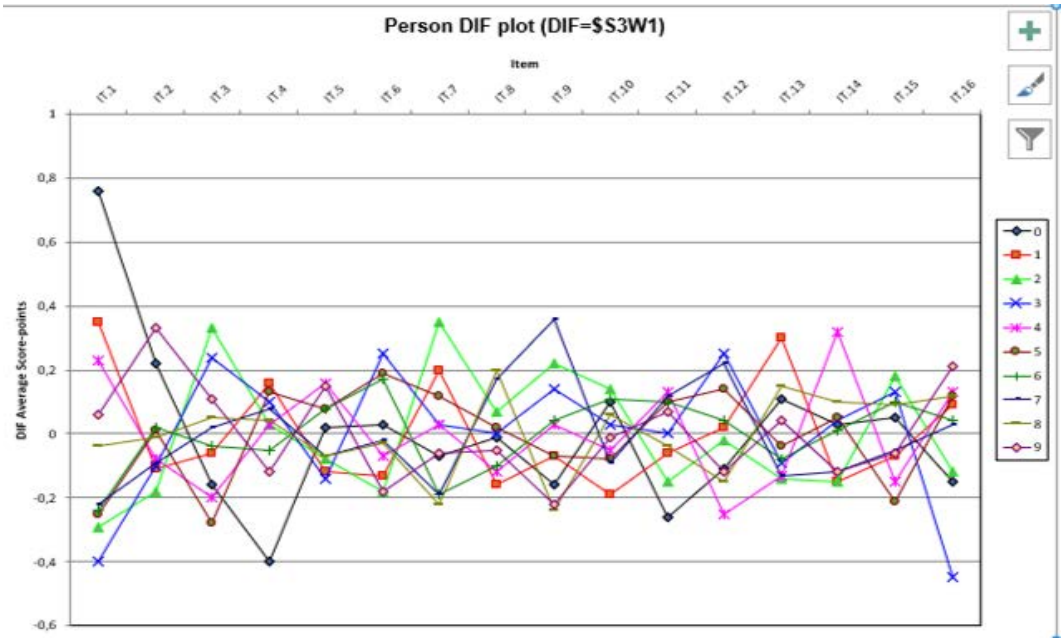
Note: The variance of explained by the measures corresponds to the Rasch dimension while the unexplained variance corresponds to all other dimensions. Raw unexplained variance also indicates the level of item independence and its goodness.

Table 5: Standardized residual for construct validity

When an unexplained variance of eigenvalue was less than 0.3 (< 0.3), that score can detect item from another dimension. In this study, the final result of the unexplained value was about 1st (2.0) until 2nd (1.8). Therefore, it was categorized as contrast and able to distinguish or detect the students' HoM.

Another consideration in analyzing the HoM was the person differential item functioning (DIF) plot covering *demographic data of students.* The result of DIF was to test the considerably influenced by sample size. Therefore, the number of students involved in the pilot project were crucial to determine the students' HoM. The statistical analysis ensured the equity and fairness of student's acceptance toward the HoM. The information of similarity index (ISI) was compared to items' information and were analyzed whether the

result fitted to the Rasch model or not. The result showed that ISI performed comparably. The result of DIF is presented in Figure 2.



Note: Person DIF Plot explains demographic data of students covering sex, age, and semester for ensuring the equity and fairness of student's acceptance of the HoM.

Figure 2: Demographic data of students (N=211)

Rasch model of measurement was used in analyzing the instrument reliability. By implementing it, the students' condition and their HoM could be traced accurately. Moreover, the student's condition could be detected when they filled out the instrument whether they were serious or not in filling it. The central feature of the Rasch model was the response probabilities, which could address and categorize the student with his/her different ability. For instance, those having the more correct answers of the test items were separated and/or distinguished from those having the less correct answer. In term of knowing person's level of their HoM, we used *a wright item–person map* to measure the difference between their HoM through the way they responded and filled out the instrument. In addition, *a wright item–person map* was also used to know the complexity of the item distributed to the person or students in this context. With this attempt, we could learn from systemic calculation and from the graphical visualization. We could also judge the instrument quality from the Rasch model of measurement provided in every aspect of the calculation.

Based on the response patterns, the entire respondents were categorized into three groups. Two classes relatively fitted the model while one class did not fit the model because the students responded to the scale uniquely in that class. The respondents with unique responses were relatively small (12.5%); therefore, it did not interfere with parameter estimation of the whole items.

Regarding DD experienced by ESP students during the pandemic, the data taken from open survey were analyzed by using NVivo12. From the analysis, a new line of opportunities was revealed to know new concepts contained within DD. Academic and emotion were the terms, which frequently appear in the coding process; therefore, they were coded as part of the DD. In addition, the virtual interview with students was also coded used as the second consideration in the data interpretation to support the open survey. From the coding process using NVivo12 software, the ESP classes could be used to explore the factors stimulate the students' DD from the perspective of mix method.

Agricultural English: Disorienting Dilemmas

To answer the research questions on how the students' DD during this COVID-19 pandemic, some findings from NVivo12 analysis and quotations taken from students' acknowledgments are presented. DD was identified for the word frequency query result, finding the theme from the data, creating a node structure of DD, and coding stripes of DD, matrix coding queries, relationship nodes, and models of DD. To catch the stated findings, the qualitative data regarding the students' DD were proceed into NVivo12 as part of a qualitative data analysis software program. This software program helped in organizing the text obtained

from the open survey and the virtual interview. Having been transcribed, they were uploaded, manually coded, and completed with some relevant comments taken from the raw data. Then, a conceptual level of the axial coding stage was performed. Those codes were then grouped after being compared and contrasted to each other. Some examples of quotation taken from the students' sad and happy expressions that reflect the DD are as follows:

> *I had a game house in my computer when I was like 7 or 8. The title of the game is "Crazy Ball." In this game, I can do ball-racing with both players. And what makes this game unique for me is* [sic] *the bot can talk (like writing something in English), and it becomes my first media to* [sic] *reading, listening, understanding, and replying at once. At first, Papa doesn't believe that the bot can talk to me. He said "How does Bot can talk to you? They've been programmed." But when I show* [sic] *him, he just laughs and walk* [sic] *away. I don't really remember what the conversation* [sic] *that he read that day, but what makes him laugh, (maybe) it means I was wrong that bot can't talk to me. That was my first time I love* [sic] *English and want* [sic] *to have great experiences in learning English with my friends in the classroom. But I do not find* [sic]. *I am badly in despair." I never trying* [sic] *to communicate in English. No more.* [Fatah/pseudo name] [Open questionnaire, 09.00/15 March 2020].

> *I love learning English, as I really want to have a friend from another country, not just from the playing game* [sic]. *In 2017, I met a tourist from* [sic] *Netherlands. To be honest, I'm a shy guy, so I can't start any conversation unless he started* [sic] *do first at me. Even when I want to speak, it was hard. I could not produce any word* [sic]. *So, I wrote a note, and I gave it to the tourist. He also did the same thing. He gave me writing in* [sic] *a paper. He read it, and he said "Wow, Buddy, what's wrong? Can I help you for* [sic] *something?" That was my experience when learning English with Mrs. L, but now, I cannot find good and interesting experiences in my English class. We are only learning in virtual* [sic] *and are* [sic] *limited my internet connection. My house is in the village, which are* [sic] *not well supported by* [sic] *internet connection. My days were always blamed by that awful condition.* [Rico/ pseudo name] [Open questionnaire, 10.15/15 March 2020].

> *To tell you the truth Mrs., I hated English at first. But I was wrong. I can do nothing without having English skill* [sic]. [Riza/pseudo name] [Interview, 20 March 2020].

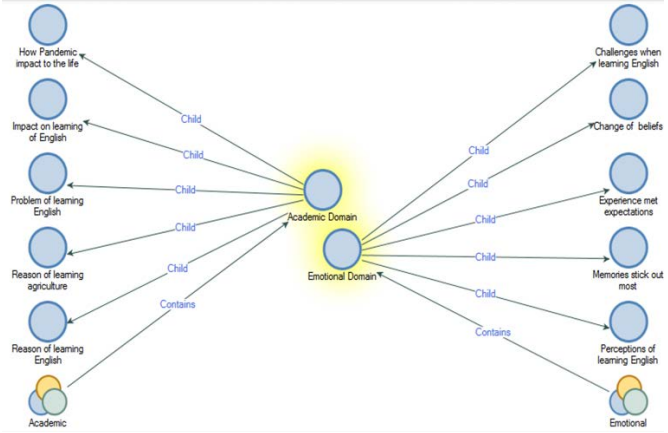
Those two quotations show the students' emotion about online learning during the pandemic. Furthermore, finding the word frequency query was needed to know the most frequently occurring words or concepts in the students' DD. With this, we could identify some possible themes of DD particularly in this covid-19 pandemic. Then, analysis was done by referring to the most frequently used words. For example, analyzing the students' DD through knowing the most common words used when talking about DD. The word frequency query of DD in the context of agricultural English is presented in Figure 3.

Note: Word frequency queries list show the most frequently occurring words or concepts of disorienting dilemma in the context of agricultural English faced by the students.

Figure 3: Word Frequency query of DD in the context of agricultural English

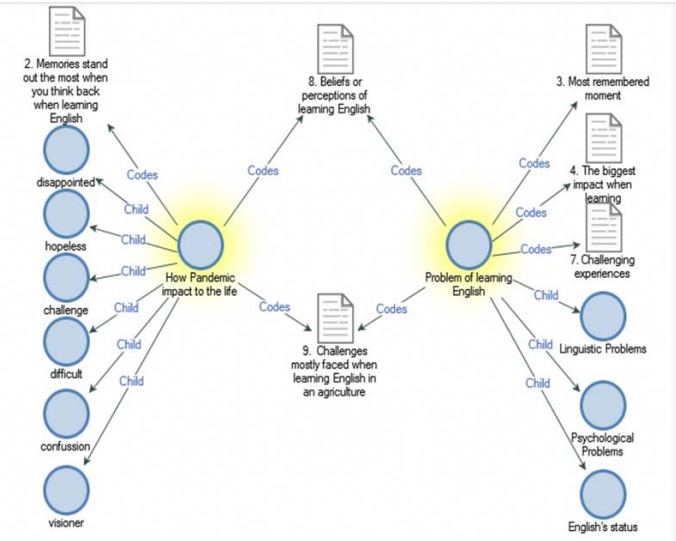
Figure 3 illustrates the discussion about DD among the students in their agricultural English classes. The term English was the most used word in that context. It was followed by learning and understanding. Word frequency queries were used to compile a list of the most commonly occurring terms or concepts showing the issues related to students' disorienting dilemma. There were some points discovered by using that word frequency query: (1) some potential themes were established, such as memories, difficulties, and experience, particularly those which appeared in the early process of recognizing students' voices from the open survey; and (2) The most used terms in perplexing dilemmas were found.

Having been coded the data by using NVivo12, we also analyzed students' voices through opened responses to find a language pack. Disorienting-dilemma-related themes had been established by examining the content and sentence structure contained therein. Additionally, with Nvivo12, we also obtained a number of certain themes, which were more weighty than others. They were acquired from their frequency and/or how often they appeared in the material analyzed. The result showed that there were two domains of the students' DD. They were academic and emotional domains. Each of them contained some issues. The academic domain covered the linguistic problems while the emotional domain was dominated the feelings of happiness and hated. In the process of analyzing the students' DD, comparison diagrams between academic and emotional domains were also included. From the analysis, the child notes (the specific term used in NVivo) building the note of academic and emotional domain can be traced. Additionally, Figure 4 depicts a comparison diagram between an academic and emotional domain in detail and Figure 5 depicts comparison diagram of COVID pandemic impact, beliefs, and problems about learning English.



Note: Comparison diagrams compare among sources, nodes, or cases of academic and emotional domain to see their similarities and differences.

Figure 4: Comparison diagram between an academic and emotional domain



Note: Figure 5 is a comparing diagram of COVID pandemic impact, beliefs, and the problems about learning English to know their child nodes and their relationship.

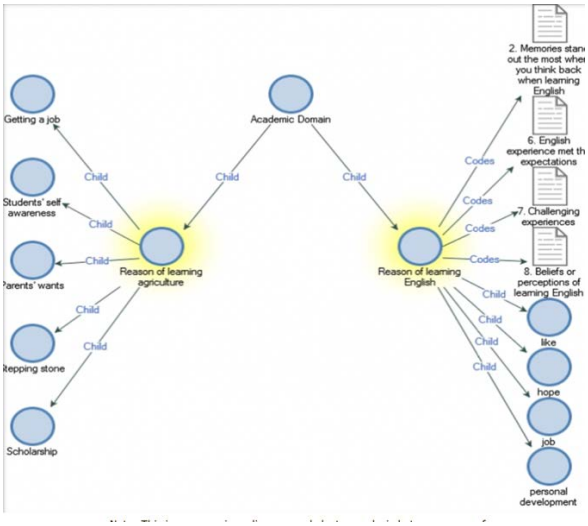
Figure 5: Comparison diagram of COVID pandemic impact, beliefs, and the problems about learning English

A number of nodes were made to identify and organize the students' DD based on their categories. The nodes provided some dimensions of DD therefore after doing the initial interview, we directly saved them to find the constructs supporting the students' DD. Coding stripes for DD were also made to find out some new conceptual aspects. In addition, it also helped much when exploring the elements for facilitating the emergent questions. Comparing categories in making a visual overview particularly how the nodes were

created were also a task when working with coding stripes. The social interaction among students and their feeling of emotion toward the pandemic were drawn based on the data provided on the coding stripes.

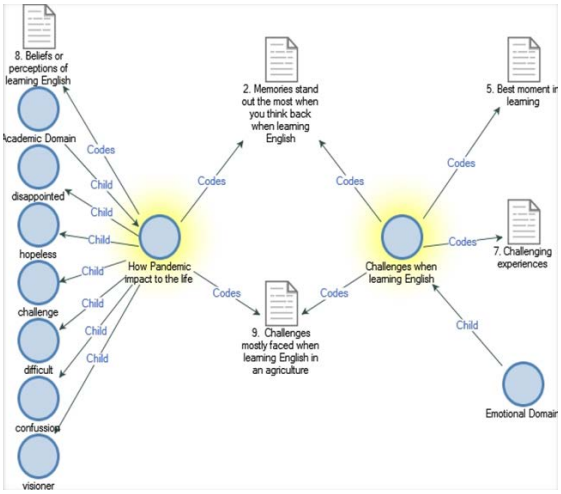
NVivo12 was also set to cluster the collected nodes based on potentially meaningful relationships components experienced by the students when learning English. Having been created, further analytical exploration was done to find out the categories. To complete the process of analyzing abundant data from the students' DD, matrix coding queries were used to make exploration and find out the relationships between the DD and the categories, which were obtained from the students.

Having been coded the data into multiple items simultaneously, an exploration of the relationship among nodes and child nodes of the DD was identified. It aimed to find out a potential relationship between any emergent DD concepts that appeared from the analysis. Academic and emotion domains as a part of the DD, which are revealed in the previous figure, led to the more specific issues. The findings showed that there were some relationships from the concepts and segments of potentially relevant data. Thus, coding was carried out to find any pieces of evidence deemed relevant to the corresponding relationship nodes. To link the different concepts beyond the DD, an exploration by comparing diagram and cluster analysis was undertaken. The results are visualized in Figures 6 and 7.



Note: This is a comparison diagram and cluster analysis between reason for learning English and agriculture to find out students' disorienting dilemma.

Figure 6: Comparison diagram and cluster analysis between reason for learning English and agriculture



Note: This is a comparison diagram between pandemic impact, memories, and challenges that shows the aspects that influence the students' disorienting dilemmas when learning English.

Figure 7: Comparison diagram of the pandemic impact, memories, and challenges when learning English

Discussion

This section addresses the two primary issues. Firstly, we explored the nuanced process through which Agricultural English students engage their HoM. Subsequently, we discuss the result of DD analysis, employing quantitative data and the Rasch Model. The outset of our discussion involves a detailed examination of students' perceptions and acknowledgments during their academic journey within the agricultural study program. Most of the students chose to study agriculture based on their parents' advice. The perception among the young generation and families toward getting jobs in the agriculture sector were not satisfactory. The surprising fact showed that many of them ignored and felt ashamed of working in agriculture sectors. A claim from Jjuuko, et al. (2019) revealed that youngsters disliked working in agriculture because the sector was identified with manual labor.

However, along with the learning process and the interaction with the new environment, students started enjoying the courses and decided to become professionals in the agriculture sector. Teaching and learning English in agriculture is different from the other programs. The data derived from the students' acknowledgment of their point of view toward their HoM and DD showed that they found their change during learning agricultural English. During the class observation in ESP I and II, most of the students were not interested in learning English. However, the results showed that they started to participate in learning experiences because they decided that English would be important to support their future career.

The data, analyzed with the Rasch application and NVivo12, and focusing on emotion, feeling, and cognitive shift brought new insights. For example, teaching and learning agricultural English should be integrated into the other disciplines; learning English in and agriculture context should emphasize where the students will find in their future life; teachers should stimulate transformational thinking while exploring the HoM. Furthermore, it is crucial to train them in managing emotions during live events. This preparation enables them to independently address challenges and make positive strides toward enhancing their well-being.

This study demonstrated that the students were in the unsatisfied level of HoM and DD. Various emotions, expectations, and cognitive shifts supported the students' achievement. This study suggested that a framework of learning English and ESP in an agriculture study program should be required. Therefore, the next investigation should be performed based on the findings of this current study.

To make an alignment between the HoM and DD, some essential elements must be taken into account. Essentially, the HoM and DD, which include a habitual way of thinking, feeling, and acting are influenced by the culture, social, educational, psychological, and economics of the students (Mezirow, 2018). In the teaching process, a practitioner cannot ignore those attributes covered in their HoM and DD. It is important to consider feelings because they encompass beliefs, judgments, and attitudes (Kitchenham, 2008). Furthermore, students with a positive DoM and the capability to navigate DD can autonomously adjust their mindset and even engage in critical reflection based on their experiences, as outlined by Christie et al. (2015) Therefore, neglecting these factors makes it challenging to attain the English learning goals and meet current demands. Teachers should consider factors affecting students' lives and in the teaching and learning process. With the help of HoM, students can achieve more than the learning targets as it is transdisciplinary based on nature (Costa & Kallick, 2009). HoM cannot stand alone as the subject matter, but it can be applied and embedded in every subject matter. When teaching ESP, HoM can also be applied as teachers share meaningful information dealing with agriculture issues and guide students' thoughts on how to make decisions and actions. Through consistent effort, students can not only reach their learning objectives, but also internalize the messages from the content and naturally apply them in their lives.

HoM have learning outcomes on four levels: *contents, thinking skills, cognitive tasks, and demanding skillful thinking* (Uiterwijk-Luijk et al., 2019). In the first level, basic questions should be addressed, such as what the concept and principles are that the students need to know, so that they can understand the learning material and benefit from the assistance and comprehension provided by teachers. Second, thinking skills support the idea that within a HoM, the completion of the learning process goes beyond just mastering the content. It involves how students utilize the acquired content to undergo, practice, and apply comprehensive processes that facilitate creative and critical thinking.

The final two levels (cognitive tasks and demanding skillful thinking, are needed to support HoM. Tasks should be developed with strategic thinking and support decision making. (Kreijns et al., 2019). The heart of HoM is how students can do self-reflection or contemplate their thoughts, feelings, experiences, and actions, as well as self-evaluate. Some questions to support these goals are how metacognitive strategies are employed and how thinking interdependently can contribute to skills and task accomplishment (Phakiti,

2003). What we have found supports the research findings done by Uiterwijk-Luijk et al., (2019) that HoM can promote students' curiosity and teachers' creativity by creating a culture of inquiry in the classroom. Teachers could stimulate students by providing several questions to support them to work critically in their teams.

When teaching English for agriculture, teachers can stimulate students with learning activities to support them to be more mature in facing the problems could happen in the future workplaces. Bee et al. (2013) stated that some activities requiring a high degree of logical thinking can stimulate students, can encourage them to engage in discussions for the purpose of enhancing their thinking skills. In reading activities, HoM could help students in generating their ideas and finding solutions. By implementing HoM in different groups of students, such as those struggling as readers in language-specific classrooms could be feasible. It is asserted that the activity has the potential to initiate a wide range of research variations and open up new avenues of inquiry within the field of transformative research in ESP. Apart from these results, it is suggested that future research might also investigate the effect of HoM for basic language skills either receptive or productive skills like listening-reading and speaking-writing. This study has shown that in the ESP classrooms, HoM or specifically these intelligent behaviors can be linked to the other learning experiences (Koura & Zahran, 2017).

During the pandemic, organizations including education started migrating their activities to virtual platforms. Given that the government had made an announcement that all activities should be conducted at home or 'work from home' (WFH), teaching and learning activities went online. The current phenomenon of the proliferation of educational software is a result of those experiences. During the pandemic, studies exploring the teaching and learning process were not abundant and since then there has been a lack of research on how agriculture students handle online learning challenges. Empirically, during the pandemic, both teachers and students faced difficulties in adapting their teaching and learning styles to online platforms. Throughout the discussion, the findings regarding HoM and DD can be considered in developing the teaching and learning frameworks for agricultural ESP. The students' problem-solving abilities can guide adjustments to their personal aspects.

The condition of students' HoM and DD play a crucial role in determining agricultural ESP teaching materials and learning experiences. After examining students' HoM and DD within the agricultural English context, certain aspects need verification. Generally, the students' HoM is still determined at the low level as the reliability is less than the score standardized by the Rasch model. Further exploration regarding the students' DD also shows interesting points where students admitted that they faced many problems when participating in the agricultural English classes through online learning. Most of the students involved in the virtual interview acknowledged that they experienced difficulty in mastering the English materials and even had limited interaction with their friends. Not only did technical problems, such as internet connection and old-fashioned technological devices hinder them, but the psychological problems deriving from their own family had frequently caused disruption for them. However, some students demonstrated effective decision-making to overcome the problems. They addressed their situation by devising a distinctive solution. Yet, some were apathetic and lacking curiosity. They were even unwilling to take action when they were given time to participate in the online classroom activities. They surrendered.

Conclusion

It is crucial to consider HoM and DD in teaching English for agriculture where needs are not only linguistically but also psychologically different; therefore, the learning outcomes should be redesigned to be more comprehensive to cope with both HoM and DD elements. The instructional framework for teaching agricultural English has to be developed based on the need for assessment reflecting the real and current students' conditions, including learning materials and experiences, which should be based on the students' needs. Additionally, English tasks, whether for receptive or productive skills, should be presented in an integrated model. Consequently, after acquiring proficiency in English., students can motivate themselves and set out their future with the English competencies they have mastered.

Students may obtain many advantages when they have good HoM and understand how to manage and negotiate DD situations. The growth in the students' ability to engage in critical self-reflection could enhance their enjoyment of participating in agricultural English classes, even during unpredictable events. What is even more important is that teachers should be able to enter into their students' lives in order to help students cope with their problems through the use of enjoyable activities, useful of training, and personal involvement. ESP students' voices can be the main sources for developing the instructional framework..

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