Multimodal mediational means in assessment of processes: An argument for a hard-CLIL approach

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Abstract
In Japan, CLIL instruction falls under a soft-CLIL approach, content serving as secondary to language instruction. Furthermore, assessment in classrooms in Japan is oftentimes limited to assessing the product summatively. In the paper, we argue for the value of focusing on content in CLIL activities and assessing the process with the goal to promote learning. The present small-scale study at a Japanese university explored how learners (*n*=6) used multimodal mediational means to build their conceptual understanding of 'Earth breathing' in order to create a presentation on it for a general English course. The further goal was to explore how inferences made from assessing this process of learners co-constructing their understanding can benefit the formative assessment of the outcome of their collaboration. We analysed learners' face-to-face classroom interaction and forum posts using mediated action as the unit of analysis. The findings revealed that through building on multimodal mediational means, learners were able to build their conceptual understanding and use academic language *with* this understanding. Deeper insights into learner performance were obtained from assessing the process of their collaboration. We will discuss the implications of the findings for English as a foreign language (EFL) and CLIL classrooms in Japan and beyond.

Keywords: CLIL, multimodality, assessment, interaction, truncated multilingualism, Japan

Introduction

English language education has long been a priority in Japan (Friedman 2013). Formal EFL (English as a foreign language) education begins before Junior High School level (Green 2016) and is based on the standardised curriculum established by the Ministry of Education, Culture, Sports, Science and Technology (MEXT 2014). The language is often taught out of context, instruction emphasising grammatical features; and assessment is summative (Gorsuch 1998). Japanese universities follow the same trend, yet have been implementing policy changes in language education over the last decade in particular with a push towards globalisation. The goal is to lead students to being competitive in global markets (METI, 2010).

It is worth noting that in Europe, too, due to globalisation, universities are changing. The difference, however, is that universities are increasingly perceived as global institutions centred around openness, mobility, and international collaboration (Dafouz & Smit 2016). The outcome in the two contexts is, therefore, different. In Europe higher education, there is a growing number of international English Medium Instruction programmes, in which language is given secondary importance, if at all, as the focus is on content (Dafouz & Smit 2016). In Japan higher education, generally, the focus is on English instruction, with little regard to content.

Still, content and language integrated learning (CLIL) has been emerging at a grassroots level in Japan. Teachers are integrating content into their language lessons; soft CLIL has started to appear in the Japanese context (Ikeda 2013). Ikeda (2013) strongly differentiated between the way CLIL is usually implemented in Europe, i.e., hard CLIL, where the emphasis is on the content, e.g. geography, taught in an additional language, and soft

CLIL, where content serves for teaching the language (Met 1999). Ikeda (2013), in a longitudinal study of the impact of such soft-CLIL instruction, concluded that it works well in the Japanese context as an educational approach despite generally low proficiency levels of Japanese learners. At the same time, Ikeda (2013) argued that for higher education in the Japanese context, hard CLIL could be a possibility.

In this paper, we focus on the content of activities in CLIL classrooms. We argue for the value of the hard-CLIL orientation, as it can yield deeper insights into how learners *use* the language to understand concepts while simultaneously developing their linguistic proficiency.

The goal of the study was to explore what mediates the development of learners' conceptual understanding alongside their academic language in a CLIL classroom and how following this development can inform learner assessment. Specifically, we explore how assessing the development of learners' understanding as a mediated process yields insights into their performance both in terms of content and language. Hence, we will build an argument for an alternative to the current orientation of CLIL instruction in Japan in two respects, by proposing assessing the process in addition to the product and by exploring hard CLIL (while not dismissing the role of language).

Learning and assessment in CLIL

CLIL has been defined as "a dual-focused educational approach in which an additional language is used for the learning and teaching of both content and language" (Coyle, Hood, and Marsh 2010, 1). This dual focus, however, is realised differently depending on the relative emphasis placed on the content and language.

Ball, Kelly, and Clegg (2015) discussed that the content and language integration be conceptualised as a continuum from hard CLIL, where the content is the focus to soft CLIL emphasising language. In Japan, the majority of language learning before entering university is focused on grammatical and lexical performance. However, it gives a foundation that should not be ignored in a CLIL classroom where the emphasis is on content. One pertinent question is, how can teachers assist learners in using this foundation?

Several directions have been proposed for learning and assessment in CLIL. Nikula, Dalton-Puffer, and Llinares (2013) argue for longitudinal studies and research on assessment promoting learning in CLIL classrooms. The integrated nature of the construct taught in CLIL has been underscored (Nikula, Dafouz, Moore, and Smit 2016), meaning that assessment in CLIL, should, too, elicit both as a unified construct of content and language. Leung and Morton (2016) conceptualised this unified construct as the intersects of content and language pedagogy. For example, when both content and language pedagogy are core parts of the syllabus, they argued, there is a clear description of both what learners are to acquire content and language-wise. Scales and rubrics are one way of how assessment criteria are operationalised. Where neither content nor language teaching are structured and explicit, they argued, conditions are created for learners to develop their content and language knowledge in dialogic interaction and learners' issues are addressed as they emerge in interaction. The exact way this happens is then contingent on the interaction.

Elsewhere (Author2 and Author1 submitted), we argued that the conceptualisations of the unified construct of content and language in CLIL need not be understood at a

geographical context, a school, or even a classroom. While overall, the content or language goals take precedence, the focus in the individual activities and procedures can change.

It needs to be mentioned at this point how assessment of a process is different from that of a product, i.e. learning outcomes. Quartapelle (2012, 50) discussed a holistic rubric with descriptors where content and language criteria were integrated. Determined by its descriptors, its purpose is to provide a summative score on the quality of learner performance. If the teacher's goal is to gain insights into how learners' integrated construct of content and language develops, an analytic rubric (e.g., Quartapelle 2012, 51 and 53) can be a better instrument. It allows for making detailed inferences about learners' performance with regard to content and language which can then be acted upon in the following teaching. Quartapelle (2012) also discussed how instruments such as the Common European Framework of Reference (CEFR; Council of Europe 2018) inform such rubrics. Indeed, in CLIL classrooms, CEFR can be a useful instrument as the basis for understanding learners' progression. However, it need not be forgotten that CEFR should be adapted to include content goals and progression of learners' performance content-wise. The current implementation of the CEFR is the more so useful in CLIL education due to the introduction of mediation as a subskill. CEFR discusses mediation beyond learners' ability to mediate across languages. It involves mediation of concepts, which is about learner ability to cooperate to solve a conceptual problem using linguistic means available to them. CEFR, therefore, can be a useful tool for understanding how learners' interaction in CLIL classrooms happens. To give an example, conceptualising an everyday term 'water' with reference to atomic elements (hydrogen and oxygen) both changes the way one thinks about water (as bonds between two elements) and elicits the use of other academic language, e.g., 'covalent bonds', 'bond angle', and 'bond length', one mediating and developing the other.

Shaw (submitted) elaborated on this with reference to an academic language proficiency scale. Namely, he discussed how an academic language proficiency scale can be used by teachers to understand how learners use content to mediate their language knowledge and vice versa in classroom learner-learner interaction. While the same criteria can be applied (e.g., a rubric eliciting content and language goals) both for assessing the process of learning and its product, when the interaction is assessed, it should not be forgotten that the latter based on the co-constructed learner performance, not the performance of individual learners. To understand how these different assessments can be integrated, in our view, it is best to conceptualise classroom-based assessment as a cycle of assessment, interpretation, feedback to learners, and adjustments made to the following, teaching, learning, and assessment (see Davison and Leung 2009). In this conceptualisation, then, assessment and inferences made from it should depend on what has been learned about learners in the previous cycles. Using similar criteria to make these inferences can help systematise this process.

That being said, there has been an acute lack of attention to assessment *for* learning: assessment for the purpose to promote learning and whose focus is on the process (Black, Harrison, Lee, Marshall, and Wiliam 2004). Moreover, there has been even less focus on assessment in CLIL with more comprehensive works such as that by Quartapelle (2012) and Author2 and Author1 (submitted) being rare examples. This issue is exacerbated in Japan, where there the focus is generally on assessment of learning products (Green 2016).

Therefore, we found it interesting to explore how inferences made in assessment of the learning process inform inferences made based on the assessment of the product. Davison and Leung's (2009) conceptualisation of classroom-based assessment, as

discussed above, serves the basis for our argument for the usefulness of making a systematic connection between the process of learners working on a task and their performance as the product of this process. This conceptualisation compels us to consider how what has been learned in the assessment of the process of learners developing their conceptual understanding alongside their linguistic knowledge can inform the assessment of the product of this development. Thus, the focus of this study is on multimodal mediational means involved in this process of learners developing their conceptual understanding alongside linguistic knowledge.

Moving beyond language in CLIL classrooms

In CLIL research, the importance of multimodal resources in constructing meanings has been argued for (Evnitskaya and Morton 2011; Kupetz 2011; Nikula, Dalton-Puffer, and Llinares 2013). Nevertheless, the role of multimodality in CLIL classroom remains largely underexplored (Lo and Lin 2015).

Canagarajah (2018, 6) argues that language users engage linguistic resources in order to achieve their goals despite not having advanced proficiency in the language, the so-called *truncated multilingualism*. These linguistic resources can gain new functionality in situated communication. He also argues that other resources in addition to language create meanings and shape language itself.

Norris (2011) notes, all actions require both social actors and cultural tools, language being but one of such tools. Furthermore, as Moore (2014, 587) states, learning-related goals are achieved through mediation with multimodal artefacts (including language, gestures, objects), activities (learner tasks), and other individuals (e.g., learners and teachers). With the development of technology, Cope and Kalantzis (2017) emphasise, the ability to collaborate with others within the expanded context created by technology becomes essential. They argue that technology creates a context allowing for learning beyond the spatial and temporal boundaries of the classroom, for multimodally constructed meanings (text, image, sound), co-construction of knowledge, and recursive and contingent feedback. In the current age of technology, learners have access to a variety of multimodal knowledge sources. They bring these knowledge sources to and negotiate these in the interaction, which itself moves beyond the face-to-face modality (Dooly 2017). This creates a strong argument for considering the role of multimodal resources in learners' construction of meaning.

Dooly (2017) argues that mediated discourse analysis makes these multimodal resources visible. Discussing mediated discourse analysis in detail is beyond the scope of this paper; however, one notion central to the mediated discourse analysis framework relevant to this study is mediated action (Wertsch, e.g., 1994). Mediated action perceives human actions as mediated by symbolic or physical tools. Wertsch underscores the dialectics between mediational means and agents using them. That is, individuals use cultural tools to mediate their actions in their own unique ways.

When discussing their framework for English-Medium Education, Dafouz and Smit (2016) build a similar argument for understanding joint construction of knowledge and development. Namely, they consider discursive practices as a window into the processes of development.

In CLIL research, using the multimodal interaction analysis framework (Norris 2004), Kupetz (2011) studied how learners used multimodal resources to construct both content

and linguistic meanings. Evnitskaya and Morton (2011) studied how multimodal resources contribute to the development of a community of practice. The learners engaged in doing science, and through that process, they developed their identities as school scientists.

These studies highlight the value of other modes as primary mediational means alongside and not as secondary to language. However, they discussed only those multimodal resources explicitly visible in particular interactional turns. Canagarajah (2018) argued a better understanding of how multimodal mediational means are used emerges when one moves beyond the immediate interaction.

Based on the above, we conducted this study equipped with the following understanding:

- Meaning-making in interaction is co-constructed (thus learners' joint functioning should be assessed).
- All actions are mediated, but the mediational means are uniquely used by the agents.
- Mediational means are multimodal.
- Mediational means not present in the immediate interactional context (with regard to time and space) too, shape the interaction.

Materials and Methods

The following research questions in this qualitative study are:

1. How do learners use multimodal mediational means to simultaneously develop their conceptual understanding and ability to use a foreign language?
2. What insights into learners' performance emerge in assessing the process of them constructing understanding in addition to only assessing the product of it?

We were interested in how learners made use of the resources in the context of classroom and forum interaction. This, as we will illustrate, can consciously be used by teachers to inform their assessment of the product of learner interaction. The practical significance of the study, therefore, stems from the process of learners' building their understanding often remaining unseen by teachers, who consequently miss a considerable part of learner development.

Participants and Data

The data we analysed were collected as part of a doctoral research project (Author 2, submitted) from an EFL course in a Japanese university but were not used in the dissertation proper.

The participants were first-year L1 Japanese undergraduate students majoring in engineering or agriculture in a university in Japan (n = 6; referred to as s1 to s6). Their EFL proficiency was roughly estimated at level A2 on the CEFR (Council of Europe 2018) scale based on their TOEFL ITP results.

This part of the course the learners participated in took a period of four weeks with weekly 90-minute contact meetings. The course entailed additional out-of-class study. Data from face-to-face interaction relevant to the learners' work on the assignment occurred on the first and fourth weeks. The course was marked as general English in the curriculum, but CLIL was chosen as the underlying framework for the syllabus. Thus, the course involved acquiring scientific concepts and skills, not just linguistic proficiency. The second author was the lecturer in the course.

The data were collected in (a) the audio-recorded first contact meeting, (b) learners' interaction in the forum created for them to discuss the video and create their presentation, and (c) the video-recorded contact meeting when the learners presented in front of their peers and the teacher. The data collection and anonymisation process rigorously followed the ethical procedures based on research parameters for the Ph.D. and for the university where this research was conducted. The forum contents were stored in a password-protected location and anonymised prior to analysis. Initial transcriptions of the classroom interaction used in this study were made during the time of the doctoral research project but not analysed prior to us engaging in the present study. Recordings were made using a voice recorder placed on the table where the group was sitting. Both authors checked the transcriptions independently and discussed all discrepancies that emerged.

The learners' task was to select a video among several provided and collaboratively create a PowerPoint presentation. The topic of the video that the group of learners we studied was 'Earth breathing'[1]. The learners were given freedom in how they approach the task.

The learners first watched the excerpt from the unadapted video (Gore et al. 2006), then discussed it in the classroom. Next, collaborating in a forum, the learners built their understanding of the phenomenon of 'Earth breathing' and created slides and their speech script which they then used to present to their classmates.

Analysis

The data were analysed using mediated action as the unit of analysis. In this study, learner utterances in classroom interaction and posts in the forum are treated/categorised as actions mediated by multimodal mediational means. We traced what was said or written, by whom, and how each piece of data related to what preceded or followed it. We also studied how participants' learning histories, their understanding of the course, and assignment goals shaped their interaction. We then studied how this joint understanding was transferred to their construction and delivery of the presentation, comparing what transpired in learners' presentation with regard to learners' conceptual understanding and language use to the inferences made based form learners' process of collaboration.

We will present the excerpts chronologically. However, we urge the reader not to interpret this as the learners' utterances mediated (only) by the immediately preceding ones, as the learners used mediational means on different spatial and temporal scales to construct their utterances / forum posts.

Results

We will present the results in two sections, each devoted to the results pertaining to one of the two research questions respectively.

[1] This was the term that the learners (s3) created in their interaction either having misheard the speaker's words 'breathes in' as 'breathing' or having enough proficiency to create a gerund from themselves. See Excerpts 1 and 2.

Studying the interaction

In this section, we present the results of the analysis with the goal to trace how the learners collaboratively constructed their understanding of the concept of 'Earth breathing'. As a first step, we will quote the text representing the video that the learners selected (Excerpt 1).

Excerpt 1: The video transcript.
I asked Revelle why the line marking CO2 concentration goes up sharply and then down once each year. He explained that the vast majority of the Earth's land mass—as illustrated in this picture—is north of the Equator. Thus, the vast majority of the Earth's vegetation is also north of the Equator (Gore 2006 p. 32).
As a result, when the Northern Hemisphere is tilted toward the Sun during the spring and summer, the leaves come out, and as they breathe in CO2, the amount of CO2 decreases worldwide (Gore 2006 p. 34).
When the Northern Hemisphere is tilted away from the Sun in the fall and winter, the leaves fall, and as they disgorge CO2, the amount of CO2 in the atmosphere goes back up again. It is as if the entire Earth takes a big breath in and out once each year (Gore 2006 p. 35).

The speaker in the video (Gore et al. 2006) adapts his language to a non-academic audience[2]. Still, academic language, such as 'carbon dioxide', 'tilted', and 'exhale' is used. The video is multimodal, containing words, pictures, and gestures.

Immediately after the learners watched this video, the teacher asked them to discuss it face-to-face to build their understanding of the concept. The following two classroom excerpts illustrate this.

Excerpt 2. The emerging topic to research.

1 s4: there is a :man (.) a man (.) explaining [si əʊ tu] this video (3.4) co2 level is
2 change by season
3 s6: CO2 increase and temperature.
4 s3: (5.0) a::h (3.3) Last (.) last (.) is (.) earth (.) breathing.
5 s1: breathing?
6 s6: breathing?
7 T: (43.9) Do you guys have any any good ideas? (.) any ideas?
8 s1: main thema is global warming
9 T: The main (.)
10 s1: And earth breaking
11 T: Oh earth breathing? Breathing
12 s1: breathing?
13 T: do you know what breathing is?
14 T: so what are some key points? Any ideas?

[2] The video script, which we could not reproduce here for the copyright reasons, was slightly different from the text quoted here from Al Gore (2006). Namely, the author in the video did not use the term CO2, but rather consistently referred to it as 'carbon dioxide'. He slightly changed several other words, such as replacing 'disgorge' with 'exhale' as well as 'takes a big breath in and out once each year' with 'once each year breathes in and out' in addition to naturally using gestures as well as demonstrating the breathing by inhaling and exhaling in the video at the end of the Excerpt 1.

In lines 1 and 2, s4 identifies the essence of the video for him. S3 contributes by saying that the last point was earth breathing. When the teacher enters the interaction (line 7), s1's response is that the main theme of the video was global warming, making connection between 'CO2', 'temperature', and 'increase' (the latter two added by s6 in line 3). She immediately adds 'Earth breathing', incorrectly pronouncing 'breathing', which prompts the teacher's inquiry (line 13). We argue the teacher's drawing attention to the word 'breathing' made it significant for the learners.

It is interesting that the discussion happens entirely in English. We assume that the language choice was mediated by the curriculum and that the teacher was in close to the group.

The words 'increase', and 'season' did not appear in the video but were used by s4 and s6. Thus, learners' learning histories, too, mediated interaction. The term 'CO2' appeared on the speaker's slide but was never spoken in the video, adding to the argument for multimodal nature of mediational means the learners used. As the teacher moved away from the group, the learners switched to more fluid use of the two languages (Excerpt 3).

Excerpt 3. Initial co-construction of understanding.

1. s3: *saishouni nani ga jougesuru tsuttekka wakaranai nani ga jougesuru tsuttekka.* ((what is going up and down in the beginning I don't understand. What did he say goes and down?))
2. s1: temperature *ka* ((or)) [si əʊ tu] (16.5)
3. s3: carbon (.) carbon dioxide (2.6) quantity:: (2.3) a:h (8.4) <carbon:: dioxide> (2.2) up and down i::s (2.6) u::n >ah< (2.4) u:n? (1.1) a:h (.) ((clears throat)) (3.4) is becau::se (1.6) ah (2.9) carbon dioxide quantity is up (0.9) up and do- (.) becau:se (2.9) e:h (.) ea::rth is breathing
4. s1: (1.0) *eh* ((a filler to ask the interlocutor to wait)) (.) what's: the: breathin::g (1.3) ah?
   (1.1) don't: say video
5. s1: ah *sumimasen* ((sorry)) *eh to* ((a filler to ask the interlocutor to wait)) (.) breathe what's the breathin::g (1.2) *no imi* ((meaning)) (.) *eh to* ((a filler to ask the interlocutor to wait)) mean::s (.) don't say video?
6. s1: (3.0) s:o (.) I (.) ah we shoul::d (.) learn the *sono* ((that)) breath:in what's the breathing (0.8) earth the breath:ing (8.7) do (.) do you thin:k?
7. s3: (2.7) hmmm (2.4) what do you think?
8. s4: maybe: (1.4) the video shows (.) the (1.6) different (.) of [si əʊ tu] levels (0.9) change (.) the (1.5) season. (.) Spring (.) is=
9. s3: =a:h=
10. s4: =lower (.) [si əʊ tu] levels
11. s3: season *tte itte ita*? ((did he say season?))
12. s4: maybe
13. s4 spring is lower
14. s3: (1.2) >ah< spring is lower
15. s4: maybe said
16. s3: (.) >ah< fall is higher?

In line 2, s1 responds to s3's inquiry suggesting that it was either the temperature or CO2 levels that went up and down. Limiting it to two options, s1 helps s3 to construct his statement. S3 the switches to English and uses vocabulary from the video to link the

fluctuation of CO2 level with ‘Earth breathing’. Still, there is little understanding of the phenomenon, as neither s1 nor s3 know what breathing is in the context of the video (lines 4–7) and they both invite others’ opinions. S4 does not directly answer this query. Instead, through verbalising his understanding and going beyond the speakers words, he provides his answer to s3’s query at the onset.

We note that the view of the interaction developing linearly reveals but a part of the picture, as the learners bring in various mediational means beyond the immediately preceding turns--the video, the teacher’s words, and the previous learning experiences mediating the emerging understanding of the phenomenon of ‘Earth breathing’.

Soon after this, the interaction moved to the forum. It appears that as the modality of the interaction has changed, the learners needed to renegotiate their understanding (Excerpts 4 and 5).

Excerpt 4. Setting the task

30 April, 09:57	S3	I think this video is earth breathing. This is because we should talk about earth breathing.
30 April, 10:01	S4	that't idea is nice. we shoud reserch about earth breathing.
30 April, 10:01	S5	OK I see. I think that CO2 levels is changing through the year.

In the initial post in Excerpt 4, s3 reiterates that the video is about ‘Earth breathing’. He, then, explicitly sets discussing ‘Earth breathing’ as the task of the interaction.

S4 largely repeats s3’s words. However, s4’s word choice changes this context from talking about Earth breathing to *researching* it, implying a switch to an academic discussion. S5 acknowledges s4’s suggestion and adds that CO2’s level fluctuates throughout the year. We interpret this as s5 responding to both s3 and s4 by *researching* ’Earth breathing’. S5 uses s4’s words in Excerpt 2, lines 4-5 and Excerpt 3, line 16. However, he also uses the speakers’ words in Excerpt 1 ‘once each year’ and adds his own voice to his formulation (‘through’). In other words, s5 uses all of these mediational means in his own unique way to formulate his sentence.

S5’s mediated action guides the following interaction: building a conceptual understanding of the phenomenon of ‘Earth breathing’ as the change of CO2 levels. We next trace how this understanding continued to develop.

Excerpt 5. CO2 levels through the seasons.

30 April, 10:01	S3	The quantity of CO2 goes up and down. Is this OK?
30 April, 10:02	S4	yes. summer and spring is low?

30 April, 10:02	S2	I think the key point of the video is season and CO2 levels. Also I think the difference between the northern hemisphere and the southern hemisphere is important.

We will next elaborate how the turns in Excerpt 5 were mediated, focussing on the mediated action in s2's post.

Now that the modality of the interaction has changed, we suggest, the learners are seeking to confirm that their previous utterances are a part of the concept of 'Earth breathing'. If this is the function of s3 and s4 posts, there is at least a partial understanding of the concept, although they both express uncertainty through interrogative sentences. Both s3's and s4's posts can be construed as clarifying their understanding of s5's post (Excerpt 4).

Instead of directly addressing s4's (and s3's) query, s2 lists the key points of the video and, perhaps, builds on s4's utterance from Excerpt 3 (line 8). Doing so, s2 implies that understanding of the concept can be built by defining the key elements forming it. The teacher's intervention (Excerpt 2, line 14) could have, too, mediated s2's post. S2 also promotes the understanding of 'Earth breathing', for the first time underscoring the difference between the hemispheres. To summarise, s2 uses (a) language from the video, e.g. 'the northern hemisphere', (b) the teacher's words 'key points' (Excerpt 2), and (c) the preceding classroom interaction, to construct two coherent, well formulated sentences.

S2 did not actively participate in the classroom interaction nor in the forum, so it is difficult to assess his linguistic performance. The few other posts that he left in the forum were short phrases, e.g. "let's make!!" or "I change slides." Therefore, it is likely that s2's post in Excerpt 5, is a case of truncated multilingualism, as he uses (very effectively) different means to mediate his action that linguistically is probably beyond his unassisted level of performance.

In excerpt 6, we trace how s2's contribution added to other learners' understanding of the concept.

Excerpt 6. Co-constructed conceptual understanding.

7 May, 12:20	S5	I'm so sorry. It's too late reply. I think the key words of this video is season, sun, hemisphere, leaves, and breath. I think we will able to understand most of this video.
11 May, 22:01	S6	I'm sorry too late. I returned to watch "Earth Breathing". I noticed the carbon dioxide levels in the atomosphere go down in the time when northen hemisphere is spring. Because plant on earth grow up at once inthe spring.
11 May, 22:05	S6	That's why , I think "earth breathing" is the change of carbon dioxide levels .

11 May, 22:27	S5	I think your idea is right. Carbon dioxide levels are changing because plant breathe carbon dioxide in and out, is it so?
15 May, 01:09	S6	Yes. That's right !!

It transpires that s5 in this post, builds on s2's post from Excerpt 5. The video may have also mediated s5's thinking, as the words 'leaves' and 'sun' from the video re-emerge here. We interpret s5 as indicating that he thinks *he* understands most of the video, and others will be able to, as well.

S6 links these keywords together in his 22.01 post, providing, for the first time, an explanation of the relationship between spring, the northern hemisphere, and CO2 levels. His understanding is rather accurate. The 22:05 post makes it visible that it is now *his* understanding.

Language-wise, s6 first produces a rather well formulated sentence, which we attribute to him rewatching the video (compare: "when the northern hemisphere is tilted toward the sun as it is in our spring and summer ... and the amount in the atmosphere goes down"). The following sentence s6 produces is much less well formulated. However, s6 no longer uses academic language to mediate his understanding; he expresses his *own* understanding using the everyday language available to him. That is, although this sentence is linguistically not as advanced as the previous, an accurate conceptual understanding of the phenomenon emerges in it.

S5 in his formulation (May 11, 22:27) replaces 'breathes in and out' from the video, the speaker accompanying it with the demonstration of the action and breathing, and gesturing, with 'breathe carbon dioxide in and out', linking breathing to quantities of carbon dioxide, which shows the development of the conceptual understanding. Using linguistic criteria alone, the teacher would not be able to trace this development. Rather, a deterioration of the learner's performance would be evident. However, considering both the linguistic and the conceptual goals should allow for tracing how the learner resolved the tension between the content and the language. As we will illustrate in the following section, this allowed s5 to use more complex language *with* conceptual understanding later when he presented in front of the class.

To elaborate, the multimodal mediational means from the video, negotiated and reconstructed by the learners, result in that the learners appropriate the academic language, using it in *their* own way to formulate their understanding. Here, s5 uses these to construct his interpretation of s6's preceding post. It is also an invitation for others to check this understanding. We note that s6 strongly confirms s5's understanding, which shows that s6's understanding is still developing.

To summarise this section, it can be traced how learners, using various mediational means, collaboratively constructed their understanding of a phenomenon of which they had little understanding at the start.

As we suggested previously in this paper, the teacher can use the same criteria as for assessing the product of learner interaction to systematise their assessment of learners' performance, especially paying attention to how learners mediate their conceptual understanding through language and vice versa. For this latter purpose, teachers can use

the CEFR mediation scales (CoE 2018). However, as we will argue in the discussion section later in the paper, these should be the basis of teacher assessment of the process rather than strict criteria to follow.

With reference to the second research question, will next illustrate how the process of learners co-constructing their understanding produced insights explaining their performance as they presented in front of the class.

Learners' presentation

We start this section by looking at the product of learner interaction, i.e., the presentation that the learners gave, focussing on s6's contribution (Excerpt 7).

Excerpt 7. S6's presentation speech.
In spring and summer, carbon dioxide levels go down. Because a lot of vegetations grow up and breathe in carbon dioxide. On the other hand, in fall and winter, carbon dioxide levels go up. Because a lot of vegetations die and can't breathe in carbon dioxide. Relatively speaking, emitted carbon dioxide levels are increase in fall and winter. Thus, the relationship season and carbon dioxide levels are very important.

The following slide accompanied s6's speech (Figure 1).

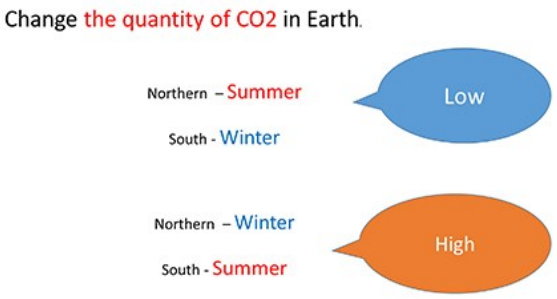

Figure 1. Slide 17 of learner presentation.

When s6 speech and Figure 1 are considered together, there appears to be a clash between them. S6' speech and the slide together constitute a rather accurate conceptual understanding; s6' speech without the slide does not. Thus, the difficulty arises as to how to assess it.

This clash is resolved once the process of creation of the presentation is considered. To repeat, s6, in the forum interaction, was able to produce a rather accurate conceptual understanding of the phenomenon, though mediated by others (Excerpt 6, 11 May 22.01). That s6 still has this conceptual understanding becomes apparent when it is considered how s6 created his speech. Initially, s6 based his script on the slide created by s1 (Figure 2), which, in turn, was mediated by the video visuals, showing the Earth tilted with its Northern Hemisphere towards the Sun (see Gore 2006, p. 34 for a reference), adding 'I made script to the seasons slide.'

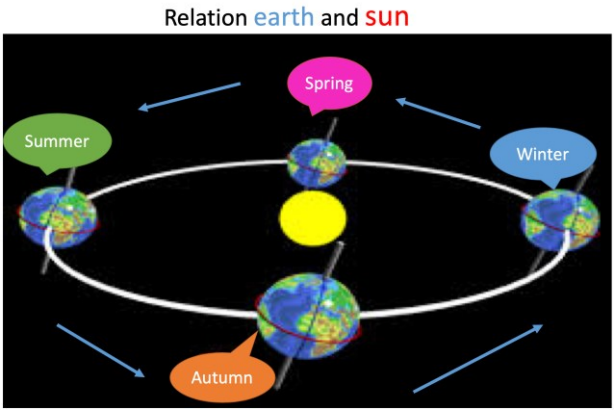

Figure 2. Slide deleted in version 14 of the slides.

The slide in Figure 2 forefronts seasons, which could have been the reason for s6 not mentioning hemispheres in his script. However, in response to the script draft proposed by s3 containing the utterance “North earth and south earth were defferent.”, s6 added “The difference is area of continents.” Conceptually, then, s6’s understanding has developed even as compared to the forum interaction, albeit still mediated by the video and the slides created by other learners.

Language-wise, s6’ script is not perfect. However, s6 is using specialised vocabulary related to the phenomenon and rather complex expressions such as relatively speaking’ and ‘thus’ (Excerpt 7). Therefore, considering s6’ level was estimated at around A2, s6’s linguistic performance could be rated highly. That said, similarities between the language used by the speaker in the video and that by s6 are apparent.

Depending on the teacher’s stance, that s6 used the speaker’s words could be seen as both positive and negative. S6 clearly based his speech on that by the speaker in the video (Excerpt 1), which can be assessed as lack of understanding by some teachers (see Leontjev, Jakonen, and Skinnari submitted). However, there is reason to suggest that s6 used these words with understanding. We wonder, still, whether it was the learners’ understanding of the assessment criteria that resulted in s6 repeating the speaker’s words. That the course was marked as EFL could have resulted in that s6 considered that his task was to demonstrate his linguistic knowledge, using then the speaker as a model of ‘good English’.

Discussion

The goals of the study were: (a) to explore the multimodal means mediating Japanese learners’ building of their conceptual understanding of ‘Earth breathing’ and their academic English and (b) to explore how studying the process of learner interaction can yield deeper insights into learner performance as compared to those when only the product/outcome is assessed. We will next discuss the results with reference to these two goals.

The language that the learners used to construct their understanding both served the major mediational means and showed how their understanding developed. Throughout the interaction, the learners’ employed language, predominantly from the video, in order to mediate their emerging understanding of ‘Earth breathing’, even though they did not always have a full understanding of the language they used. This is particularly evident in s6’ posts (Excerpt 6), who uses the speakers’ words in the video to mediate his following seemingly

inferior sentence language-wise “Because plant on earth grow up once in the spring.” where his conceptual understanding transpires. S6 develops his understanding by first using the academic language which was beyond his unassisted level of linguistic performance to help him construct his understanding in everyday words before moving back to the academic language, but *equipped* with this understanding. What seemed to be a ‘digression’ in the learner’s performance language-wise, in fact, constituted the development of his conceptual understanding. This would not be possible without the learner using the academic language beyond his unassisted level of performance (Canagarajah 2018).

The mediational means were also multimodal. One example is the use of ‘CO2’ (Excerpts 2, 3, 4, and 5; Figure 1), which the learners took from the speaker’s slides rather than his speech. Furthermore, the learners had to transfer their oral negotiation in the classroom to the forum; hence, the onset of forum interaction was seemingly a repetition of the classroom discussion. The context of the forum itself mediated the way the learners interacted, as the learners could read their previous posts. Finally, the slides and their accompanying scripts were created by different learners. The slides, the pictures and the accompanying text were changed through the 15 versions in tandem with the scripts. The scripts, therefore, served as mediational means for the slides just as the slides served as mediational means for the scripts, developing the learners’ conceptual understanding and their language.

We also argue, following Canagarajah (2018), that learners brought mediational means beyond those in the immediate context, into the interaction. For example, the course syllabus and the learners’ understanding of the activity, too, mediated their performance. Perhaps, as s6 considered the goal of the presentation was to demonstrate his linguistic performance, as the course was marked as EFL in the curriculum, he borrowed the language heavily from the video, but was unable to express a fuller conceptual understanding. The conceptual understanding in his speech would emerge more fully, perhaps, should he have used the everyday language.

We would like to emphasise that the learners’ forum posts and utterances in the classroom should not be perceived as individual learners’ understanding. These were *their* posts and *their* utterances co-constructed and mediated by their learning histories, the teacher, the video, and the modality of the interaction.

This brings us to the other part of the inquiry, namely assessment promoting learning in classrooms where content and language are integrated. Should the teacher have had access to only the product of the interaction (Excerpt 7) the teacher could see, for example, that both the conceptual and linguistic development had occurred in s6’ performance. The teacher could also note that s6’ script stemmed from the speaker’s words. However, otherwise, little is transparent as to why and how s6’s understanding has developed and, more importantly, how this assessment can be used to promote learning.

A different picture emerges when the learners’ interaction is considered. S6’ mediated understanding of the concept in the forum (Excerpt 6) is, rather accurate. The first inference that can be made is that once sufficient mediation is available, s6 is capable of demonstrating the conceptual understanding of ‘Earth breathing’. However, this mediated and co-constructed understanding is not yet fully internalised, as even though the slide accompanying the speech involved the notion of hemispheres, s6 never mentioned them (see Figure 1). In both cases, we argue, s6’s performance is mediated, but in the latter case, the mediation is not enough.

Equipped with these insights, the teacher could help s6, and other learners, to further internalise the conceptual understanding by drawing s6’s attention to the words ‘northern’

and ‘southern’ on the slide and asking what these refer to. This would become possible as the teacher could pay attention to how s6 contribution in Excerpt 6 was mediated (e.g., with reference to Excerpt 5). Still, the teacher should keep in mind that it was not just one particular turn but it was the whole interaction and all various multimodal mediational means that mediated s6’ contributions to the forum and shaped his performance in Excerpt 7. Should the learner have trouble responding, the teacher could next say something along the lines of ‘I remember you posted something about this in the forum’. If this would not be enough, the teacher could play back the relevant part of the video. Such approach as illustrated above is itself both an instructional and assessment activity referred to as Dynamic Assessment (e.g., Poehner 2008). Briefly put, it allows for determining how close learners are to independent functioning with regard to the assessed constructs (content *and* language) and how teachers can model their assessments systematically as a continuous process.

Somewhat paradoxically, considering both the product and the process as a joint performance, the teacher can better understand how individual learners have internalised both the content and the language by building on their joint performance. In this paper, we studied cooperation between learners; hence, in the assessment of the process, their performance as they collaborate on a common task should not be perceived as independent. The question still remains how the two assessment cycles can be systematically used together to understand how learners reached the goals (and why they did not) and how they can further be guided in their development.

We propose this can be done through the following:

- using the same analytic rubrics having both content and language criteria (Shaw submitted; Quartapelle 2012) to gain a deeper understanding of learners’ strengths and weaknesses and of how to guide learner development;
- paying attention to how learners use content to mediate their language and vice versa; mediation scales from the Companion Volume of the CEFR (CoE 2018) can help teachers understand how they can guide the development of their learners’ language through content and vice versa;
- making note of mediational means that learners use to co-construct their performance and how they use these means.

These can serve as the basis for teacher assessment (Davison and Leung 2009), informing the teachers’ understanding of where the learners are currently in terms of their performance, how they got there and how to help them move forward.

To give a specific example how this can be done, we refer to the case of s6. His presentation (Excerpt 7) can be assessed using Quartapelle’s (2012) analytical rubrics. The rubrics for the content, e.g., “Identifies concepts, classifies them and formulates hypotheses on process / problem solving” (p. 51) and language, e.g., “...generally appropriate use of vocabulary” (p. 53) can serve as a basis for assessing s6’s conceptual understanding and linguistic knowledge. Yet, if the same rubric is used to also assess his forum post (Excerpt 6), then insight can be made with respect to the process that led to his forum presentation. The mediational scales in the Companion Volume (CoE, 2018), in turn, e.g., “Can paraphrase more simply the main points made in short, straightforward spoken or written texts...” (p. 128) and “Can relay (in Language B) specific information given in straightforward informational texts...” and can help the teacher to understand that the s6 in the forum was

eventually able to explain the concept in the everyday language (using language to mediate the concept) which allowed him to use the academic language to talk about this concept (the conceptual knowledge allowing him to use the academic language with understanding).

As the present study illustrates, learners use a variety of multimodal mediational means to shape their interaction. To structure their assessment of the process, when designing their activities, teachers can think in advance which mediational means are afforded to learners by the activity, so that they can later use these to further direct learner development. In the present study, the video that the learners were given served as a powerful mediational means, involving both scientific concepts and academic language that learners then used in their interaction in their own unique way. A good example from Dooly's (2017) study was the concept of "students will be able to", which was introduced to student teacher by the instructor, and which student teachers started to use to mediate their interaction, changing their understanding of classroom activities and developing teacher talk due to using the concept.

That said, we argue that if teachers, when assessing the process, strictly follow any fixed assessment criteria, they essentially underuse opportunities to gain deeper understanding of learner performance emerging in the complex interplay of mediational means as learners co-construct their conceptual understanding and develop their linguistic performance. Dooly's (2017) study we referred to earlier, while not having a focus on assessment, is an example that teachers can use as a reference for tracing of how students bring mediational means into the interaction and use them to promote their own development.

Thus, we perceive the three suggestions outlined earlier rather as a basis for understanding the emergent and centrifugal process of learner interaction. Indeed, the starting point of developing classroom assessment practices is teacher awareness of what is involved in learners' interactions in CLIL classroom. Once teachers become more conscious in eliciting, observing, and promoting the development of learners' content and linguistic knowledge in CLIL, they can truly make assessment of processes a part of their classroom practices (e.g., Lantolf and Poehner 2011).

A point to consider is how feasible it would be for a teacher to become more involved in the interaction process among learners in activities similar to the one we studied. Learners collectively conceptualised their understanding of 'Earth breathing' not only through the classroom interaction, but also through the forum discussion, and the sharing of PowerPoint and script files. These provided the teacher with a history of the path the learners took to reach their understanding. Having these insights, a teacher can provide recursive feedback (Cope and Kalantzis 2017) at specific times through the forum interaction. If the teacher sees that the learners are struggling with a conceptual understanding, the teacher can mediate it through using the language. For example, in the case of the present study, the teacher could refer the learners to a particular part of the video, such as the speaker discussing hemispheres or using the speaker's words or showing screenshots accompanied with the relevant language used to talk about the phenomenon.

This could be done using a flipped classroom (Author2 2018), with learners continuing their conversation in the online forum during non co-located times, the teacher building on these during the face-to-face time, for example, as we proposed above. Instead of viewing lectures online (Cope and Kalantzis 2017), learners create their own dialogue and bring their own resources to reach the set goal. The classroom time is then used to reflect on the learners' understandings, with teacher intervention mediating the subsequent forum interaction among learners.

Alternatively, learner reflection as to what they learned and how can be elicited at certain times during the forum interaction in form of a set of guiding questions. Using these to assess the process instead of going through the whole of the forum interaction could save teachers time and resources simultaneously allowing them to learners in their development.

Conclusion

The present study aimed at exploring what mediated learner performance as they collaborated on a task eliciting both academic English and content knowledge. The focus was on the insights that can be made based on assessing the process of creating the presentation as compared to assessing the product.

Learners used multimodal resources to develop their English and conceptual understanding including the speaker's words and visuals in the video, the classroom interaction, the forum posts, and their intermediate versions of the slides and speech scripts. The learners also brought their learning histories into the interaction. Finally, the syllabus, too, mediated the learner interaction and its product. Being able to express themselves freely in Japanese or in English without focusing on accuracy, the learners developed their conceptual understanding and were able to present it in academic English; despite that in the beginning, they were given language and a concept beyond their unassisted level of performance to discuss. In other words, they learned to use the novel academic language *with* conceptual understanding.

We do not advocate for a drastic change in content and language integrated instruction in Japan from soft to hard CLIL. However, we suggest that even when the overall focus of instruction is on language, this should not prevent teachers from including some activities as part of their courses that elicit content goals in order to obtain deeper insights into their learners' performance.

Limitations of the study should be mentioned. To start with, other mediational means could have been studied. We limited these due to the feasibility, as even the limited number of mediational means we studied resulted in a complex picture. Admittedly, we did not explicitly discuss the learners' use of both English and Japanese to co-construct meanings. We nevertheless consider it useful to study in further research (Cenoz 2015; Lo and Lin 2015; Nikula and Moore 2019). The concept of translanguaging (Wei 2018) can be of particular use for understanding how learners engage their multilingual repertoires to co-construct meanings. We also caution the reader against generalising the findings to other contexts due to the qualitative nature of the study and the small sample. Further research will, hopefully, add strength to our argument.

Furthermore, we acknowledge that the second author was both the teacher of the learners and a researcher who together with the first author conducted a detailed analysis of the data. Hence, the context was different from that when a researcher comes into a classroom to observe the lesson in progress or when the teacher adopts a practice based on their sole understanding. However, already that teachers are aware of the value of assessing process alongside product, acknowledge the role of multimodal mediational means in the development of learner abilities, and consider language and content as parts of the same construct, matters. The exact way this awareness manifests itself will probably be different across classrooms. We reported on but an example of such practice. With regard to further research on assessment in CLIL, we call for a change in teachers' role from being research subjects to equal collaborators adding their expertise as teachers to researchers'

expertise. Space precludes us from duly elaborating on how this can be done, but we propose that Vygoskian *praxis* (see Lantolf & Poehner, 2014; Lantolf, Poehner, and Swain 2018) can inform this process. Briefly, praxis is a dialectical unity of theory and practice, where practise is used to validate theoretical understanding and theory is actively used to change practise. It is our hope that the present study will inspire such research.

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APPENDIX A

wo:rd	prolonged sound
(.)	silence less than 0.2 seconds
(2.0)	duration of a silence
((word))	comment or English translation
word	stressed word or its part
<word>	slower pace
>word<	faster pace
wo-	cut-off word or utterance
?	rising intonation
=	latched utterances
[IPA]	phonetic transcription using IPA