YEAR 9 STUDENT VOICES NEGOTIATING DIGITAL TOOLS AND SELF-REGULATED LEARNING STRATEGIES IN A BILINGUAL MANAGED LEARNING ENVIRONMENT

Ulla Freihofner, Dr Simone Smala and Dr Chris Campbell
The University of Queensland
Brisbane, Australia

ABSTRACT

The increase in the use of educational technologies in Australian high schools has sparked this investigation into how Year 9 (13 to 14 years of age) students experience and negotiate a new technology enhanced learning environment in a bilingual classroom setting. The paper is about examining the students' language practices in German and English while using a Managed Learning Environment (MLE). The study aims to unearth how such translanguaging practices (using both German and English to communicate in bilingual education settings) contribute to and shape self-regulated learning in a scientific open inquiry process. This is corroborated by insights into student reflections on using the MLE in two languages, with data gained from a student survey. The study further analyses the relationship between bilingual language practices and adaptive tool use. The effectiveness of online learning environments depends on the students' adaptive tool-use (Barzilai & Zohar, 2006; Lust, Vandewaetere, Elen, & Clarebout, 2014) and the ability to engage in self-regulatory learning practices (Zimmerman, Bembenutty, & Schunk, 2013). Data were collected via voice recordings, a student-designed questionnaire and focus group interviews with 22 Year 9 students covering 18 Biology lessons during 6 weeks, over two consecutive years. The study revealed that students' self-regulatory practices during open inquiry processes developed in specific ways through the exposure to a bilingual classroom setting, e.g. by being exposed to unknown terms in German which led them to search for translations and then on to further self-initiated and self-regulated research to find explanations online However, when biology content knowledge was pre-prepared (in the second language of German) by the teacher in guided customized simulations on a computer software tool, students seem to favor such guided practices over self-initiated and self-regulated research as shown during the open inquiry task. However, independent of the specifics of bilingual language use in open or guided inquiry, the tool-use also appeared to be reliant on students' prior disposition. Consequently, results of this study might have interesting implications for the future customization of online learning spaces for high school students and educators in bilingual settings as well as other fields.

1. INTRODUCTION

Recently, educational technologies have become features of everyday life in Australian high schools. Student learning environments have changed due to the introduction of educational technology, or information and communication technologies (ICT) into classrooms (Australian Curriculum, 2013). Empirical research in regards to what works best for students has mainly focused on the delivery of information and less on the pedagogy involved in using electronic learning technologies and little attention has been awarded to how children handle this learning (Schraw & Robinson, 2008). Likewise, in the bilingual context research has mainly focused on teacher-centered issues, disregarding communication processes for meaning making from a student view point (Bonnet, 2012). The field of bilingual learning environments in combination with the use of a MLE has received little attention. Focus has been given to the design of online learning spaces for content and language integrated learning (CLIL) environments (Marenzi & Zerr, 2012; Pellegrino, De Santo,

& Vitale, 2013; Xuelian, 2011) rather then student centered research. The importance for this study therefore lies with the emphasis to capture student opinion about their experience working independently in a MLE to achieve imposed learning goals as well as reaching personal goals.

Investigating student perceptions about their use of a MLE in Biology lessons required further considerations for its design. The design features needed to allow strategies for self-regulation (Zimmerman, 2002) and scientific open inquiry (Bybee, 2010) to set the students up for the opportunity to explore and experience learning in a student- centered method. In the process of scientific open inquiry the student has agency to decide his/her own learning path according to their formulation of the research questions and choice of investigative methods (R. L. Bell, Smetana, & Binns, 2005; Zimmerman, 2002). To support self-regulation and open inquiry scaffolded learning activities and feedback loops were incorporated into the MLE encouraging goal setting, planning, and reflection on achievement (Bell, Smetana and Binns, 2005, Hsu, 2015). Customised online software applications such as Education Perfect (Smith, 2015) supported the use and production of the foreign language through helpful language, vocabulary lists and fact sheets. Web links coupled with scaffolded activities and work sheets gave the students the opportunity to research the topic further for knowledge creation. These applications were optional for the students, however some were utilized during the lesson activities initiated by the teacher modeling effective practice for language and knowledge acquisition. The MLE design also allowed the teacher to step back in her role of gatekeeper of knowledge and student regulator (Boekaerts, 2002) facilitating a student-centered approach. The specific MLE design for this particular bilingual classroom setting was key to the investigation of student opinions. It aimed to position the students to be self-motivated, self-regulated and encouraged scientific open inquiry strategies.

It is important here to highlight that these Year 9 students were learning in a bilingual setting, with applications of a content and language integrated classroom (CLIL) environment. In the CLIL approach, the specific content and the language are taught explicitly as a synergy (Dale & Tanner, 2012). This synergy happens in the context of dialogic learning, because the dialogue of learning uses an additional language and focuses on quality discourses between learners, and between learners and teachers (Coyle, Hood, & Marsh, 2010). The students engage in both languages and their voices are expressing experiences that involve personal, classroom and knowledge aspects. To be able to analyze the student dialogues about their experiences the theoretical lens of dialogism and heterology developed by Bakhtin (Bakhtin, Holquist, & Emerson, 1981; Hall, Vitanova, & Marchenkova, 2005) and translanguaging practices (Garcia & Wei, 2014) have been adopted. The theory of dialogism provides the starting point by looking at dialogues as interacting forces of monoglossic (scientific discourse) and heteroglossic (individual discourse) language. The students' dialogues occur using two languages involving translanguaging practices.

2. THEORETICAL CONSIDERATIONS

The following paragraphs describe the link between dialogism, the CLIL pedagogies and translanguaging practices. Bakhtin's understanding of dialogue incorporates the communal existence where people are mutually interdependent (Todorov, 1984). It is a space in which the present and the past experiences interrelate and interact in every dialogue. This interaction of present and past in the dialogue evolves into cultural identities, producing semiotic resources and possibilities of meaning making. Bakhtin argued further that the production of thought and self-awareness can only happen through contact with the 'Other' (Bakhtin, 1986). This conceptualization of language has implications for this study because language production is seen as a social and historical process that is used to create specific cultural spaces through the interaction with the unknown. The students in this CLIL Biology classroom were exposed to the 'Other' through the science content in German in the MLE, in their personal engagement producing German language in peer and teacher communication, and producing German language in the Biology content domain. The merger of dialogism and bilingual communication comes to the fore in the students' translanguaging practices. Garcia (2014) refers to translanguaging as language practices of plurilingual individuals where they travel between the different languages to complete the meaning making process (Garcia & Wei, 2014). For example in this bilingual classroom two languages were required to communicate meaning. If the two languages cannot stand-alone, they become a complete integrated system, and consequently a translanguaging strategy (Canagarajah, 2011). By using translanguaging strategies students were appropriating the content and the

languages and also negotiating different cultures apparent in the monoglossic and heteroglossic discourses (Garcia, 2009).

With this in mind the student voices were analyzed according to three language discourses developed for the CLIL approach by Coyle, Hood and March (2010) which was influenced by Mohan and his Knowledge framework (Mohan, 1986). These are firstly the 'language of learning' involving the scientific content and curriculum language, secondly the 'language for learning' needed to communicate with others while also being engaged in the curriculum discourse and thirdly the 'language through learning', which captures the unplanned peer conversations to gain understanding (Coyle, Hood and Marsh, 2010). Furthermore the three language discourses were matched to Bakhtin's theory of heterology where language is seen as different discourses according to social application (Todorov, 1984). According to Bakhtin a discourse is the written and spoken language 'peculiar to a specific stratum of society within a given social system at a given time' (Mortimer & Scott, 2003, p. 13) and it organizes, transforms and resolves situations (Todorov, 1984). The situations and specific curriculum discourses in a CLIL classroom like the 'language of learning' can be seen as an example of Bahktin's monoglossic language discourse (Bakhtin, Holquist and Emerson, 1981). Monoglossia guarantees a mutual understanding of language crystallized into a unified 'correct' language (Bakhtin et al., 1981) like the scientific language for Biology (Mortimer & Scott, 2003). Bakhtin (1981) stated that monoglossia is posited and opposed to heteroglossia. Bakhtin's notion of heteroglossia is encapsulating the influences by society and the individual's history to form the current personal discourse (Bakhtin et al., 1981). Heteroglossia represents the 'language through learning' in the CLIL approach, embodied by unplanned individual conversations. When a person brings the meaning of the monoglossic-unified language to life in their current circumstances, e.g. explaining a scientific concept by combining it with a personal example, heteroglossia is involved. This interface of monoglossia and heteroglossia is described in CLIL theory by the 'language for learning'. An overlap of scientific language and personal knowledge takes place within the classroom discourse for the students to form an understanding. In all three CLIL language discourses the students' voices were involved in translanguaging practices. Additionally the students' CLIL language discourses combined with the monoglossic and heteroglossic forces highlights aspects of self-regulation. The students' use of the MLE contributed and supported the dialogues and the engagement of translanguaging practices.

An application of the above theoretical frameworks enabled the teacher/researcher to situate the students into the role of expert on their learning. As a consequence the study argues that the expert student voices provide new and deeper insights into Year 9 students' dialogic bilingual engagement and understanding of self-regulated learning, open inquiry, technology-use and translanguaging processes. The following research questions were useful in the design and analysis of this investigation:

1. How do Year 9 students in a bilingual environment use and perceive the chosen MLE design for scientific open and guided inquiry?
2. How do students use their student voice as language and content learners to reflect on becoming self-regulated and effective learners within the MLE?

This research study was directed by a qualitative approach grounded in theories of social constructivism, ethno-methodology, multiple case study design, communication in CLIL, and expressions of student voice linked to Bakhtin's theory of heterology and dialogism.

3. METHOD

The multiple case study design (Stake, 2005) is able to capture the dynamic CLIL MLE setting from a student's viewpoint. The first case study was used to ascertain the validity of the research questions and the feasibility of the research methods used. The subsequent study allowed for fine-tuning the methods and established support and explanations of new discoveries. The qualitative methodology was chosen to illuminate student voices and therefore the methods selected were able to capture the students' dialogues and specifically their use of monoglossic and heteroglossic language discourses specific to the CLIL setting. The following section describes these methods and includes the participants, the design considerations for the MLE and the different data collections tools.

3.1 Participants

There were 22 participants who were in Year 9. The participants were Australian native speakers aged 13 and 14 years from a Queensland high school enrolled into a CLIL program for their second year. The ethnicity of the two groups included five students with parents from Germany, Switzerland, Eastern Europe, the Philippines and South Africa and 17 students with parents from Australia. The participants worked through a Biology topic, Human Body Systems, over six weeks. The students had three seventy-minute CLIL science lessons per week in various classrooms and laboratories and eleven other CLIL lessons each week. All participants had free access to their own laptop and the Internet during each lesson and at home. The two Year 9 cohorts were chosen to represent a student group new to the laptop tool and a MLE to receive first insights into student's perceptions about their changed learning environment and their adaptation of learning strategies to the laptop. Ethical clearance was obtained from all participants and their guardians for the suggested data collection tools.

The CLIL classes chosen were determined by the fact that the Year 9 students in that high school received new laptops as their learning tools at the beginning of that school year. This had never happened in the past and the new tool combined with new strategies in the CLIL MLE offered new insights into the students' lived experiences getting used to a new learning environment and formulating new learning strategies for language and science content learning. These student voices frame the realm of understanding of a 13 and 14year old student (Bell, 2016; Fuller, 2005) in the role of user of the technology and thus may act as informants for the understanding of future educational practices and the design of future learning spaces (Druin, 2002). In this study the teacher/researcher received valuable student feedback on the current design of the MLE and further customization and adjustments were possible. This process not only benefitted the teacher/researcher, but also empowered the students to be in partnership with the teacher/researcher to create an effective learning environment for themselves and their peers. For example, the following comment was made by a student in the 2015 focus group interview: "I did enjoy it up until we started using the computers, then it got really stressful and we had to find a lot of information and not everything on the Internet is reliable and the computers stressed me out a lot. So no, I did not enjoy that." Furthermore, the teacher/researcher was able to work from an emic approach, (Lichtman, 2013) stemming from the involvement with the two cohorts for 18 months prior to the study taking place. This, in particular, allowed the teacher/researcher and the participants to form a trustworthy, non-threatening environment, where the students felt comfortable expressing themselves freely. It also afforded the teacher/researcher the expertise to make sense of student opinions.

3.2 Design of the EdStudio and Online Tools

The MLE, the Learning Place (Department of Education, 2012) in Queensland schools, allowed the teacher/researcher to customize an online classroom space, called EdStudio. Affording a student-centered learning approach the design for the EdStudio was based on considerations for appropriate technology use, pedagogy, content knowledge, learning activities and student engagement called TPACK (Angeli & Valanides, 2014) and a social infrastructure framework (Bielaczyc, 2006). The key points from the two frameworks supported the bilingual setting, self-regulated learning strategies and a scientific open inquiry process; they were as followed:

1. Customization of Biology content in the German language;
2. Scaffolding to reach specific learning goals and to support self-regulated learning strategies in the open inquiry process in English and German language;
3. Ensuring collaboration between students, and
4. Providing learning activities to connect the classroom with the online learning environment and vice versa.

The EdStudio design was adapted slightly from 2014 to 2015 to accommodate changes that arose from school-based decisions affecting the science curriculum. However, in 2015, a significant difference occurred in the customization of the Education Perfect website (Smith, 2015), the software application to train vocabulary. A new feature called smart lesson enabled the further customization of learning content by combining fact sheets with vocabulary lists, close exercises and quizzes. This differed from 2014, where only

the vocabulary learning function was available. The new feature automated the feedback on learning checklists, which the students had to perform in 2014 by themselves.

3.3 Data Collection Tools

Enabling the portrayal of student voices, data collection tools were chosen that highlighted their opinions and afforded students participation as experts (Lichtman, 2013). Triangulation of data occurred through the use of voice recordings backed up by video footage, a student-designed questionnaire and focus group interviews.

3.3.1 Voice Recordings and Video Footage

During each lesson three iPads, one iPod touch and two cameras were used to record student voices and actions. These voice recordings offered a unique insight into the student's learning journey and the transcripts provided particular clues, e.g. think aloud phases and student peer conversations for evidence of student conversations in two languages. Because of possible sound-loss in the voice recordings video footage was used to backup the data.

3.3.2 Student-Designed Questionnaire

Placing the students in the expert role a student-designed questionnaire was developed and managed before and after each research phase. The teacher/researcher initiated a class discussion to stimulate the students' thought processes in regard to exploring learning interests together with their peers. To eliminate the intrusion into the privacy of participants a questionnaire could present (Cohen, Manion, & Morrison, 2011), the questions were designed by the students and targeted towards peers. The questions were written by the students anonymously, gathered and typed up by the teacher/researcher. In 2014, the students compiled 55 questions and in 2015 the students wrote 45. This process offered unique insight into the students' understanding of learning strategies linked to self-regulation, translanguaging practices and language acquisition. The student voices provided themes emphasizing learning with technology, learning German, learning strategies, organization, time management, learning environment and motivation for learning. Learning strategies, learning German and motivation for learning were most prevalent for both years. Learning with technology was a prominent issue in 2014 but was hardly mentioned by the 2015 cohort. These themes confirm that Year 9 students are conscious of different aspects of self-regulation.

3.3.3 Focus Group Interviews

At the completion of the Biology unit the participants took also part in a focus group interview led by another CLIL teacher not involved in the teaching of CLIL science. This interview offered the participants an opportunity to discuss issues free of bias towards the teacher/researcher. The group interview was chosen by the teacher/researcher firstly to provide a comfortable trustworthy environment for the Year 9 students; and secondly to receive input triggered by the group's interaction, which might not have emerged in single interviews (Lichtman, 2013). To further support a non-threatening interview environment the focus group interview provided the participants with the opportunity to share their experiences while forming a mutual understanding of the questions being posed (Mills, 2003). It also acted as member check to clarify student viewpoints (Lichtman, 2013; Cohen, Manion and Morrison, 2011) arising from the student-designed questionnaire. Students provided feedback on issues raised, for example 'When do you realize that you need feedback on your learning?' Student responses clarified in this example that specific language use and understanding was determining their actions.

A small selection from the above-mentioned data sources provides the following preliminary results.

4. RESULTS

4.1 Laptop and Managed Learning Environment Use

The first research question concentrated on student perception in regard to working with the laptop in the CLIL MLE within scientific open and guided inquiry processes. In order to establish how student were using

the laptop and MLE, the focus group interview and student-designed questionnaire responses provided useful data. Student comments offered evidence that certain software applications especially the teacher-designed EdStudio and the vocabulary training website (Education Perfect) were important for their learning. The student responses mentioned that the MLE allowed the students, for example, to become experts in science by having access to the biggest library in the world; the Internet (Refer to Table 1). The students realized that they developed new voices, by engaging in many sources of scientific monoglossic discourses available online. The responses to the student-designed questionnaire highlighted that 16 of the 22 students relied heavily on the EdStudio and the vocabulary training website. It was established by both cohorts that the EdStudio offered a convenient content system (Steffens, 2006), where students would find the monoglossic German course content. It seemed significant and encouraging for the students to know that even if they were not at school for various reasons, they could access the information from home. The frequent comments mentioning Education Perfect indicate that the students were actively monitoring their learning of the German monoglossic science language.

However, laptop uptake and engagement with the MLE also depended on student's prior dispositions towards using technology. This was apparent when students commented negatively and frequently on the perceived malfunction of the laptops. It also showed when students had difficulties organizing their work into a customized container system (Steffens, 2006), where lesson notes and research information can be stored. These students felt stressed and overwhelmed with the information provided in the EdStudio in monoglossic German science language and the Internet. Further this hindered their uptake of Education Perfect and resulted in failing to learn the monoglossic German science language. Consequently it discouraged these students to be open for the learning experience, curtailing the motivation to explore the topic and therefore disengaging some students, refer to Table 1. Their self-regulatory processes and language acquisition were thus negatively affected.

Table 1. Student Comments on Laptop and MLE use

Focus group interview examples	Student comments – transcription:	Interpretation
How do you use the internet for learning? (2014)	Google! I pretty much use it as like, the Internet is pretty much like the world's biggest library filled with all kinds of information. It's also good because you can get multiple sources for information very easily. Dict.cc yeah! … The Learning Place of course, and things like language perfect as well, because there is a bunch, there is a lot of tools for like studying and all that.	This student is aware that the internet is a significant source for his learning. Self-efficacy of tool-use is very high. When the student utters: "the Learning Place of course", it is ensured that the teacher understands that the online learning space customized by the science teacher is seen as important learning tool to provide the monoglossic German science content. Mentioning the translating website dict.cc, the Education perfect site and the EdStudio (Learning Place) also confirms that the student uses legitimate websites to translate and gather information. The student implies that he is involved in the actual class work and not using an automated translating service, which would have been the case, if only Google was mentioned.
How do you use the laptop for your learning? (2015)	Ah, the Learning Place, well as the student X said everything is on the Learning Place and anything you need for your lessons is on the Learning Place and … even though Frau Frei, I don't complete all of them, I still try okay?	This student is also aware that the Learning Place is a content system, however the link is made to the site as a learning tool to acquire German monoglossic science content. This is apparent by the last comment directed at the science teacher, when the student says: "even though Frau X I don't complete all of them, I still try okay?" It also indicates high self-efficacy beliefs in regard to technology use.
What are the challenges when you learn using your laptop? (2014)	ST - oh there is [sic] many things; one, it can just completely stop and crash on me and so any work, so anything you	This student is expressing negative experiences with the laptop tool. He is not aware that the information he

	have worked on in the lesson you've lost and you can't exactly get that back easily and you have to catch back up on it, by either getting it from a friend or copy it down from a friend, which is the same thing … ah it's not ah, yeah so, technology, well the laptop isn't the most reliable thing that you can use.	collects and produces could be stored on the Learning Place, so that he is able to retrieve important work. He struggled with organization. Self-efficacy beliefs for technology use are low.
What do you like about the Learning Place Studio and Language Perfect? (2015)	ST – Well, I don't like the Learning Place, it is really unorganized and confusing and in the end I just went like rookie at the Learning Place, it puts me off science. Language Perfect I liked it, it is just time consuming and takes ages and yeah.	This student is overwhelmed with the information provided on the Learning Place and generally finds learning on the laptop not rewarding. She disengaged from the learning process due to her frustration with the organization of information and files. This feeling is transferred to other online learning activities like the vocabulary training website. Self-efficacy beliefs for technology use are low.

It is interesting to note that the Education Perfect website to practice monoglossic German science language and content shows a clear difference between the 2014 and 2015 scores with regard to learned questions. In 2014, the website only offered vocabulary training in 4 modes – reading, writing, dictation and listening while in 2015, a guided simulation feature called Smart Lesson was available and quizzes, close exercises and a competition were added, including more complex monoglossic language. The students engaged more despite the added complexity and consequently the results were noticeably improved. The highest score reached by a student in 2014 was 99 questions learned and the highest score in 2015 was 224 questions learned. The total amount of questions learned in 2014 by all 11 participants was 344, whereas in 2015 the 11 participants learned 567 questions according to Education Perfect data. This data suggests that an interactive guided online simulation with structured feedback is a relevant factor to improving language acquisition. This is in line with findings from De Jong (2011) stating that domain-specific simulations incorporating prompts for reflection is profitable for students. The participant responses to the SDQ support this finding, because in 2014 only three participants were using the Education Perfect site to memorize the German monoglossic language. However, in 2015 eight participants used the Education Perfect site incorporating the guided simulation for their learning.

4.2 Translanguaging and Self-Regulation

The second question investigated how Year 9 students used their voices as language and content learners to reflect on becoming self-regulated learners in the MLE. Here, three categories were applied based on the three language discourses of CLIL communication (Coyle, Hood and Marsh, 2010) aligned with Bahktin's theories of dialogism and heterology (Todorov, 1984; Bakhtin, 1986); refer to Table 3. The students used translanguaging practices for all aspects of classroom discourses. As the students were involved in moving between languages and discourses in their cognitive explorations, they recognized that meanings beyond the taken-for-granted everyday meanings could not always be applied. The 'Other' in this case the monoglossic or heteroglossic German language furthered the production of thought and self-awareness (Bakhtin, 1986), it allowed the students to pause and reflect on their current knowledge. Self-reflection happened through not knowing the German terms. However, if monoglossic English science language was presented, students tended to overlook the particular meaning of a term if it appeared to be known in a heteroglossic context. The students are, for example, familiar with the heteroglossic term 'open inquiry'. Because of its familiarity students seemed to overlook its scientific context and therefore cognitive action by the students was not required. The following comment from the focus group interview shows that the students were still not cognizant of the scientific monoglossic English meaning, even after transparent scaffolding and modeling occurred during the lessons: ST (2014) "knowing what the process of open inquiry is supposed to be, would probably be a good idea first, because I didn't know what that means". Several students agreed to this comment. This shows that non-technical monoglossic science language can be taken for granted by students

and become problematic as discussed by Wellington and Osborne (2001) (Wellington and Osborne, 2001). However, when the students encountered either unknown German monoglossic or heteroglossic terms, they immediately flagged this and self-reflection was set in motion. Following was the planning for strategies like translating or code switching, and seeking peer feedback, to find an understanding. Thus it can be summarized that this bilingual searching for meaning supported various processes of self-regulated learning, like self-evaluation, self-observation, self-efficacy, and seeking peer and teacher feedback as shown in Table 2.

Table 2. Translanguaging Practices

Translanguaging	Monoglossia	Interface	Heteroglossia
	Language of learning	Language for learning	Language through learning
2014 Student examples from voice recordings	ST1 – "Is that voice box or windpipe?" ST2 - just put the Stimmapparat. (*Translation: voice box*)	ST1 – did you guys call the aorta the Aorta or the Hauptschlagader? (*Translation: did you guys call the aorta the aorta or the main artery?*)	ST1– is broken down, I don't know, unterbrechen (*Translation: to disrupt*) ST2 - really! ST1– I think it's perfect German. ST2 – unterbrechen; unterverbrechen; ST1 – unter kaputt machen ST2– really, that is like kaputt machen; is like to destroy.
2015 Student examples from voice recordings	ST – Zellkern, (*Translation: nucleus*) membrane, Zellorganellen (*Translation: cell organelles*)… *This student is comparing her words with another student and identifies her missing word.*	ST – Vorhof, Vorhof (*Translation: atrium, atrium*) *This student is answering the teacher's questions quietly in German to himself.* Zu linken, link (*Translation: To the left, left*)	ST1 – the stupid computer, haben (*Translation: To have*) restarted. ST2 – did you just say haben (*Translation: To have*) restarted? ST1 – yes I did something Denglisch in there … wow ST2 – I did it once.
Interpretation	Translanguaging: Using both monoglossic German and English science languages for meaning making. Self-regulated Learning Help-seeking from peers Self-efficacy German language	Translanguaging: The scientific language was absorbed into the everyday English language with ease by clarifying the understanding of the German content. Self-regulated Learning Peer feedback Self-efficacy content Self-efficacy German language	Translanguaging: Drawing on heteroglossia to create the meaning required. Self-regulated Learning Self-efficacy German language Peer feedback Self-evaluation

5. CONCLUSION

Although educational technology use is widespread in Australian schools, little is known about student perceptions and experiences within a CLIL and MLE and how students can benefit from the educational opportunities provided. The current study addressed this gap by analyzing student conversations and comments of Year 9 CLIL students. This student perspective has previously been neglected in current research on educational technology use, translanguaging, and self-regulation, but seems necessary given the student's opinions about the uptake of specific learning strategies and tools to enhance their learning in the CLIL science setting.

The analysis revealed that Year 9 students classify customized online learning spaces as content systems (Steffens, 2006) and mostly engage to retrieve information. The difficulties arise, when Year 9 students need

to manage their own container systems (Steffens, 2006) applying strategies of self-regulation such as self-motivation, performance and volitional control. This is supported by student comments revealing that self-motivational and self-efficacy believes appear to influence student uptake of laptop and MLE use. However, an important change in student uptake of tool-use occurred through the introduction of a domain specific guided interactive simulation with feedback function. This finding is supported by research from De Jong (2011) who argued that scaffolding in inquiry simulation is necessary for student success and Clark and Mayer (2011) who established that simulations work best with inbuilt feedback functions (Clark & Mayer, 2011). The findings clearly showed a positive uptake of tool-use related to the introduction of the guided simulation in 2015. From the comments of the focus group interviews it can be summarized that Year 9 students are not cognizant of their learning strategies. Even though transparent scaffolding and modeling were provided for scientific open inquiry in the MLE, the students in this CLIL classroom setting did not seem to take notice of the processes of open inquiry and connected self-regulated learning strategies. These findings stand in contrast to current research stating that appropriate online scaffolding combined with human support could lead secondary students to take up self-regulated processes and open inquiry strategies (Bell, Smetana and Binns, 2005; Clark and Mayer, 2011; Hsu, 2015; Kitsantas, et al., 2013; Zimmerman, 2002).

A further key point in the findings relates to the student's translanguaging strategies linked to self-regulated learning. It is highly plausible that students benefit from the translanguaging practices in the CLIL environment, affording students more access to self-regulatory strategies such as self-motivation, performance and self-evaluation. This supports students' development of self-efficacy beliefs and seeking feedback. Through self-evaluating translanguaging processes students show deeper cognitive processes by rethinking meanings they may have taken for granted if they were delivered in their native language. This is reinforced by research from Garcia and Wei (2014) and Blackledge and Creese (2010) who found that translanguaging builds deeper thinking, and additionally develops language and literacy skills (Garcia and Wei, 2014; Blackledge and Creese, 2010). The pause created by rethinking meanings allows the students to realize that their language choices are not yet correct. It alerts the students that their current language knowledge is still developing and the content may not be understood, therefore feedback is required or new research has to occur. Consequently these translanguaging practices establish a connection between students' use of self-regulation and open inquiry.

It should be noted that this current investigation had its limitations by being situated in a unique CLIL environment where students were exposed to a triple challenge. The learning involved the negotiation of a bilingual setting, new laptop tool use and a new MLE. Hence, the findings are significant for a CLIL setting, where these challenges exist and highlight the importance of careful customization of MLEs and software applications. In summary, two practical considerations emerge from this study. Firstly, Year 9 students in a CLIL setting are more likely to engage in a guided learning approach in a MLE. This is in line with the student's preference for guided online simulations. Secondly, the translanguaging practices in the CLIL setting appear to be beneficial to student's development of self-regulation strategies. Future research into specific customized MLE designs to accommodate student opinion and perceptions would provide further inside into the success to deliver strategies for self-regulation, translanguaging and open inquiry processes in MLEs.

REFERENCES

Angeli, C., & Valanides, N. (2014). *Technological pedagogical content knowledge: exploring, developing, and assessing TPCK* (Vol. 2015). New York: Springer.

Australian Curriculum, Assessment and Reporting Authority,. (2013). Information and communication technology (ICT) capabilities. Retrieved from http://www.australiancurriculum.edu.au/GeneralCapabilities/information-and-communication-technology-capability

Bakhtin, M. M. (1986). *Speech genres & other late essays* (V. W. McGee, Trans.). United States of America: University of Texas Press.

Bakhtin, M. M., Holquist, M., & Emerson, C. (1981). *The dialogic imagination: Four essays*. Austin: University of Texas Press.

Barzilai, S., & Zohar, A. (2006). How does information technology shape thinking? *Thinking Skills and Creativity, 1*(2), 130-145. doi:10.1016/j.tsc.2006.08.001

Bell, B. T. (2016). Understanding Adolescents. In L. Little, D. Fitton, B. T. Bell, & N. Toth (Eds.), *Perspectives on HCI research with teenagers* (pp. 10-24). Switzerland: Springer International Publishing Switzerland.

Bell, R. L., Smetana, L., & Binns, I. (2005). Simplifying inquiry instruction. *The Science Teacher, 72*(7), 30-33.

Bielaczyc, K. (2006). Designing social infrastructure: Critical issues in creating learning environments with technology. *Journal of the Learning Sciences, 15*(3), 301-329. doi:10.1207/s15327809jls1503_1

Boekaerts, M. (2002). Bringing about change in the classroom: strengths and weaknesses of the self-regulated learning approach—EARLI Presidential Address, 2001. *Learning and Instruction, 12*(6), 589-604. doi:10.1016/S0959-4752(02)00010-5

Bonnet, A. (2012). In depth: Towards an evidence base for CLIL: How to integrate qualitative and quantitative as well as process, product and participant perspectives in CLIL research. *International CLIL Research Journal, 1*(4), 66-78.

Bybee, R. W. (2010). *The teaching of science: 21st-century perspectives*. Arlington, Va: National Science Teachers Association (NSTA).

Canagarajah, S. (2011). Codemeshing in Academic Writing: Identifying Teachable Strategies of Translanguaging. *The Modern Language Journal, 95*(3), 401-417. doi:10.1111/j.1540-4781.2011.01207.x

Clark, R. C., & Mayer, R. E. (2011). *E-learning and the science of instruction: proven guidelines for consumers and designers of multimedia learning*. San Francisco, CA: Pfeiffer.

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th ed.): Routledge Taylor & Francis Group.

Coyle, D., Hood, P., & Marsh, D. (2010). *Content and language integrated learning*. Cambridge UK: Cambridge University Press.

Dale, L., & Tanner, R. (2012). *CLIL activities*. Cambridge, UK: Cambridge University Press.

Department of Education, Training and Employment. (2012). The learning place flyer.

Druin, A. (2002). The role of children in the design of new technology. *Behaviour & Information Technology, 21*(1), 1-25.

Fuller, A. (2005, Dec 2005 - Feb 2006). Into the mystery of the adolescent mind. *The Byron Child,* 14 - 22.

Garcia, O., & Wei, L. (2014). *Translanguaging: Language, bilingualism and education*. Hampshire, UK: Palgrave Macmillan.

Hall, J. K., Vitanova, G., & Marchenkova, L. (2005). *Dialogue with Bakhtin on second and foreign language learning*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.

Lichtman, M. (2013). *Qualitative research in education: A users guide*. California: Sage Publications Ltd.

Lust, G., Vandewaetere, M., Elen, J., & Clarebout, G. (2014). Tool-use in a content management system: A matter of timing? *Learning Environments Research, 17*(3), 319-337. doi:10.1007/s10984-014-9161-2

Marenzi, I., & Zerr, S. (2012). Multiliteracies and active learning in CLIL: The development of LearnWeb2.0. *Transactions on Learning Technologies, 5*(4), 336-348. doi:Doi 10.1109/Tlt.2012.14

Mills, G. E. (2003). *Action research: A guide for the teacher researcher* (2nd ed.). Upper Saddle River, New Jersey: Merrill Prentice Hall.

Mortimer, E., & Scott, P. (2003). *Meaning making in secondary science classrooms*. Maidenhead: Open University Press.

Pellegrino, E., De Santo, M., & Vitale, G. (2013). Integrating learning technologies and autonomy: A CLIL course in linguistics. *Procedia - Social and Behavioral Sciences, 106*, 1514-1522. doi:10.1016/j.sbspro.2013.12.171

Schraw, G. J., & Robinson, D. H. (2008). *Recent innovations in educational technology that facilitate student learning*. Charlotte, NC: Information Age Pub.

Smith, C. (2015). Education Perfect.   Retrieved from http://worldseries.educationperfect.com

Steffens, K. (2006). Self-regulated learning in technology-enhanced learning environments: Lessons of a European peer review. *European Journal of Education, 41*(3-4), 353-379. doi:10.1111/j.1465-3435.2006.00271.x

Todorov, T. (1984). *Mikhail Bakhtin: The dialogical principle* (W. Godzich, Trans.   Vol. 13). Minneapolis The University of Minnesota Press.

Xuelian, L. (2011). Designing online collaborative tasks for language learning. *Theory and practice in language studies, 1*(2), 191-193.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64 - 70.

Zimmerman, B. J., Bembenutty, H., & Schunk, D. H. (2013). *Applications of self-regulated learning across diverse disciplines: A tribute to Barry J. Zimmerman*. Charlotte, North Carolina: Information Age Publishing.