One-to-One Computer and Language Development in a Multilingual Classroom

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The purpose of this study is to provide knowledge about the impact of using one-to-one computers in educational practice, which in this case is language development in a multilingual classroom. The questions investigated are if and how the pupils’ learning is promoted and how the teacher’s instruction is influenced when each pupil has access to a personal computer. A 4th grade class, where all pupils speak Swedish as a second language, has been observed. Analyses are carried out by Activity Theory (AT). Language development and learning is in focus, as well as socio-cultural theories of mental tools. Having one-to-one computers in the studied classroom practice indicates that the computer is the actual mediating artifact in the students’ language development. The teacher becomes invisible and acts as technical support. The computer with its spellcheck function has taken over the teaching role. The interaction among the classroom actors appears as minor.

Keywords: one-to-one computer, Activity Theory (AT), multilingual classroom

Introduction

How well pupils succeed in school is dependent on several interactive factors that can be linked to school and teaching. Thus, the ongoing activity can be seen as an activity system or community of practice. Instruction involves the facilitation of pupils’ learning, and accordingly, the instruction provided can be crucial for what learning opportunities are made available. In order to promote pupils’ language development in the instructional context, the importance of teacher-pupil and pupil-pupil interaction and a number of other components are emphasized (Cummins, 2000; Cummins & Schechter, 2003). It is important that the subject matter is understandable, which is promoted by its connections to the pupils’ everyday context and also to their backgrounds and earlier experiences. Furthermore, obviously, one must bear in mind in instruction what the purpose is. The instruction should also offer a cognitive challenge so that the pupils engage themselves in the subject matter, and it should stimulate pupils to be able to express their cultural experiences (Palincsar & Brown, 1984).

Cummins (2000) and Cummins and Schechter (2003) emphasized the importance that through language, pupils master the skills to be able to influence their surroundings in different situations, generate new knowledge, express themselves creatively, and enhance the ability to participate in social settings. These ideas reflect cooperative learning which is a study habit whereby pupils work together in small heterogeneous groups to complete an assignment that all contribute to (D. W. Johnson & R. T. Johnson, 1999a; Slavin, 1995). In
cooperative learning, one learns from another pupil or other pupils’ works by talking with each other and doing things together in the group. The main idea is that pupils take the responsibility for their own as well as their classmates’ learning. Studies with focus on reading achievement state that cooperative learning is more effective than traditional instruction regarding improving pupils’ understanding of reading material (Stevens, 2003), which is particularly relevant for second language pupils’ reading comprehension (Bolukbas, Keskin, & Polat, 2011; Ghaith, 2003).

**Purpose and Research Questions**

The overall purpose of the present study is to contribute knowledge about the impact of one-to-one computers in educational practice, which in this case is language development in a multilingual classroom. The research questions are:

1. If and in what way is learning promoted when each pupil has access to his/her own computer?
2. How are the teacher’s role and the instruction influenced by every pupil having his/her own computer?

**Previous Research**

It is becoming more and more evident that every pupil should have access to a computer for use both in school and at home. Schoolwork with the aid of a computer can thereby occur wherever, whenever, and in many different ways. In Swedish schools, 73% of 4th grade pupils have access to computers during reading instruction (Skolverket, 2011). Education ministers, principals, and teachers place increasing confidence in information and communications technology (ICT) and computers benefiting instruction, learning, and in the long-term achievement results. Of the 290 municipalities in Sweden, over 200 have planned or already begun programs for one-to-one computers in one or more schools in the municipality (http://www.skolverket.se). The main argument for this initiative is that computers in instruction open new doors for teachers and pupils to broaden their knowledge exchange. The term “one-to-one computer” is used frequently in the following text and is defined as every pupil having access to his/her own portable computer that also has an Internet connection.

The application of one-to-one computers, however, is not a new phenomenon, and such efforts have been going on since the late 1980s (Johnstone, 2003).

**Computers in Education—Teaching Method, Engagement, and Learning**

Some research on one-to-one computing environments indicates that certain teachers with access to computers alter their teaching (Angrist & Levy, 2002). This can be that pupils participate more (Donovan, Hartley, & Strudler, 2007), but also that there is a teaching method whereby the pupils become more active regarding constructing their own knowledge (Mouza, 2008; Zucker, 2004). Teachers also believe that pupils in a one-to-one computing environment are more engaged in the schoolwork, that they become more skillful at looking up information, and that both learning results and cooperation increase (Bebell & Kay, 2010). Cooperative learning in particular has been studied from different perspectives with the introduction of one-to-one computing. Teachers who work together with developing instruction with the aid of computers benefit pupils’ learning (Marzano, 2003). Also, the cooperation among pupils around the computers apparently promotes learning performance (Marzano, Pickering, & Pollock, 2001). Ovston and Wideman (2001), who studied pupils’ writing ability in the 4th grade, pointed to similar results: In one third of the classes that partook in the study, the pupils worked alone at their computers; one third of the pupils worked together at a computer...
in twos, while the pupils in the last third worked together in fours at a computer. The study showed that pupils who worked together in pairs at a computer developed their writing skills noticeably more than the other groups. Similar results are also shown by Larkin (2011).

Nevertheless, there are teachers who do not succeed in integrating computers productively in their teaching (Bebell & Kay, 2010). Despite the pupils have access to their own computer, they do not use them any more often than what is the case at schools without this high computer density. In such classes, no changes appear regarding pupil engagement, learning results, or cooperation among the pupils. Of course, the pupils play a role in this context. In British schools, Selwyn, Potter, and Cranmer (2009) studied ICT in relation to pupils’ learning. They stated that “… Our data depict a generation of young people for whom ICTs are part of their everyday lives, closer inspection shows many primary pupils’ actual engagement with ICT to be often perfunctory and unspectacular—especially within the school setting” (Selwyn et al., p. 928).

Playing games and copying pictures are what the pupils in their study do most with their computer use, which is true for at school as well as during freetime.

A number of studies look for a connection between one-to-one computers and learning performance. Experimental studies carried out in the United States show that pupils who participated one-on-one with a computer performed better in mathematics as well as in natural science subjects (Gulek & Demitras, 2005), which in particular seems to apply to boys (Dunleavy, Dexter, & Heinecke, 2007). Another American study shows that pupils’ results improved in mathematics, but not in reading and writing. A given explanation was that pupils have become so accustomed to writing with computers that they have a hard time showing their knowledge fairly when they must use pen and paper to pass a written exam (Shapley, Sheehan, Sturges, Caranikas-Walker, Huntsberger, & Maloney, 2009). An evaluation of eight American schools with one-to-one computing concluded that the pupils’ results improved in four of the schools, the pupils’ results declined in three of the schools, and there was no difference in one of the schools (Lowther, Strahl, Inan, & Bates, 2007). In a large-scale Israeli study, Angrist and Levy (2002) showed that the introduction of one-to-one computers in the classroom neither harms nor improves the pupils’ school results, which in this case dealt with mathematics as well as other subjects.

Whether or not one-to-one computers promote pupils’ learning is thus ambiguous. What is also unclear is whether or not the higher computer density leads to increased financial costs. This is a widespread concern (Lei & Zhao, 2008). Studies show that certainly the use of one-to-one computers reduces the cost of other learning materials and supplies (Greaves, Hayes, Wilson, Gielniak, & Peterson, 2010), but in return, there are costs of the computers and their operation, which are sky-rocketing (Vascellaro, 2006).

**Theoretical Background**

The theoretical background to the present study is made up of factors that promote pupils’ language development (Cummins, 2000; Cummins & Schecter, 2003), together with socio-cultural theories about the importance of mental tools for learning (Kozulin, 1998). The results are analyzed using Activity Theory (AT) (Engeström, 1987).

**Opportunities for Learning**

Kozulin (1998) discussed the formal reading and writing instruction conducted in school, but also the absence of teaching with the introduction of new tools where teachers take for granted that the pupils already
know and understand. The zone of proximal development (ZPD) is a child’s proximal development zone which the child does not attain on one’s own, but succeeds with the help and guidance of classmates, parents, or teachers (Chaiklin, 2003; Kozulin, 1998). Learning to read and write involves partly learning how to use symbols like letters or numbers as representations of words and quantities, and partly learning what the different concepts mean in the culture of the child. It is therefore necessary to learn the culturally mediated paper-and-pencil relationship which the child can learn naturally by imitating his/her parents’ reading and writing culture; this happens, for example, when he/she can write his/her name as a visual image without having to understand that the grapheme is tied to a phoneme. Learning how to read and write, namely, to translate speech into written symbols or the symbols made into meaningful units, requires formal instruction (Adams, 1995). Kozulin’s (1998) theoretical constructs around the importance of mental tools or symbols for development and learning are possible to apply to children’s development, education, changes in education, and the requirements on teachers in a modern or post-modern society.

**AT and Human Behavior**

AT attempts to capture the structure of human behavior where what happens is determined not only by the motive or purpose the individual has for his/her actions, but also by the existing conditions. The particular context is also something that Engeström (1987) emphasized when he developed Vygotsky’s theory about how people use tools or other artifacts in order to achieve their goals. He wrote that Vygotsky’s mediating triangle (subject, mediating artifact, and object) is incomplete and only covers the tip of the iceberg that depicts the structure of human activity.

According to AT (Engeström, 1987), human activity is influenced by cultural artifacts (instruments) and is directed toward specific goals (objects) which eventually lead to a result. Actions are included in a system, in a community of practice with more or less limiting norms and rules, where the various participants (subjects) have different tasks or roles in order to achieve set goals and desired results. Mediation is related to interaction, namely, the interplay between the subject and the object in the social and historical community of practice, the context the subject is a part of. Using AT, the connections and changes over time are elucidated, and the relationships among the parts become clear, with the interaction of all the described components (see Figure 1). Analysis of the study results is by means of an educational reconstruction of this model.

![Figure 1. The structure of human activities (Engeström, 1987, p. 78).](image-url)
The top of Vygotsky’s mediating triangle looks familiar, as Engeström (1987) also used it when he created his framework. Subject is the person or persons, who by using instruments—mental or physical artifacts (mental processes, language, text, and computers) through activity, try to attain the object that is the purpose or goal of the action. Figure 1 shows that the base of the system of relationships is an activity system consisting of contextual factors, such as rules—the spoken and unspoken rules and conventions that exist and that the individual must abide by; community—the social context, individuals who share the same object and as subjects are a part of the same; and division of labor—the assignment of tasks which is also dependent on the power relationships that exist. The change process that is a consequence of the activity or actions is referred to as the outcome.

The double arrows in Figure 1 symbolize the mutual relationship existing between the included variables. Thus, each phenomenon cannot be understood separately because all interact.

**AT and Language Development in a Multilingual Community of Practice**

In Figure 2, the fundamental parts of the teaching context taken from Cummins’ (2000) reasoning about the importance of the instruction, setting, relationships, and interaction are carried over to a reconstructed activity triangle. The triangle in Figure 2 symbolizes the knowledge generated in the community of practice formed by the multilingual classroom. The change process is a result of the exchange that occurs through the interaction between the classroom actors, the mediating instruments, and the existing contextual conditions. The basis, but also the purpose, of the instruction is that the pupils understand the content, with the starting point in their previous language skills and experiences.

*Figure 2. The desired classroom pedagogical practice. AT (Engeström, 1987) linked to Cummins (2000) and Cummins and Schechter’s (2003) learning theory.*

Based on the interpretation of Cummins (2000) and Cummins and Schechter’s (2003) theory, the desired classroom pedagogical practice is illustrated in Figure 2. It illustrates the connection between the teacher and the pupil to learn, the importance of teacher-pupil-pupil interaction, the link to the pupil’s prior knowledge together with understandable subject matter, and in the long term, the importance of these factors for learning, which in the present study involves achievement in terms of language development.
The pupil with his/her language to be developed corresponds to the subject in the triangle; he/she is surrounded by a school setting and is part of a classroom community with rules and assigned roles. In order to develop his/her language skills, the pupil must learn vocabulary and language rules, as well as practice using the language in different situations, both in speech and in writing. Knowledge, both prior and that to be developed, makes up the object in the triangle. By using mediating artifacts, such as the teacher and the school’s educational materials, and by building upon one’s earlier language skills, the pupil can develop new language skills. When the pupil’s language has developed to a satisfactory level, for example, the Swedish language in Grade 6, the goal can be said to be achieved. Therefore, acceptable and achieved learning objectives are the outcomes of the change process. Thus, the pupil’s developed language skills are the results of his/her actions, his/her prior skills, his/her interactions with his/her teacher and classmates, and his/her use of cultural tools, namely, mediating artifacts.

Empirical Data, Method, and Implementation of Analysis

The present article is based on a case study (Merriam, 1994) with the focus on the language development of 22 pupils in a multilingual class in the 4th grade. Six different languages are spoken in the class, and all pupils have Swedish as a second language. The class was visited on several occasions during one school year. The pupils and teacher were accustomed to having the observers in the classroom, and it is assumed that the investigators’ presence did not affect the events.

Empirical data were collected in the form of classroom observations, field notes, and interviews with the teachers and pupils. The observations and the interviews were recorded and transcribed (Cohen, Manion, & Morrison, 2012). The pupils’ legal guardians provided written consent that their children may participate in the study. All the respondents were also informed that their participation is voluntary and the findings are confidential. The teacher and the pupils have been given fictitious names in the report.

For the lesson period that is in focus for this study and that is described in the field notes (see Appendix), the goal was that we, as researchers, would influence the activity as little as possible. This meant that we initially placed ourselves at the back of the classroom. When the pupils got started with their own schoolwork, we walked around the classroom so as to gain an idea of how they worked and what the results were. After the teacher’s presentation, when the pupils were encouraged to work in pairs, two girls were followed more closely.

In order to find answers to the study questions, this presentation focuses on the pupils’ writing and the teacher’s response given one-to-one computers as the mediating tool for the pupils’ learning. The analysis is based on a reconstruction of AT (Engeström, 1987) with inspiration taken from Cummins (2000) and Cummins and Schecter (2003), as presented in the previous section.

Context of the Case Study

The present school was part of a project in which each pupil and their teachers were given access to their own computer. The pupils received their computers at the start of the spring term 2011. This was preceded by a meeting with parents where all were informed about the practical as well as the pedagogical issues. In addition to a word-processing program, the pupils had the possibility of installing their own programs that they needed for learning purposes on their computers. The classroom teachers received their computers one term before. In order to improve their computer skills and establish a common knowledge base, they partook in a course in
Practical IT and Media Competence. The purpose was to get an idea of how different software can be used in practice in school learning activities.

The pupils were permitted to take home their computers to complete homework. They were responsible for charging the computers, and this was done in a special cabinet where the computers were stored when they were not taken home. The pupils carried out their writing assignments according to the teachers’ directions. They wrote their texts entirely using the computer and were supposed to save them in individual Net archives called “Dropboxes”, where there should be a folder for each school subject. No texts were printed out in paper copy. According to the teachers, this paperless storage method should be understood as more accessible and manageable than the traditional one, where pupils’ papers were collected in binders.

**Teaching Practice and AT—Model for Analysis**

By using the described theoretical background, we attempt to clarify what impact one-to-one computers can have on the multilingual classroom teaching practice. The AT triangle includes the concepts: mediating tools, subject, and object, which relate to each other through actions toward the learning objectives. In this study, the mediating tools of the teacher consist of the instructional material in the form of a compendium, each pupil’s personal computer, and the language with which the interaction occurs. The subject is the pupils’ learning in terms of language development, including prior knowledge. The language, which will be developed, is the object. The desired result is that each pupil develops skills in Swedish as a second language, such as required to pass the present class level. The reasoning and the various connections are shown in Figure 3.

![Figure 3](image)

*Figure 3. Pupil, language development, and mediating artifacts.*

The pupil develops his/her language ability through the mediating artifacts of the teacher and the computer, together with his/her foundation of prior knowledge. Yet, all learning takes place in a context, and to be able to understand and visualize the impact of one-to-one computers in this multilingual classroom teaching practice, field notes of this study are placed in the context of the rules, surroundings, and assigned roles (Engeström, 1987) that make up the investigated teaching practice in this multilingual classroom.

We also develop the model (see Figure 3) by adding other mediating artifacts which are presented in Figure 4. These consist of the rules that the teacher sets up, in other words, the organization of the instruction. The teaching comprises the teacher-pupil interaction and the multilingual classroom, which in turn contains variation in language development, cognitive challenges, and also the group’s assigned roles including the pupil-pupil interaction (Cummins, 2000; Cummins & Schecter, 2003).
Figure 4 illustrates that the rules and the roles in the multilingual classroom make up the triangle’s base, namely, the community of practice and that there is a scheme of relationships and actions where arrows 1-12 show the internal links. It shows that both the teachers’ and the pupils’ actions are part of the classroom community. It also becomes apparent that their actions are both influenced by and they influence the classroom community and the assigned roles in the group just as they affect the pupils’ learning. The arrows are numbered in order to make the analysis more clear.

Results and Analysis Based on AT

This section contains an analysis of the case study field notes (see Appendix) which focuses on the dialogue between two pupils. The starting point is the reconstructed AT (see Figure 4). In the analysis, the relationships between the teacher and the pupils and their actions are illustrated using the numbered arrows in the same figure. The analysis is presented in a running account where excerpts from the field notes are included in order to support the reasoning.

Actions and Relationships—Mutual Influence

After the teacher has read aloud for the pupils, the lesson starts. She passes out notebooks consisting of short articles that the pupils are requested to read. She walks around the classroom and encourages the pupils’ writing, which illustrates the interaction between the teacher and the pupils. This is illustrated by the arrows 1, 2, 4, 5, 9, and 10 in Figure 4. The pupils are directed to read the text first, underline the facts, and then write a summary of what they have read, which is based on the assumption that the pupils understand what they read, in other words, the content is understandable for the pupils. This corresponds to arrow 3 in Figure 4. The teacher walks around the classroom and coaches the pupils in their writing. In this way, the interaction between the teacher and the pupils is evident (see arrows 5, 9, and 10 in Figure 4).

The pupils are encouraged to work in pairs to carry out the assignment, which is shown by arrows 6, 7, 8, 10, 11, and 12 in Figure 4. Thus, they are also encouraged to engage in cooperative learning. Mira and Ada sit in the cloakroom where they take turns reading, and with Mira’s help, Ada is able to read a previously
Ada has difficulty decoding words. She stumbles, begins to read a word, stops, and starts again. Mira corrects her, and when a word appears for the third time (“people”), Ada is able to read it correctly.

It is significant that cooperative learning is really taking place, in any case for one of the girls when she learns to pronounce a word correctly. Here, it becomes clear that an interaction occurs between the pupils (see arrow 7), and that at least one of the girls, Ada, develops her language ability (see arrows 3, 9, and 11). It is also clear that Mira takes on a teaching role in the relationship with Ada, and that Ada learns from her friend who can read a little better than she herself can.

Actions and Relationships—Failure to Mutually Influence

According to observations and field notes, the pupils regularly consult with each other during their writing. The feedback they get from the teacher about their texts takes place if the teacher has time during the writing lesson when she is circulating around the classroom. Then, she reads and comments on the pupils’ texts on the screen. Nevertheless, much of the teaching time is spent on solving technical problems or finding the pupils’ lost files. When the pupils remember to save their texts, this often happens without the teacher first having read their texts or commenting on them.

After 15 minutes, four of the 20 pupils have found their texts. Elin, who quickly found her text, wants help and puts up her hand. After 15 minutes have gone by, she has still not received any help. The teacher is busy helping pupils find their texts in the Dropbox.

The pupils do not receive any real help with their writing because the teacher’s time is taken up with other tasks. Thus, guidance based on the pupils’ ability and knowledge or interaction between the teacher and the pupil does not occur. This lack of interaction causes arrows 1, 4, 5, 9, 10, and 12 to disappear from Figure 4.

When the girls read aloud to each other, their intonation can signal that their understanding of the text is unclear.

“The girls’ intonation when they read can reveal that they do not read with full understanding”.

The excerpt above shows that arrows 2 and 3 can be at risk, because it is unclear if the pupils understand what they read.

When the pupils are sitting at their computers, it is more or less an unspoken rule in the one-to-one computer situation that each pupil should write for himself/herself, which is also what eventually happens. Mira starts writing. Ada copies from her, but Mira says after a while that Ada must write by herself. “No, J… did not say that”, replies Ada.

Mira demonstrates clearly that she no longer wants to work together by turning away her computer screen. She tells Ada to write by herself instead.

Ada peeks at Mira’s text and tries to copy. Several words are only half-written. Mira turns away her computer.

When Ada is told not to look, the interaction between the girls ends, with the consequence that the movement between the subject and the group stops; arrow 7 in Figure 4 disappears.

When the lesson is over, the pupils are reminded to save their work and go out on break. On another occasion, the pupils will work on their texts again. The teacher points out that they should be careful for punctuation, paragraph breaks, and that they may not use slang words. After 15 minutes, four of 20 pupils have
found their work. One girl in the class, Elin, who had quickly found her text, wants help, so she raises her hand, but all during this lesson, she has still not received any help. The teacher is busy looking for missing texts.

**Lack of Basis in Pupils’ Knowledge and Ability**

The articles in the compendium handed out by the teacher are fact-filled and require a lot of prior knowledge. The texts are primarily directed to an adult reading audience. The content is not suitable for young second language learners or for their prior knowledge and experience. The texts or subject areas are not introduced before the schoolwork begins.

The content consisting of short articles deals with natural disasters. The texts are fact-filled with succinct sentences, mostly with conjunctions and illogical line breaks.

The basis for selecting the text is neither the pupils’ nor the group’s knowledge and ability, which means that there is no connection between the organization of the instruction and understandable instructional content. All the above means that arrows 2, 3, 8, 11, and 12 disappear.

When Ada wonders if she may write about her own experience of a natural disaster, she is reminded by the teacher to summarize the given text instead.

Ada asks the teacher if she may write about her school in Kosovo. When the storm came, the roof blew off. The teacher answered that she will get to do that another time, but now they should summarize the text about disasters.

Ada seems to have no understanding of what the work will lead to. She does not know what it means to summarize a text.

Ada asks Mira what a summary is. She gets the answer that it is to re-write what is in the text.

Ada begins to write, but her thoughts drift to the content of the text. Instead of summarizing the text, she wants to write about her own experience of a disaster; she also says that animals are in danger due to the warmer climate. Clearly, she understands what a disaster is, but also what a disaster can cause. Her own initiative is ignored, and she is not allowed to elaborate on her own experiences. The teacher does not acknowledge Ada’s initiative nor her prior experience. The interaction between the teacher and the pupil ends, and arrows 1, 3, 5, 8, 9, 10, and 11 disappear. The pupil’s earlier experiences do not become the foundation for new understanding and new knowledge, and they are not considered for making the instructional content understandable.

The same girl tries one more time to get attention from the teacher, but without result. The activity and the relationship between her and the teacher, which are symbolized by arrow 1, appear to be nonexistent.

**Computer as Mediating Tool**

In this situation, when Ada is re-directed to herself and assistance with writing becomes the computer’s word-processing program, the computer appears as the mediating tool. This relationship is shown by arrow 1.

Mira writes purposefully on her text. She decides to write in large paragraphs the words and sentences she underlined in the original text. The computer shows her (arrow 1) that certain words should begin with a capital letter, in this case the names of some countries.

Mira sees red underlining in her text and figures out that Indonesia and also Africa should begin with a capital letter. She makes these changes. She sees also that the word Sweden is underlined in red. She clicks her right mouse button again and chooses the correct spelling. Mira reads her text aloud for herself and corrects where she thinks it is necessary.

Mira does not appear to draw the conclusion that the name of a country must begin with a capital letter,
because she repeats the mistake when she begins the name of another country with lower case.

The computer becomes the mediating tool (arrow 1) also for the other pupils when they are left to themselves. The computer spelling program indicates when a word is misspelled, and afterwards in this way the pupils can correct by themselves what they want to or think is needed. Ada, Mira, and Elin do not seem to reflect on their mistakes, but instead choose the spelling that the spellcheck suggests. Here, they take advantage of their prior knowledge of how the spelling program can help.

Arrows 1, 2, and 3, which in the original triangle (see Figure 3) show the relationship and action among the mediating tool, the subject, and the object, illustrate the pedagogical practice of Ada, Mira, and Elin in the one-to-one computing situation.

Discussion and Conclusion

The classroom, classroom rules, and assigned roles make up the special learning community, which can assist the pupils, for example, in attaining the language proficiency required for the curriculum learning objective. Specific knowledge should be generalizable and transferable to other contexts (Chaiklin, 2003; Kozulin, 1998). Such generalization can be facilitated when the pupils discuss, read, and write together, and also through formal instruction (Cummins, 2000). In an optimal teaching situation, there is interaction among the teacher, pupils, and mediating artifacts, meaning a mutual influence leading to learning and increased academic performance (Marzano et al., 2001). To develop pupils’ language skills requires them to interact with someone who can do more than they themselves can do, such as interaction with the teacher (Chaiklin, 2003; Kozulin, 1998; Cummins, 2000; Cummins & Schecter, 2003). In the multilingual classroom of this study, six languages are spoken, besides Swedish that only the teacher masters fully. This means that there are limitations to the pupils’ possibilities to acquire the target language, Swedish, since they receive modest support from their classmates for reaching their proximal development zone (Chaiklin, 2003; Kozulin, 1998). As in the described figures, it is primarily through teacher interaction that the pupils are challenged to develop their language skills to a higher level, even though the classmates to some extent also support.

In the present case study, it is obvious that schoolwork should be done at one’s own computer, and likewise that each pupil should produce one’s own text. Thus, cooperative learning (Bolukbas et al., 2011; Ghaith, 2003; D. W. Johnson & R. T. Johnson, 1999a; Slavin, 1995; Stevens, 2003) is not encouraged with the writing assignments. Yet, research shows that cooperation among pupils around a computer promotes learning performance (Larkin, 2011; Marzano et al., 2001; Owston & Wideman, 2001). When the field notes and interviews are analyzed, however, using the figures of the adapted AT (Engeström, 1987; Cummins, 2000; Cummins & Schecter, 2003), lack of interaction among the classroom actors appears. Only the pupil and the computer remain, with the pupils to a large extent being re-directed to themselves when they write their own texts with the help of the computer. The teacher becomes invisible and functions only as technical support. The computer with its spellcheck has taken over the teaching role. Further, the analysis shows that there was little time for the teacher to give pupils feedback in the actual writing process, because her time was primarily spent on solving technical problems with the computers. The teacher’s role, as one who stimulates cognition (Chaiklin, 2003; Kozulin, 1998) and who interacts (Cummins, 2000; Cummins & Schecter, 2003) for the pupils’ language development in the multilingual classroom, has been minimized. The pupils are mostly directed to their computer word-processing program, with its spellcheck being frequently used. This strategy has the risk that misspelled words are not marked, because they have a correct spelling with another meaning than that
which is intended.

One of the girls generalizes and transfers what she has read during the lesson to something she herself has experienced, but also something she has read about or heard about on other occasions. In this way, she makes a text-to-text connection and a text-to-value connection (Palincsar & Brown, 1984), but the interaction ends when she does not get any response for her ideas. She is not encouraged to go further with her ideas, and the assumption is that she is also not challenged in her proximal development zone (Chaiklin, 2003; Kozulin, 1998).

Research shows that in some cases, teachers in one-to-one computer environments change their teaching style and that pupils become more active participants, more engaged in their schoolwork, and more constructive in their learning (Angrist & Levy, 2002; Bebell & Kay, 2010; Donovan et al., 2007; Mouza, 2008; Zucker, 2004). Other research indicates that teachers do not succeed in integrating computers productively in their instruction (Bebell & Kay, 2010). However, we cannot know whether this situation would be the same if the pupils did not use computers, but wrote with paper and pencil instead. One conclusion can be drawn, however, that the teacher should have been more available to help the pupils in their writing. Maybe she could have clarified that a country should be written with a capital letter, or maybe she could have had time to listen to the pupils’ earlier experiences and what they wanted to tell. Maybe she could also have had time to elaborate on homonyms and thereby encourage the pupil who was observant about the word “sister”, which depending on the context, can have a different meaning.

Hardly anyone would think that the purchase of paper and pencils would lead to improved teaching and increased learning. Nonetheless, the idea that increased access to computers leads to such a development led decision-makers to invest heavily in one-to-one computers. Just as unlikely that paper and pencils lead to learning, is that computers do that. Equipping pupils each with his/her own computer does not automatically lead him/her to learning more or better. Everything is contingent upon the teacher, her teaching and the decisions she makes with the purpose of making it easier for the pupils to develop their knowledge and ability. If one-to-one computers are allowed to steal precious time, while also permitting pupils to work to a large extent without interacting with each other, then it seems that they are a rather poor investment, which is particularly relevant for pupils trying to develop a second language.

References


Appendix: Field Note—Observations From the Multilingual Classroom

The lesson, which according to the schedule should start at 8:15, gets started 10 minutes later when all the pupils have found their places. The teacher turns off the lights in the classroom, and the pupils who sit near the windows close the curtains. The reading aloud that begins every day’s schoolwork starts. The teacher, Johanna, reads for 25 minutes. The illustrations in the book have been scanned and are displayed on an interactive whiteboard. Sometimes, the teacher refers to the pictures which she also points to. Various activities take place during the reading, such as getting a bag, peeling some fruit, closing the curtains, walking around, chatting, laughing, squirming in one’s chair, and listening to music. After the book reading, a pupil with a birthday is congratulated, and all stand on their chairs and sing. Afterwards, a film is shown. The film is about the Iron Age.

Then the teacher passes out notebooks. The content consists of short articles about natural disasters. The texts are fact-filled with succinct sentences; most have conjunctions and illogical line breaks.

The pupils are told to work two by two. They are required to read the text, underline the facts, and then write a summary of what they have read. Two girls, Mira and Ada, go out and sit in the cloakroom. The girls take turns reading the text. Ada has difficulty decoding words. She stumbles, begins to read a word, stops, and starts again. Mira corrects her, and when a word appears for the third time (“people”), Ada is able to read it correctly. The girls’ intonation when they read can reveal that they do not read with full understanding. The girls underline words after they read them, but often they underline the whole sentences in the text. Ada looks at Mira’s text and tries to make the same underlining that Mira has made. When they have finished reading the text, the girls return to the classroom and take out their computers. They sit beside one another and turn on their computers. Several of their classmates have already begun to work at their computers.

Ada asks the teacher if she may write about her school in Kosovo. When the storm came, the roof blew off. The teacher answered that she will get to do that another time, but now they should summarize the text about disasters.

Ada asks Mira what a summary is. She gets the answer that it is to re-write what is in the text. Mira begins to write. Ada copies from her, but Mira says after a while that Ada must write by herself. “No, J… did not say that”, replies Ada.

Mira sees red underlining in her text and figures out that Indonesia and also Africa should begin with a capital letter. She makes these changes. She sees also that the word Sweden is underlined in red. She clicks her right mouse button again and chooses the correct spelling. Mira reads her text aloud for herself and corrects where she thinks it is necessary. Ada peaks at Mira’s text and tries to copy. Several words are only half-written. Mira turns away her computer. Ada asks Mira if she should write everything that she has underlined. “No, you should make a summary”, answers Mira. “The ice is gone. Do you know how many polar bears die? I have seen that on TV”, says Ada.

After a while, the girls compare their texts, and when Ada uses the word count tool, she says that she has more words. “But, I have written more. And do you know why that is? I have written bigger words, of course”, answers Mira.

The teacher goes around and encourages the pupils. She repeats several times that one must write in one’s own words. The pupils do not get any direct guidance in the actual writing task. She spends a lot of time with one pupil who has a problem with the computer. The pupils finish at different rates. Some put back their computers. They go around and chat with each other. Others take out computer games and start to play. The teacher permits these activities. Some friends come over and read Mira’s and also Ada’s texts. They point out that the teacher said that they must write in their own words, but they get the reply that the girls thought those words were so good they therefore chose to keep them. The lesson finishes up and the pupils are told to save their texts to go out on break.

During the next lesson, the pupils are to find information and continue to write about an animal or a plant that they chose. After 15 minutes, four of the 20 pupils have found their texts. Elin, who quickly found her text, wants help and puts up her hand. After 15 minutes have gone by, she has still not received any help. The teacher is busy helping pupils find their texts in the Dropbox.