The Effect of Tablets on the Acquisition of Semantic Relationships within the Community of Lexical Inquiry

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Abstract

This study introduces a multimodal approach of teaching and learning semantic relationships at the elementary level. This approach is called the Community for Lexical Inquiry (CLI). The paper compares results of an experiment in which the CLI approach was tested in a classroom setting using two groups: one that used paper as their medium for creating the heuristic lexical cards which are part of this approach, and another that used an interactive whiteboard application on a tablet for the same purpose. The question asked is: does the medium used (tablet or paper) influence the acquisition of semantic relationships? Quantitative results indicate that using an interactive whiteboard application on a tablet to create heuristic lexical cards does not have an effect on semantic relationship acquisition. However, qualitative results mention that the tablet's interactive whiteboard encourages students to verbalize their strategies while completing their heuristic lexical cards, and that this facilitates their acquisition of thematic words. After four cycles of the CLI approach, the average of both groups improved.

Keywords: *vocabulary teaching, lexical learning, multimodality, tablets*

1. Introduction

The Community of Lexical Inquiry (CLI) is a dialogic, multimodal approach for teaching and learning semantic relationships (synonyms, antonyms, word families and thematic words). One aspect of the CLI approach involves the creation of heuristic lexical cards, either on paper or on tablet using an interactive whiteboard application. The objective of this study is to compare the impact of the medium (paper or tablet) used to create these heuristic lexical cards on the acquisition of semantic relationships.

2. Theoretical Framework

The CLI's name and didactic approach are inspired by the Community of Philosophical Inquiry pedagogic model (CPI) [1]. The term "community of inquiry" refers to the fostering of curiosity towards words, to the shared discovery of new words, and to an investigative approach for finding the meanings of words by and for the students.

2.1 Discursive approaches to vocabulary teaching

The CLI's discursive approach was developed with consideration to, among others, Vygotsky's sociocultural theory of interactions [2] and Plane and Lafourcade's focus on semantic development [3].

2.2 Cognitive science research into multimodality

Multimodal teaching methods (visual, tactile, and oral) has been shown within cognitive science to be a positive reinforcement for language learning as compared to monomodal methods [4],[5] and was thus chosen to be integrated into the CLI's approach.

3. The Community of Lexical Inquiry (CLI) approach

The complete CLI material is available and exemplified with videos at http://www.uqac.ca/crl.
In summary, the Community of Lexical Inquiry comprises five steps:

3.1 Philosophical discussion about the meaning of a word and active listening to words

A word is introduced by the teacher in an engaging way, for example by showing a video about a scientific experiment and asking about the meaning of the word "research". A discussion begins about this word

naturally and the concept of relationships between words is introduced, for example, "Does anyone know a word that is the opposite of research?". Sharing ideas and listening to other students is encouraged.

3.2 Collaborative analysis of the definition of a word
After the discussion on the meanings of the word, students develop their own definitions by themselves, in pairs, and in groups before looking up the definition in a dictionary. If relevant, there can be a critical analysis of the difference between the dictionary definition of the word and the definitions that the students developed.

3.3 Modelling lexical strategies
In this step, explicit lexical strategies are introduced to establish the semantic relationships between the words used during the discussion. The teacher models these strategies using a lexical decision tree (see http://www.uqac.ca/crl/index.php/etape-3/).

3.4 Completing the heuristic lexical card
In the fourth step, students complete a heuristic lexical card using the words discussed (see http://www.uqac.ca/crl/index.php/etape-4/). This can be done either on paper or by using an interactive whiteboard application on a tablet. This application consists of a blank whiteboard where students can add images, text and can record their voice to explain their process. Students refer to the lexical decision tree document during this phase to help guide their reasoning.

3.5 Collaborative dialogue about semantic relationships
The final step of the method is the collaborative dialogue. Here, students share their investigations into semantic relationships, justify their approach, explain their reasoning, and modify and/or complete their heuristic lexical cards.

The question asked by this study relates to step 3.4 of the CRI approach: does the medium used (paper or tablet) when completing the heuristic lexical card have an effect on the acquisition of semantic relationships?

4. Methodology

4.1 Context and participants in the research project
The research took place in an elementary school in Montreal, in the province of Québec, in Canada. Though the school is located in a context of a French-speaking majority, the student population consists of multi-ethnic and multilingual families. Two classes were selected with the help of teachers who responded to the invitation to participate. Two sub-groups were created, separated by the medium used during the study: 31 students (paper group) and 32 students (tablet group).

4.2 Data collection
Before and after the CLI approach, the "Word Families 2" subtest, which is part of the Clinical Evaluation of Language Fundamentals program (CELF), was used to evaluate students' skill at understanding and explaining the logical relationships between semantically associated words. Two mixed analysis models of distinct variance were used to compare the medium used (IV) and semantic relationships acquisition (DV) at pretest and posttest.

A score was assigned to each of the lexical heuristic cards completed at the end of the second, the fourth and the sixth CLI. An independent correlation structure was used to model the correlation between the semantic relationship scores at three analysis times ("CLI2", "CLI4" and "CLI6") in order to compare the effect of VI when completing the heuristic lexical cards on VD.

Qualitative data were also collected during partially-guided interviews with each of the students and two teachers to discuss their learning-teaching experiences. Data analysis was done via emergent

categorization.

5. Results

5.2 Quantitative results

Table 1. Estimate of the averages of the least squares for semantic relationships to the CELF

Medium	Pretest			Posttest		
	Equivalence score for semantic relationships	Standard error	Percentile rank	Equivalence score for semantic relationships	Standard error	Percentile rank
Paper (n=31)	10.294	0.475	53	10.833 (n=30)	0.453	61
Tablet (n=32)	10.906	0.471	61	11.313 (n=29)	0.460	67

On average, the capacity to establish semantic relationships of both groups who participated in the CLI project improved regardless of the medium used (paper or tablet) to complete the heuristic lexical cards [F(1; 2,03) = 0,07; p = 0,8152].

Table 2. Averages of the least squares of the semantic relationships on students' lexical cards

Medium	CLI2		CLI4		CLI6	
	Ratio of the semantic relationship scores	Standard error	Ratio of the semantic relationship scores	Standard error	Ratio of the semantic relationship scores	Standard error
Paper (n = 12)	0.292	0.103	0.532	0.100	0.629	0.099
Tablet	0.533 (n = 27)	0.0951	0.726 (n = 29)	0.091	0.676 (n = 25)	0.095

For both groups (students who used either paper or tablet to create their lexical cards), the time of measurement had a significant influence on the ratio of the scores for semantic relationships [F(2; 59) = 9,21; p = 0,0003]. In fact, the ratio of the scores at Time 2 is significantly inferior to the ratio of the scores at Time 4 [t(57,3) = -3,56; p = 0,0022] and at Time 6 [t(59,8) = -3,84; p = 0,0009]. The ratio between Times 4 and 6 (CLI4 and CLI6) is not significantly different [t(60,3) = -0,37; p = 1,00001]. There is no significant relationship between the type of medium used and the times of measurement with regards to the semantic relationship scores [F(2; 60,6) = 1,27; p = 0,2877]. It would thus seem that the observed differences between the times of measurement are the same for each group.
In summary, all of the students who followed the CLI method showed progress in their capacity to establish semantic relationships regardless of the medium used to complete their heuristic lexical cards.

5.2 Qualitative results
During the inverviews, the two teachers expressed that they were impressed with the multimodal possibilities of using the tablet application for creating lexical heuristic cards, and both said that they intend to use the interactive whiteboard application again. Both teachers also mentioned that this approach offers a strong metacognitive potential for helping students with their lexical learning:

Teacher 1: "With three students who rarely spoke, really almost never, I could finally hear these students talking aloud for the first time. So yes, audio mixed with the touchscreen features (erasing or moving words around in real time), that really does help them."

Teacher 2: "When they listen back to themselves, they are able to understand the processes they are using, and they can reflect on them ... I find the verbalisation aspect of ShowMe (interactive whiteboard) to be brilliant and I will use it again. The oral part is the most interesting, because it shows me how my students are thinking and how I can help them. The fact that I have access to a student's strategies as spoken aloud by them allows me to work with that student."

Students said that the fact that they can look back on their digital work at any time is very useful. Twenty students (twelve girls and eight boys) mentioned that this metacognitive reflection helped them to self-correct. The video screen capture feature of the interactive whiteboard created the sense of having an audience that helped students to verbalize their lexical strategies: M12: "It's like I enter into a world where I'm showing people how to do it, and showing myself too, and that's much better than talking to yourself."

6. Discussion

The results do not show that the use of a tablet yields a higher success rate in the semantic relationships established on students' heuristic lexical cards. However, both students and teachers who participated in the project indicate that using the tablet while making the lexical cards does provide several advantages: using the tablet gives the student the sense of having an audience, which encourages them to speak aloud and verbalize their strategies, and the tablet facilitates verbal expression among shy speakers. Furthermore the video recording feature of the interactive whiteboard application has proven particularly helpful for students for whom communication with adults is a source of stress. For the teachers, the tablet's recording feature allows later access to the student's thoughts and lexical reasoning which facilitates personal scaffolding for students who need further help. Therefore, the use of the video capture application on the tablet helps teachers or special needs teachers to understand certain lexical difficulties.

By examining Table 2, we note that repetition of the CLI method is necessary in order to see significant progress in the students. More precisely, for the students in this study, the results suggest the recommendation of a minimum of 4 CLI cycles in a class to allow the students the time to develop semantic relationships. Furthermore, we understand from Table 2 that the first four repetitions of the CLI method produces significant progress in students regardless of the medium used for the lexical card (paper or tablet).

7. Conclusion

The Community of Lexical Inquiry is an approach that relies on communication and multimodal learning to teach semantic relationships. The results indicate that the CLI as a whole helps students make significant progress in their capacity to establish semantic relationships using either medium. The most significant progress was seen after four repetitions of the CLI method. Through interviews and testimonials, it was learned that students who are typically sky speakers benefitted from the sense of having an audience that the tablet provided: this encouraged them to more openly verbalize their process.

The results are limited by the number of participants (n=63). Additional studies with larger sample sizes should look at the effect of using the CLI method with and without the philosophical discussion on the meaning of words because some teachers hesitate to invest time in oral communication; this comparison could help to quantify the importance of oral communication on the acquisition of semantic relationships.

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