International Journal of TESOL Studies (2021)
Vol. 3 (2) 5-22 https://doi.org/10.46451/ijts.2021.06.02

Article

Using an Online Social Annotation Tool in a Content-Based Instruction (CBI) Classroom

Marissa K. L. E
National University of Singapore, Singapore

Abstract
Online social annotation (SA) tools like Hypothes.is offer students a means of working collaboratively on an online document like a webpage. Such collaborations involve multiple students making annotations on a single digital platform to deconstruct assigned course readings. This type of collaborative endeavour is potentially helpful in the Content-Based Instruction (CBI) classroom because the emphasis on academic content in the CBI classroom can lead to difficulties for students, especially when students engage with threshold concepts that form part of the academic content required. Collaborations using SA tools could thus provide opportunities for peer learning and active engagement that would help students in facing the challenge of tackling threshold concepts. This pilot study aims to examine the usefulness of the Hypothes.is platform in the CBI classroom for facilitating student learning of threshold concepts. Analysis of annotations showed that students engaged with assigned electronic webpage articles in a variety of ways. Furthermore, textual analysis of a sample from the course's final assignment showed evidence that relevant threshold concepts had been utilized appropriately and constructively. Finally, a follow-up survey also indicated a significantly positive response towards the utilization of Hypothes.is. In all, the study's findings show that the employment of online SA tools can potentially serve as a complementary teaching and learning tool to help students learn through collaborative peer learning and active engagement.

Keywords
Online social annotation (SA) tools, content-based instruction (CBI), collaborative learning, threshold concept

1 Introduction

Online social annotation tools (SA) tools are digital platforms that allow annotations to be made on digital texts and shared with a group or community via the internet. The use of SA tools for collaborative learning has been explored in various disciplines and domains, for example in the language classroom (Johnson, Archibald, & Tenenbaum, 2010), in the field of engineering (Lin & Lai, 2014) and teaching training (Benitez, Quinones, Gonzalez, Ochoa, & Vargas, 2020). Miller, Lukoff, King and Mazur (2018) also report on how SA tools help to enhance learning in the physics classroom, focusing on how

Address: Centre for English Language Communication, National University of Singapore, 10 Architecture Drive, 117511, Singapore
Email: elcmari@nus.edu.sg

a particular SA platform, Perusall, promotes the use of active reading strategies and helps encourage "high-quality learning interactions between students outside class" (p. 1). In addition, Eryilmaz, van der Pol, Ryan, Clark and Mary (2013) point out how an annotation functionality helps lower the cost of conducting coordination activities in terms of time and effort that are necessitated during an interactive learning activity, thus allowing for more concentration on the learning activity. The same study also found that using annotation facilitated richer discussions that were likely to generate learning gains for individual students. In general, it has been shown that SA tools have potential usefulness when integrated into learning activities across a range of educational settings (Novak, Razzouk, & Johnson, 2012).

Thus, with the benefits of utilizing SA tools in mind, in particular that of helping students engage constructively with reading material, this study aims to examine its usefulness in the Content-Based Instruction (CBI) classroom. Simply put, CBI involves the use of academic content to teach a target language. CBI, as defined by Tedick and Cammarata (2012), is "a curricular and instructional approach in which nonlinguistic content is taught to students through the medium of a language that they are learning as a second, heritage, indigenous, or foreign language" (p. 28). The objective behind this pedagogical approach of teaching language is a prioritization of ideas in order to contextualize language teaching, rather than a decontextualized focus on language rules and structure (Martel, 2018).

However, there are challenges faced in the CBI classroom when students are unfamiliar with academic content as well as the disciplinary conventions of academic reading and writing. This would likely be the case especially with first-year undergraduates who have just entered university. As Stoller and Fitzsimmons-Doolan (2016) point out, one of the challenges facing CBI is determining what would be "a good match with students' ages, students' cognitive levels, and curricular expectations" (p. 9). In addition, critics of CBI have accused CBI practitioners of simplifying academic content to the extent that learners' grasp of this content is compromised (Dalton-Puffer, 2011). Essentially, there is a need to ensure that the content provided is not only challenging enough to reach adequate difficulty levels of learning but allows for student engagement as well.

One way an adequate difficulty level can be met in a course is by utilizing the notion of 'threshold concept' (Meyer & Land, 2003; 2005). According to Barradell and Peseta (2016, p. 263), what differentiates threshold concepts from other key or core concepts is "the potential for change; a change in knowing, doing, being, and future learning possibilities". In addition, they point out how key or core concepts are "building blocks whilst threshold concepts are far more sophisticated than 'the essentials' would suggest" (p. 263). These two descriptions are encapsulated by eight characteristics of threshold concepts indicated by Meyer and Land (2003, 2005), which are: transformative, troublesome, irreversible, integrated, bounded, discursive, re-constitutive and liminality. In the context of the course used in this study, which is an academic writing course that utilizes academic content knowledge from the topic of neoliberalism to teach academic writing, concepts like 'ideology' and the 'market' have the potential to function as threshold concepts since they align with some of the characteristics mentioned above. Neoliberalism is an area of study that has been difficult to define (Venugopal, 2015). It has been described as functioning both as a descriptive and explanatory concept relevant to a broad range of topics that span from politics to even infotainment. In addition, neoliberalism's constantly mutating character renders it applicable in multiple spheres that have varied implications across context-specific socio-economic, socio-political and socio-cultural spaces (England & Ward, 2016). Thus, for first-year undergraduates, tackling the topic of neoliberalism and its threshold concepts would possibly pose significant challenges.

Consequently, it makes sense to employ collaborative learning strategies to help students negotiate such challenges. There is much literature on how collaborative learning is useful for effective learning where such collaborative efforts result in 'built knowledge' (Scardamalia & Bereiter, 1994). This means that knowledge is 'built' via interaction and reflection that facilitates the co-construction of meaning within and beyond the group. SA tools, with their abovementioned benefits in terms of enriching student

interaction with both the assigned readings and their peers and reducing the logistical load of student group collaboration on online platforms, among others, thus have the potential to facilitate this 'building' of knowledge that involves the negotiation of threshold concepts.

Therefore, this pilot study aims to explore the usefulness of SA tools in helping students manage the academic content used in a CBI classroom. More specifically, the study looks to examine the following research questions:

1. What types of annotations do students make on an assigned course reading? Are these annotations reflective of constructive student engagement with the reading?
2. To what extent is there evidence from student work that they understand and are able to apply threshold concepts relevant to the academic content used in the course?
3. What are students' experiences of using an SA platform? Was it helpful for their learning?

The SA tool utilized in this study is Hypothes.is (https://web.hypothes.is/). This tool can be used for free as a Google Chrome extension or proxy bookmarklet for other browsers. As shown in Figure 1, students can use Hypothes.is to highlight parts of the webpage text (red-lined boxes) and create annotations anchored to these highlighted parts (red arrows). Annotations can be responded to by clicking on the rounded arrow icon on the bottom right hand corner of each annotation. These responses can then be viewed by clicking on the 'Show replies' link (green-lined box) which will expand the thread to show all replies to the annotation.

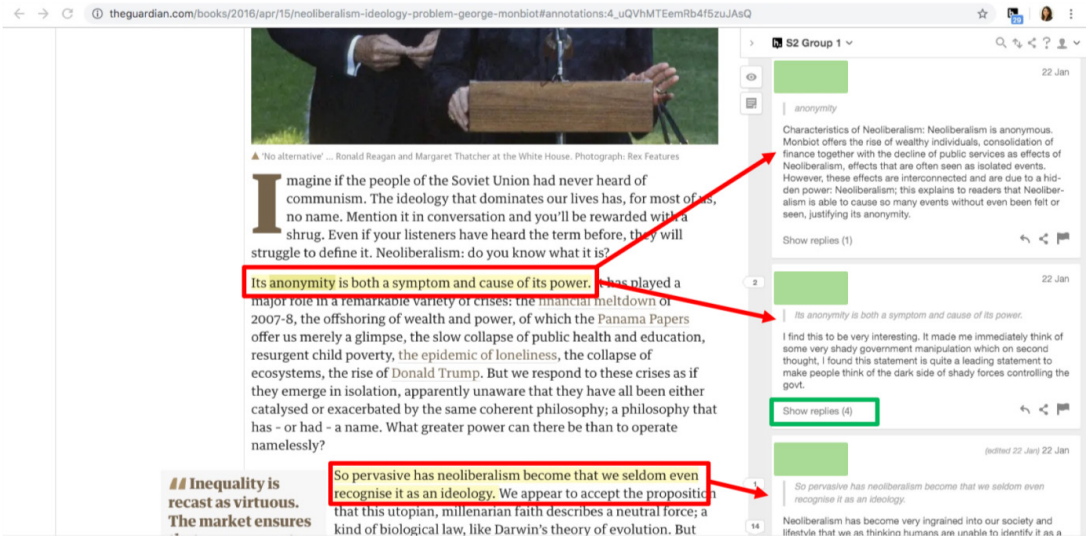

Figure 1. Webpage with Hypothes.is annotations

The management of academic content is understood here in three ways: (i) constructive engagement with the assigned course readings via the Hypothes.is platform, (ii) the ability to understand and apply threshold concepts in classwork and assignments and (iii) students' experience of using the Hypothes.is platform in terms of their perception of its impact on their learning. It should be noted that this study does not seek to prove the effectiveness of SA tools like Hypothes.is over other types of teaching and learning tools but aims primarily to describe how it facilitates student engagement with assigned course readings and how this facilitation of engagement potentially contributes to effective application of threshold concepts, with this effective application supported by a positive user experience of the platform as well.

In the sections to follow, the relevant literature will be discussed, focusing in particular on the areas of SA tools, threshold concepts and the ICAP framework (Chi et al., 2018) utilized in the Discussion section. The methodology used in this study is then described, with the results following after. Following from there, the results are discussed in relation to the three research questions stated earlier. The paper

then concludes with some considerations on the use of SA tools in the classroom and directions for future research.

2 Literature Review

2.1 SA tools

In this section, we review a subset of the relevant literature in two main areas – SA tools and threshold concepts – and introduce the ICAP framework. The first part of the section focuses on reviewing studies examining the usefulness of SA tools on the learning process. It also looks briefly at two general types of research literature on SA tools and describes the various learning contexts in which SA tools have been used. Following that, two reviews of the available literature on SA tools are discussed to give some indication of the varied effectiveness of SA tools when studied in learning settings and highlight the need for continued research on the use of SA tools for educational purposes. The next part of the section then explains the notion of threshold concepts and its relevance to the CBI classroom, using this explanation as a basis for the threshold concepts focused on in the specific context of this study. Finally, the section ends with a brief introduction to the ICAP framework that will be used in the Discussion section to explain how the different types of annotations reflect the co-construction of knowledge among students.

At its most basic, annotation as a tool for helping students make sense of and engage with what they read is something that can be done with a highlighter and pen. However, with advances in digital technology and the ease of electronic publication of texts on the internet, annotation using SA tools can now be conveniently conducted with others on electronic texts, facilitating a social aspect that carries with it the potential to engage students via peer learning (Glover, Hardaker, & Xu, 2004; Mendenhall & Johnson, 2010). Besides this social aspect, annotation can also be used to track how readers think about what they read at certain points of the text by anchoring these annotations to particular parts of the text (Brown & Croft, 2020). This evidence-based tracking is useful for both teachers and students – the teacher can gain insight into how students process information at particular points in the text and students can reinforce their own learning by reviewing these annotations at a later time, which can help enhance student motivation since learning is available at any time of the day with an internet connection (Gao, 2013). Both teachers and students can also offer feedback on annotations in the material space of the text, anchoring this feedback to relevant parts of the text (Lebow, Lick, Harman, Dalglish, & Grundmann, 2011) and enhancing a single initiating annotation by providing other points of view that can enable co-construction of meaning to facilitate learning (Suhre, Winnips, de Boer, Valdivia, & Beldhuis, 2019).

As mentioned in the introduction, SA tools have been used in a variety of disciplines to facilitate learning. This flexibility of use can be attributed to what Kalir and Garcia (2019) have identified as the five common underlying purposes of annotation, namely, "to provide information, to share commentary, to spark conversation, to express power, and to aid learning". However, to my knowledge, the use of SA tools in the CBI classroom is something that has not been studied. This is an area which has potential for investigation, especially since CBI classrooms utilize academic content that could be considered unfamiliar and challenging for the learner.

The literature on SA tools can generally be divided into two types: those that focus on the technological aspects of the platform and those that focus on the implementation of the platform in learning settings. However, what links both types is a common interest in how the technology can help facilitate learning and effective collaborations between learners. For example, Glover et al. (2004) describe the design and development process of a SA tool system both in terms of its technical aspects and how these technical implementations can be used to enhance collaborative learning content. In contrast, work like Archibald (2010) focuses on the utilization of social annotations with regard to reading comprehension, critical thinking and meta-cognitive skills.

In Novak et al.'s (2012) review of the available literature related to the utilization of SA tools in higher education settings, although a total of 90 articles involving the use of SA tools were found, only 16 met their criteria for inclusion into the review. From these 16 articles, the authors determined that there was "some evidence regarding the potential effectiveness of integrating social annotation tools into learning activities" (Abstract). Ghadirian, Salehi and Ayub (2018) also conducted a review of 71 studies, highlighting how there has been an increase in the number of research publications relating to SA tools and learning, which reflect what is likely to be an increasing interest in its use for educational purposes. However, they adopt a more critical approach in their review, pointing out how particular studies could have been improved to enhance their findings and raising the possibility of how the various SA platforms available could be improved in terms of their interfaces, for example.

While issues like interface design may impact the user experience for students, conducting research studies on the utilization of SA tools in the classroom can help to improve these aspects to enhance the user experience for the learner (Suhre et al., 2019). This is especially important since different disciplinary domains require students to engage differently with different types of content. For example, science disciplines may involve more use of figures and diagrams, which would require the use of visual literacy skills that may not be as frequent as compared to a language classroom. Essentially, like any other technology platform, the various affordances of particular SA tool platforms will change according to their users' needs (Krouska, Troussas & Virvou, 2018). However, this is something expected, and would not necessarily detract from the usefulness of SA tools if taken into consideration with each iteration of a SA platform's development.

2.2 Threshold concepts

We next turn to the notion of threshold concepts, which was first proposed by Meyer and Land (2003). They define this as follows:

> A threshold concept can be considered as akin to a portal, opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress. As a consequence of comprehending a threshold concept there may thus be a transformed internal view of subject matter, subject landscape, or even world view. (p. 412)

Meyer and Land (2003) first identified five characteristics of threshold concepts to differentiate them from key concepts or core concepts, with three more characteristics added in their 2006 publication. However, it is not necessary for a threshold concept to conform to all eight characteristics (The Threshold Concept, n.d.). These eight characteristics are listed in the table below, together with their brief definitions.

Table 1

Characteristics of Threshold Concepts (adapted from The Threshold Concept, n.d.)

Characteristic	Definition
Transformative	Changes the way a student views the discipline
Troublesome	Causes difficulties for the student, e.g. counter-intuitive, foreign or seemingly incoherent
Irreversible	Once learnt, becomes difficult to unlearn
Integrated	Once learnt, can help bring together different aspects of the subject for the student
Bounded	Delineates a specific conceptual space, fulfilling a designated purpose

Discursive	Incorporates an enhanced and extended use of language
Re-constitutive	Entails a change in learner subjectivity
Liminality	Crossing a transitional or liminal space

As Table 1 shows, the common theme bringing these eight characteristics together is that of transformative learning (Meyer et al., 2010), where this transformation takes place on three levels: cognitive, epistemological and ontological; otherwise labelled as ways of thinking, practising, and being (Meyer & Land, 2003). While there has been much enthusiasm among many disciplines with regard to the utilization of threshold concepts to enhance student learning (Meyer & Land, 2006), Barradell and Peseta (2016) point out further considerations with regard to research into identifying threshold concepts for a particular domain. Most importantly, they highlight how the task of identifying threshold concepts remains a problem since there are conceptual challenges that need to be addressed. For example, they highlight how experts themselves may not necessarily have a shared understanding of what the threshold concepts are in their field. In addition, as Timmermans and Meyer (2019) argue, the identification of threshold concepts is only one stage of the process, requiring further thought as to how educators can be helped to integrate threshold concepts into their course design. Nonetheless, Barradell and Peseta (2016) affirm the usefulness of utilizing threshold concepts because of the rootedness of these concepts in the students' learning experience, stating that:

> [f]ocusing on the desired students' learning experiences (rather than concepts/ideas) can lead disciplinary communities to better articulate how they might design these learning experiences in curricula. (p. 272)

This is a point made also by Cousin (2010) where she focuses on the collaborative nature of the process of identifying threshold concepts, arguing for how this process utilizes the individualized experience of relevant stakeholders, which in turn puts emphasis on the actual learning experience rather than on general theory that may be abstracted from actual experience.

There does not seem to be much research on the use of threshold concepts in the CBI classroom, though there is reference to the idea of transformation (Stryker & Leaver, 1997) from the CBI research literature that can arguably be associated generally with the eight characteristics of threshold concepts identified above. For example, such transformation can be said to stem from how the CBI classroom is characterized by inter-disciplinarity and use of current events related to real-life, among others, that can potentially lead to a change in learner subjectivity, for example. Learners in the CBI classroom are thus 'transformed' into able users of the target language via the content knowledge taught. However, to what degree this transformation described by Stryker and Leaver in their edited volume aligns with the notions of liminality and challenge that are essential in a discussion of threshold concepts is open to discussion. Nonetheless, it can be assumed that the CBI classroom, like any learning environment, would have in its planned curriculum, threshold concepts that learners will have to grapple with in order to develop critical competencies in the target language and content knowledge taught.

2.3 ICAP framework

Finally, since this study utilizes the ICAP framework to discuss constructive student engagement with the learning content, this framework is briefly described here. Four behavioural modes of knowledge building are identified in the framework. These are interactive, constructive, active and passive, corresponding to the acronym ICAP (Table 2). Chi and Wylie (2014) describe these four modes as a means of using overt behaviours to evidence student engagement with learning materials and activities.

Table 2
Descriptions of ICAP Framework Behaviour Modes (adapted from Chi and Wylie, 2014)

Modes	Description
Interactive	Learners' behaviours in dialogic interaction where each participant's utterances function constructively in the learning process, and involve a sufficient degree of turn-taking.
Constructive	Learners create outputs or products not included with the learning materials.
Active	Learners engage with instructional material via overt physical action or manipulation.
Passive	Learners are directed toward and taking in information from instructional materials without overtly doing anything else related to learning.

3 Methodology

The identification of threshold concepts in this study is based on a review of the literature on neoliberalism, the author's experience in the classroom observing which concepts students tended to have more difficulty with, student reactions to these new concepts learnt observed during consultations, the author's informal interactions with students, and their submitted assignments. Kiley (2009) adopts a similar approach in interviewing doctoral supervisors concerning what they felt were threshold concepts in the process of supervising doctoral candidates.

Three threshold concepts were thus identified – 'ideology', 'competition' and the 'market'. These concepts were compared with the eight characteristics described above of threshold concepts and found to align with them in the following ways:

- Transformative: involving the notion of multi-disciplinarity with reference to the topic of neoliberalism (in contrast to the topic-specificity of most academic disciplines at the undergraduate level)
- Troublesome: challenging students' pre-conceived notions that are tied to aspects of life that they have come to accept as 'common sense' (Gramsci, 1972), e.g. how competition is necessary in society
- Irreversible: enacting a significant change in the way students come to understand the modern market-driven societies they live in
- Integrated: concepts like ideology, competition and the market acting as focal points that bring together other aspects of the topic of neoliberalism, e.g. meritocracy, political economy and post-structuralism
- Bounded: helping to position analysis of data undertaken by students within the broad topical confines of neoliberalism
- Discursive: requiring an extended vocabulary and understanding of that vocabulary, e.g. developing a critical understanding of competition as a neoliberal political tool to manage societies
- Re-constitutive: changing students' ways of seeing the topic as they see its impact on how they view their own subjectivities[1] in their daily lives
- Liminality: involving a transitional space since these concepts of ideology, competition and the market need to be re-thought by students

In this study, the 44 students involved were first year undergraduate students coming from three different residential colleges in the residential college programme at a prominent Singapore public university. These students were enrolled in a 13-week intensive writing programme aimed at teaching students how to read and write academic texts effectively. These students came from a range of faculties from

the arts and social sciences to engineering. Also, based on a pre-course survey conducted, most students associated the course with the areas of economics and business because of the use of the term 'market-driven societies' in the course title and the 100-word course description, with only a few making reference to the topic of neoliberalism. Thus, it is likely that most of the students would have had little to no academic knowledge about the topic of neoliberalism.

Students were asked to use Hypothes.is to respond to questions in their tutorial handouts for a period of two weeks during tutorial classes. They worked in groups to respond to the questions and were allowed to choose whether they wanted to make individual annotations or group annotations after group discussions of 10-20 minutes on average. When the group had finished with their annotations, these annotations were then shared with another group who would comment on the annotations with questions or comments of their own.

The annotations made by students on Hypothes.is were then collected and collated in Microsoft Excel. For analysis, a sample of annotations made by six groups consisting of 3-4 members each, two from each of the three tutorial classes in the course, was categorised using Gao's (2013) coding scheme (Table 3) for analyzing online social annotations. Due to constraints of space, the annotations used in this study are taken from those made in response to a single prompt from one of the tutorial questions for a lesson in which Hypothes.is was utilized. The webpage version of an article written by George Monbiot (Monbiot, 2016) on neoliberalism was utilized for this lesson. This prompt is reproduced after Table 3.

Table 3

Coding Categories for Different Types of Student Annotations (Gao, 2013)

Categories	**Behaviours**
Self-Reflection	Learners reflect on and interpret what they have learnt from the text
Elaboration/Clarification	Learners build upon an existing comment by adding supporting examples and justification
Seeking	Learners ask for more information, clarification
Alternative/Complementary Proposal	Learners offer a complementary or alternative view
Internalization/Appropriation	Learners paraphrase the concepts/ideas presented by their classmates or acknowledge learning something new
Conflict/Disagreement	Learners show disagreement or conflicting opinions
Support	Learners express agreement without further explanation, establish rapport, or share feelings

Prompt:

Identify the characteristics that Monbiot identified – make an annotation on the webpage to:

> *a. Highlight the relevant part of the text.*
> *b. Type in a note indicating that this is a characteristic of neoliberalism (as identified by Monbiot).*
> *c. In the same note, write a summary of Monbiot's argument to substantiate why he has identified this particular characteristic of neoliberalism. Use your own words as far as possible.*

A post-implementation survey was then conducted to find out students' experience of using Hypothes.is. In addition, text analysis of selected student assignments was done to see if students were able to apply

these three threshold concepts identified in this study in their writing. While there were three assignments in total for the course, this study focuses on the final assignment, which is a brief research paper the students did on the impact of neoliberalism on a social domain of their choice.

4 Results

In this section, the results of the study are reported in three separate sub-sections aligned with the three abovementioned research questions.

4.1 Student annotations

This sub-section addresses the first research question posed earlier. From the sample utilized for this study, the types of annotations made by students are labelled using the adapted framework from Gao (2013) (Table 4).

Table 4
Student Annotations

Type of Annotation	No. of Initiating	No. of Responding	Total	Percentage (of Total)
Self-Reflection	41	0	41	55.4
Elaboration/Clarification	0	6	6	8.1
Alternative/Complementary Proposal	4	7	11	14.9
Internalization/Appropriation	0	7	7	9.5
Conflict/Disagreement	0	2	2	2.7
Seeking	0	1	1	1.4
Support	0	6	6	8.1
Total	45	29	74	

The large number of self-reflection annotations is expected given that this type of annotation forms the bulk of the initiating annotations showing what the students have reflected upon and interpreted based on their reading of the text in response to the earlier prompt. These initiating annotations are then responded to by other students. However, this does not mean that initiating responses can only be of the self-reflection type. One student made four initiating annotations that signalled to the group her group was reviewing that they had missed identifying certain characteristics of neoliberalism found in the text. These annotations are classified as alternative/complementary proposal type annotations. Nonetheless, initiating annotations were usually of the self-reflection type.

From Table 3, we can see that there was a range of annotation types in the responding annotations made by students. Students were willing to offer complementary and alternative points of view that enhanced the initiating annotation made. An example is given below involving the threshold concept of ideology:

Student A: *Initiating* — *Neoliberalism has become very ingrained into our society and lifestyle that we as thinking humans are unable to identify it as a form of ideology. We have grown used to this ideology till [until] its part of our everyday life, even though this ideology is the product of a deliberate effort to change society and consolidate wealth and power.*

Student B: *Response* — *Are we not able to identify neoliberalism as an ideology bc [because] of how ingrained it is or because it can take so many forms?*

In the initiating annotation, Student A responds to the question prompt and points out a characteristic of neoliberalism, noting how it operates as an ideology. She also goes on to explain how it operates as a type of 'common sense' that allows the dominant class to 'consolidate wealth and power'. Student B then offers an alternative perspective in the form of a question. By offering this alternative perspective, Student B brings in the idea that neoliberalism remains pervasive as it can be utilized in so many different forms, or what has been referred to in the research literature as 'shape-shifting neoliberalism' (e.g. Bergeron, 2008). In fact, Student B's question is a necessary one as it fills the gap in Student A's explanation, indicating how exactly neoliberal ideology has become so ingrained in society. Thus, from this short exchange, we can see the value of using SA tools in facilitating peer learning that leverages on student autonomy.

4.2 Student work

With regard to the second research question stated earlier, a sample of student work given below shows how the threshold concepts of ideology, competition and the market have been utilized in a small-scale research paper the students had to complete as their final assignment for the course. The underlined phrases indicate references to the three threshold concepts identified for this study. This short extract is taken from the student's project that was done on the manifestation of neoliberal logic in freemium games commonly played on smartphones.

> *Due to the prevalence of the leader-board feature, a sense of competition is deeply instilled in the player, as those who are further up in the leader-board often get to enjoy greater bonuses, both through actual game rewards as well as social recognition. This differential treatment between the top and the bottom links back to the neoliberal characteristic of hyper-competition, where players must fight aggressively to stay in their position lest others take it from them. [1] Hence, one would either have to spend a lot of time and effort on the game, where you really work for your position 'meritocratically', or otherwise pay and use the rule-bending premium currency to rise to the top of the leader-board. [2] This is corroborated by my interviewee, who states that one would either require an "insane amount of commitment" to the game to stay amongst the top, otherwise it would be "not that possible without spending [a large sum of money on microtransactions]". Here, an abridged form of meritocracy is formed, where one's position in the game is originally thought to be self-responsibilised through commitment and time, and yet now players can buy their way to the top using "cheap methods". Thus, it is evident that hyper-competition and an abridged meritocracy have intruded the freemium game market and are clearly expressed in the game's design. [3]*

In [1], the concept of competition is apparent in how the student comments on the 'differential treatment' of players of different ranks being associated with hyper-competition. This shows how the student understands competition not merely as a contest to see who is the best, all things being equal, but that in neoliberal logic, competition is understood as competition at all costs, where the cost here is the amount of time and effort spent, with a monetary avenue available should one be unwilling to spend the time and

effort. Games are thus no longer merely about the fun and pleasure they bring to win the game, but the costs and capital one has to invest in order to win.

For [2], the underlined phrase shows how the student understands the notion of the market in neoliberal logic. He notes how one's position can be a consequence of buying and selling, where such buying and selling is not confined merely to money but includes time and effort as commodities which are invested in order to maintain one's position on the game leader-board. In addition, his remark about how this is an 'abridged form of meritocracy' where the utilization of cash provides a short-cut to the goal of increasing one's ranking shows his critical understanding of how the market in neoliberal logic is not merely confined to the buying and selling of commodities, but can include 'short-cuts' to be used if one has financial capital available.

Finally, in [3], the concept of ideology is evidenced as the student points out how 'hyper-competition and an abridged meritocracy have intruded [into] the freemium game market and are clearly expressed in the game's design'. With the concept of ideology understood as a hegemonic 'common-sense', the fact that neoliberal tenets like hyper-competition and meritocracy are expressed in the ubiquitous use of online freemium games shows that neoliberal logic has quite possibly become part and parcel of daily life. While the definition of ideology is complex and often debated, what can generally be agreed on is how ideologies act as a means of organizing society by virtue of how pervasive and dominant these ways of understanding reality are (Threadgold, 1986). Thus, by showing how neoliberal tenets like hyper-competition as a more aggressive form of competition and meritocracy are expressed in a commonly-used experience that leverages on its popularity to make profit, the student displays a useful understanding of the concept of ideology that he has managed to apply successfully in his assignment.

4.3 Student experience

As for the third research question, in a survey given to students at the end of the two week period when Hypothes.is was used, students reported favourably on their experience of using the platform. Twenty-two out of 44 students in the course responded to the survey. Of the 7 questions used in the survey, we focus here on the first one, stated in Table 5 below.

Table 5

Responses to Survey Question

Survey Question	Not useful at all	Of little use	Moderately useful	Very useful	Extremely useful
The Hypothes.is tool is useful for my learning and engagement with the assigned web texts	0	0	8 (36.3%)	7 (31.8%)	7 (31.8%)

In addition, students were also asked what feature they found most useful on the Hypothes.is platform. Their responses were positive, as can be seen from the various responses given below:

> *The function itself or enabling us to annotate freely is wonderful. Easy to look back on my own thoughts that I might easily forget.*
>
> *It is very convenient to use and I can use real-time discussion with my friends and teachers using the comment features in the Hypothes.is tool. This makes my learning more fruitful and effective.*
>
> *I love that I can highlight the text. It helps me to remember the key ideas in the article.*

> *The ability to add comments and reply to them, which provides an interactive platform to discuss about the text. Allows me to also see what my classmates have written and to learn from them.*

From these responses, we can see how Hypothes.is provides students with the facility to:

- enhance their learning via revision at any time
- discuss with friends and teachers in and out of class
- anchor their thoughts to the text via highlighting
- engage interactively about the text not just verbally but also via the written mode

In all, from the three categories of results described here, the use of Hypothes.is can be linked to active learning (Meyers & Jones, 1993), peer learning and student autonomy (Boud, Cohen & Sampson, 2001) and the utilization of multiple modalities (verbal and written) that can be beneficial in cultivating an inclusive classroom (CAST, 2018). The use of annotations also helps make learning visible (Hattie, 2012) via anchoring of responses to the assigned text. These elements contribute to the process of constructing understanding of threshold concepts and will be discussed further in the next section.

5 Discussion

This section is divided into two, with the first part discussing how Hypothes.is enables movement through the four modes of knowledge identified in the ICAP framework explained earlier in the Literature Review section. This is done in order to show how active and peer learning occur in the process of co-constructing knowledge, and how these activities enable student autonomy and visible learning. This discussion addresses the first research question and third research question stated earlier. The second part then addresses the second research question about students' ability to apply threshold concepts in their work.

5.1 Student engagement and experience

In this study, the number and variety of annotations made (Table 4) show the active mode being utilized as students engage with the instructional material to highlight relevant parts of the text and annotate on these parts their responses to the tutorial questions assigned. These annotations can also be classified under the constructive mode because they involve learners paraphrasing parts of the text and inserting their own ideas as well. An example of this can be found in the example described earlier where Student B responds to Student A's initial self-reflection with an alternative perspective. The interactive mode is thus also identified in this same example.

While the turn-taking shown among students is limited, what needs to be taken into consideration is how these annotations were made in the context of in-class discussions where students would have been engaged in real-time discussions within their groups. In addition, Student B comes from a different group from Student A. The dialogic interaction thus spans beyond the confines of a single group, consequently expanding the process of meaning construction.

From this brief description of the results using the ICAP framework, we can see how students engage actively to co-construct knowledge. Student autonomy is also enabled as they work independently at reviewing each other's annotations. Furthermore, the observation of overt behaviours described by the modes in the ICAP framework also helps make visible the process of learning. The process of knowledge construction is thus displayed for both teacher and learner as each step in the process is systematically shown, with students working through each other's annotations, questioning or agreeing with them, or offering expanded, complementary or alternative viewpoints that enable an expansion of the learning

space autonomously generated by the students themselves, together with input by the teacher whenever necessary. Thus, based on the ICAP framework, it is clear how active and peer learning are enabled via the Hypothes.is platform.

The benefits of this enabling of active and peer learning via the Hypothes.is platform were reflected in the feedback from students about their experience, with the time and space to respond to and reflect on annotations, and visibility of learning and interactivity featuring prominently as useful outcomes of utilizing Hypothes.is. A positive experience with a learning tool is important in facilitating its effective and appropriate usage in the classroom, and can also impact learners' self-regulatory behaviour and motivation (Perez-Alvarez, Maldonado-Mahauad, & Perez-Sanagustin, 2018). Furthermore, it could also be argued that inclusive learning can be facilitated on Hypothes.is since it allows more introverted students the time and space to process their thoughts and respond via the platform.

5.2 Students' ability to apply Threshold Concepts

As shown in the Results section, there is evidence of student understanding of threshold concepts and effective application of this in student work. While it is not possible to posit a direct relationship between the use of Hypothes.is and such understanding and application on the basis of this study alone, it could be argued that the multimodal potential of annotations provides a rich, dynamic environment for the co-construction of meaning (Kalir & Garcia, 2019) that impacts learning and in turn, application. Using Kristeva's (1986) concept of intertextuality, Kalir and Garcia argue that annotations can be considered multimodal because they involve not just the reading of words but an understanding of how the words in the original webpage text link to the multiple annotations operating in concert with each other as an overall interactive 'space' of text. What consequently happens is a co-construction of meaning that goes beyond the original webpage text. This co-construction of meaning is dynamic, and changes as the annotations change and get responded to or deleted, which consequently enriches the learning experience.

Although Google Docs has similar annotation capabilities, it is restricted to PDF, Microsoft Word or Google Docs documents. In comparison, Hypothes.is offers a key advantage in terms of convenience for webpage annotation. The ubiquity of the electronic webpage and its potential for use in the CBI classroom where assigned readings are often the norm means that the ability to annotate directly on the webpage would be a significant advantage. This is what a SA tool like Hypothes.is provides. For an electronic webpage to be annotated on Google Docs, the webpage would need to be converted to PDF, which adds another step to the process.

Moreover, SA tools like Hypothes.is make it possible for annotations to include hashtags as well to help students group annotations together meaningfully. Furthermore, the inclusion of images in an annotation allows for a multimodal component that can help make the reviewing of annotations more engaging. For example, in the assigned reading by George Monbiot referred to earlier, a student inserted an annotation consisting of a humorous meme depicting revolutionaries during the French Revolution using the guillotine to execute their enemies. Accompanying this image was the phrase 'Does Capitalism Spark Joy?', which is a reference to the minimalist lifestyle culture popularised by Marie Kondo, a pop culture figure known for her dispensation of advice on how a neat home helps maintain one's sense of balance and happiness in life. The figures of the revolutionaries in the meme all had the face of Marie Kondo superimposed on their heads. The image thus communicated the message – if capitalism does not spark joy, it should be gotten rid of. The student has therefore shown understanding of what the reading is about, but via an image. This use of multimodal resources to show understanding is very much in line with the need for education in modern society to take into account multiliteracies (Cope & Kalantzis, 2009) where learning and communication are no longer confined to monomodalities (Kress & van Leeuwen, 2006). There is thus the complex integration of intertextuality that comes

with the use of the image which facilitates the multiplicity of meanings that characterise multimodal texts (Baldry & Thibault, 2006). This example therefore highlights how SA tools like Hypothes.is can provide affordances that Google Docs does not have, which when considered in relation to the co-construction of knowledge that is learning, foregrounds how students are not only given more possibilities to express understanding, but are challenged as well to utilize multiliteracies to create and understand knowledge.

While the positive learning outcomes as shown in the example of student work cited earlier cannot be directly linked to the use of Hypothes.is in this study, it can be argued that the potential advantages of a SA tools platform like Hypothes.is would likely have played a part in leading to the outcome of the final assignment as evidenced in the example of student work shown earlier. This is especially the case since most, if not all, students had come into the module as first year undergraduates with little knowledge of the topic of neoliberalism. As the example shows, at the end of 13 weeks, the student was able to use the threshold concepts of ideology, competition and market appropriately in the context of a small-scale research paper, therefore showing not only understanding of the concepts, but the ability to apply these concepts in a topic of his choice. The student can thus be said to have overcome the challenge of mastering content in the CBI classroom. Also, as shown in the Results section above, the variety of both initiated and responding annotations (Table 4) evidences student learning that is not only active, but constructive and interactive as well. Utilization of these modes of learning is argued by Chi and Wylie (2014) to be indicative of student engagement that facilitates knowledge change which accompanies cognitive processes. Thus, I argue here that the various ICAP modes of learning displayed via use of Hypothes.is show how knowledge construction can be enacted using SA tools, with outcomes like student work and student experience indicative of the potential impact of using SA tools in the classroom.

Even with these benefits, it is important to keep in mind how the design of SA tools should also be considered in order to facilitate user engagement (Kawase, Herder, & Nejdl, 2009). Thus, there is a need to take into account factors like the visibility of annotations together with the original text resource provided, for example. In addition, students' use of SA tools would also require guidance and scaffolding where necessary (Yeh, Hung, & Chiang, 2017), reflecting how the benefits associated with the use of SA tools should be accompanied with the required pedagogical knowledge that can help maximise the use of SA tools in ways that are most beneficial for students.

6 Conclusion

The pilot study described in this paper has aimed at showing the benefits of the Hypothes.is platform in the CBI classroom with regard to the learning of threshold concepts, pointing out how it facilitates the active co-construction of learning in ways that enhance student autonomy and leverage on peer learning, while making learning visible. Positive outcomes of student work and experience also provide useful indications of the benefits of the tool in the CBI classroom. Furthermore, the facilitation of multiliteracies and inclusivity adds to the benefits of SA tools. With online learning becoming increasingly ubiquitous, having a toolkit of various digital tools would be helpful for teachers aiming to keep students engaged with reading tasks via online platforms.

While the potential of Hypothes.is as a learning tool has been shown here, further research would be required to study its utility in teaching contexts beyond that of the CBI classroom. In addition, the topic of neoliberalism, being very much situated in the humanities, could perhaps be more suitable for facilitating the effective use of Hypothes.is as compared to topics that utilize less text-heavy linguistic course material. Studies would thus also need to be done in a variety of topics and disciplines to further examine the utility of Hypothes.is. Moreover, this study was done over a rather short period of two weeks. Future research done over a longer period of time would help provide more substantiation for

Hypothes.is' utility as a learning tool. Finally, it would also be interesting to see if there are long-term effects on learning resulting from the use of SA tools, for example, the adoption of annotation as part of a student's repertoire of meta-cognitive strategies for learning across subjects.

Notes

1. Subjectivity is understood here as made up of different roles taken on by an individual as part of the social context he or she belongs to. Unlike identity, one's subjectivity is not fixed but operates dynamically and in flux (Hall, 2004).

References

Archibald, T. (2010). *The effect of the integration of social annotation technology, first principles of instruction, and team-based learning on students' reading comprehension, critical thinking, and meta-cognitive skills*. (Unpublished doctoral dissertation), Florida State University, USA.

Baldry, A., & Thibault, P. (2006). *Multimodal transcription and text analysis: A multimedia toolkit and coursebook*. Oakville, CT: Equinox.

Barradell, S., & Peseta, T. (2016). Promise and challenge of identifying threshold concepts: a cautionary account of using transactional curriculum inquiry. *Journal of Further and Higher Education, 40*(2), 262-275.

Benitez, C., Quinones, A., Gonzalez, P., Ochoa, C., & Vargas, A. (2020). The impact of online annotation tools on students' academic performance in a distance university program. *Turkish Online Journal of Distance Education*, *21*(2), 167-177.

Bergeron, S. (2008). Shape-shifting neoliberalism and World Bank education policy: A response to Steven Klees. *Globalisation, Societies and Education*, *6*(4), 349-353.

Boud, D., Cohen, R., & Sampson, J. (2001). *Peer learning in higher education: Learning from and with each other*. London: Kogan Page.

Brown, M., & Croft, B. (2020). Social annotation and an inclusive praxis for open pedagogy in the college classroom. *Journal of Interactive Media in Education*, *1*(8), 1-8.

CAST (2018). *Universal Design for Learning Guidelines Version 2.2*. http://udlguidelines.cast.org

Chi, M. T. H., Adams, J., Bogusch, E. B., Bruchok, C., Kang, S., Lancaster, M., Levy, R., Li, N., McEldoon, K. L., Stump, G. S., Wylie, R., Xu, D., & Yaghmourian, D. L. (2018). Translating the ICAP theory of cognitive engagement into practice. *Cognitive Science*, *42*, 1777-1832.

Chi, M. T. H., & Wylie, R. (2014). The ICAP framework: Linking cognitive engagement to active learning outcomes. *Educational Psychologist*, *49*(4), 219-243.

Cope, B., & Kalantzis, M. (2009). "Multiliteracies": New literacies, new learning. *Pedagogies: An International Journal*, *4*(3), 164-195.

Cousin, G. (2010). Neither teacher-centred nor student-centred: threshold concepts and research partnerships. *Journal of Learning Development in Higher Education*, *2*, https://journal.aldinhe.ac.uk/index.php/jldhe/article/view/64

Dalton-Puffer, C. (2011). Content and language integrated learning: From practice to principles?. *Annual Review of Applied Linguistics, 31*, 182-204.

England, K., & Ward, K. (2016). Theorizing Neoliberalization. In S. Springer, K. Birch, & J. MacLeavy (Eds.), *The Handbook of Neoliberalism* (pp. 50-60). Abingdon, Oxon: Routledge.

Eryilmaz, E., van der Pol, J., Ryan, T., Clark, P. M., & Mary, J. (2013). Enhancing student knowledge

acquisition from online learning conversations. *Computer-Supported Collaborative Learning*, *8*, 113-144.

Gao, F. (2013). A case study of using a social annotation tool to support collaboratively learning. *Internet and Higher Education*, *17*, 76-83.

Ghadirian, H., Salehi, K., & Ayub, A. F. M. (2018) Social annotation tools in higher education: a preliminary systematic review. *International Journal of Learning Technology*, *13*(2), 130-162.

Glover, I., Hardaker, G., & Xu, Z. (2004) Collaborative annotation system environment (CASE) for online learning. *Campus-Wide Information Systems*, *21*(2), 72-80.

Gramsci, A. (1972). *Selections from the prison notebooks of Antonio Gramsci* (Q. Hoare & G. Nowell-Smith, Trans.). New York: International Publishers.

Hall, D. E. (2004). *Subjectivity*. New York: Routledge.

Hattie, J. (2012). *Visible learning for teachers: Maximizing impact on learning*. London: Routledge. *Hypothes.is*. (n.d.). https://web.hypothes.is.

Johnson, T. E, Archibald, T.N., & Tenenbaum, G. (2010). Individual and team annotation effects on students' reading comprehension, critical thinking, and meta-cognitive skills. *Computers in Human Behaviour*, *26*, 1496-1507.

Kalir, J and Garcia, A. (2019). *Annotation*. MIT Press Open. https://mitpressonpubpub.mitpress.mit.edu/annotation

Kawase, R., Herder, E., & Nejdl, W. (2009). A comparison of paper-based and online annotations in the workplace. In U. Cress, V. Dimitrova, & M. Specht (Eds.), *Learning in the Synergy of Multiple Disciplines* (pp. 240-253). Berlin: Springer.

Kiley, M. (2009). Identifying threshold concepts and proposing strategies to support doctoral candidates. *Innovations in Education and Teaching International*, *46*(3), 293-304.

Kress, G., & van Leeuwen, T. (2006). *Reading images: The grammar of visual design* (2nd ed.). New York: Routledge.

Kristeva, J. (1986). Word, dialogue and novel. In T. Moi (Ed.), *The Kristeva Reader* (pp. 34-61). Oxford: Basil Blackwell.

Krouska, A., Troussas, C., & Virvou, M. (2018). Social annotation tools in digital learning: A literature review, *9th International Conference on Information, Intelligence, Systems and Applications (IISA)*, Zakynthos, Greece (pp. 1-4). IEEE. doi: 10.1109/IISA.2018.8633609.

Lebow, D. G., Lick, D. W., Harman, H. J., Dalglish, C., & Grundmann, O. (2011). Social annotation to enhance learning and assessment in higher education. In C. Wankel (Ed.), *Educating Educators with Social Media: Volume 1* (pp. 261-278). Bingley, UK: Emerald.

Lin, J. W., & Lai, Y. (2014). Using collaborative annotating and data mining on formative assessments to enhance learning efficiency. *Computer Applications in Engineering Education*, *22*(2), 364-374.

Martel, J. (2018). Three foreign language student teachers' experiences with content-based instruction: Exploring the identity/innovation interface. *Innovation in Language Learning and Teaching*, *12*(4), 303-315.

Mendenhall, A., & Johnson, T. E. (2010). Fostering the development of critical thinking skills, and reading comprehension of undergraduates using a Web 2.0 tool coupled with a learning system. *Interactive Learning Environments*, *18*(3), 263-276.

Meyer, J. H. F., & Land, R. (2003). Threshold concepts and troublesome knowledge: Linkages to ways of thinking and practising within the disciplines. *ETL Project Occasional Report 4*. Edinburgh.

Meyer, J. H. F., & Land, R. (2005). Threshold concepts and troublesome knowledge (2): Epistemological considerations and a conceptual framework for teaching and learning. *Higher Educa-*

tion, *49*(3), 373–388.

Meyer, J. H. F., & Land, R. (2006). *Overcoming barriers to student understanding threshold concepts and troublesome knowledge*. London: Routledge.

Meyer, J. H. F., Land, R., & Baillie, C. (Eds.). (2010). *Threshold concepts and transformational learning*. Rotterdam, The Netherlands: Sense.

Meyers, C., & Jones, T. B. (1993). *Promoting active learning. Strategies for the college classroom*. San Francisco: Jossey-Bass.

Miller, K., Lukoff, B., King, G., & Mazur, E. (2018). Use of a social annotation platform for pre-class reading assignments in a flipped introductory physics class. *Frontiers in Education*, *3*(8), doi: 10.3389/feduc.2018.00008.

Monbiot, G. (2016). Neoliberalism – the ideology at the root of all our problems. *The Guardian*. https://www.theguardian.com/books/2016/apr/15/neoliberalism-ideology-problem-george-monbiot#annotations:4_uQVhMTEemRb4f5zuJAsQ

Novak, E., Razzouk, R., & Johnson, T. E. (2012). The educational use of social annotation tools in higher education: A literature review. *Internet and Higher Education*, *15*, 39-49.

Perez-Alvarez, R., Maldonado-Mahauad, J., & Perez-Sanagustin, M. (2018). Tools to support self-regulated learning in online environments: Literature review. In Pammer-Schindler V., Pérez-Sanagustín M., Drachsler H., Elferink R., Scheffel M. (Eds), *Lifelong Technology-Enhanced Learning. EC-TEL 2018. Lecture Notes in Computer Science*, *Vol 11082*. Springer, Cham. https://doi.org/10.1007/978-3-319-98572-5_2

Scardamalia, M., & Bereiter, C. (1994). Computer support for knowledge-building communities. *Journal of the Learning Sciences*, *3*(3), 265-283.

Stoller, F.L., & Fitzsimmons-Doolan, S. (2016). Content-based instruction. In N. Van Deusen-Scholl, & S. May (Eds.), *Second and Foreign Language Education. Encyclopedia of Language and Education* (3rd ed.) (pp.1-14). Springer, Cham. https://doi.org/10.1007/978-3-319-02323-6_7-1.

Stryker, S. B., & Leaver, B. L. (1997). *Content-based instruction in foreign language education: Models and methods*. Baltimore: Georgetown University Press.

Suhre, C. J. M., Winnips, J. C., de Boer, V., Valdivia, P., & Beldhuis, H. J. A. (2019). Students' experiences with the use of a social annotation tool to improve learning in flipped classrooms. *5th International Conference on Higher Education Advances (HEAd'19)*. Universitat Polit`ecnica de Val`encia, Val`encia, Spain, doi: http://dx.doi.org/10.4995/HEAd19.2019.9131

Tedick, D. J., & Cammarata, L. (2012). Content and language integration in K–12 contexts: Student outcomes, teacher practices, and stakeholder perspectives. *Foreign Language Annals*, *45*(S1): S28–S53. doi: 10.1111/j.1944-9720.2012.01178.x.

The threshold concept. (n.d.). https://www.ee.ucl.ac.uk/~mflanaga/thresholds.html

Threadgold, T. (Ed.). (1986). *Semiotics, ideology, language*. Sydney: Sydney Association for Studies in Society and Culture.

Timmermans, J. A., & Meyer, J. H. F. (2019). A framework for working with university teachers to create and embed 'Integrated Threshold Concept Knowledge' (ITCK) in their practice. *International Journal for Academic Development*, *24*(4), 354-368

Venugopal, R. (2015). Neoliberalism as concept. *Economy and Society, 44*(2), 165-187.

Yeh, H., Hung, H., & Chiang, Y. (2017). The use of online annotations in reading instruction and its impact on students' reading progress and processes. *ReCALL, 29*(1), 22-38.

Marissa K. L. E is currently a Lecturer at the Centre for English Language Communication (CELC) at the National University of Singapore (NUS). She has previously worked on research projects in digital humanities, social semiotics and multimodal discourse analysis. Her research interests include systemic functional linguistics, critical multimodal discourse analysis and conceptual metaphor theory. She has published and presented in the areas of social semiotics, multimodal discourse analysis, multiliteracies and the use of multimodality for educational purposes.