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The impact of learning strategies on a CSCL task for vocational students

Rolana Karkoutli

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TECFA,

Faculty of Psychology and Educational Sciences

University of Geneva

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Jury:

Mireille Bétrancourt
Giulia Ortoleva
Daniel Schneider
Gaëlle Molinari

Professor, TECFA
Research assistant, TECFA
MER, TECFA
Professor, UniDistance

Director
Co-director
Examinator
Examinator

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Summary

Most studies on learning strategies have been conducted mainly with university and high school students. Only a few studies took vocational students into consideration. However, we think it is also very important to understand how vocational students apply learning strategies and how these learning strategies influence their performance. Therefore, we designed this study with the goal of investigating the use of learning strategies at school and at the related internships by the students of the vocational education school for Social and Health Care Assistant.

Another aspect that was very important for our study was the use of computer supported collaborative learning (CSCL). The linking of the knowledge learned at school and at the workplace is very important. Therefore, technologies can play a very important role to fill the gap between these two learning places and thus the purpose of this Master project was to investigate the effect of the learning strategies used on the collaborative writing task performed on the wiki page of the vocational school.

An experiment was conducted in this study where 14 students were first asked to report their use of learning strategies at school and at the workplace using a questionnaire; followed up by a computer-assisted collaborated task where they had to describe a critical situation they faced during their internships on the school wiki; and thereafter two students had to comment on each described situation and the writer of the situation had to react to the comments. Furthermore, we also asked 40 other students to fill in the questionnaire about the use of learning strategies at school and at the workplace, without having them to do the collaborative tasks.

The results of the study have shown that the practical application as a behavioural strategy is used more often at work than at school. Additionally, the results also show that students with previous work experience use less interpersonal help seeking strategies and more written help-seeking strategies when they face problems during their study and work.

Regarding the impact of the learning strategies on the computer supported collaborative task, we were unfortunately unable to find any significant correlation between the length of the written text and the use of cognitive learning strategies and between the accuracy of the experience description and the use of metacognitive learning strategies as we had predicted based on literature. However, we also predicted that students using elaboration learning strategy would refer more often to similar situation when commenting on the experiences of others. For this prediction, we found a strong trend towards a correlation, which can become significant if we had more participants in the computer supported collaborative writing task.

Résumé

La plupart des études sur les stratégies d'apprentissage ont été menées principalement avec des étudiants à l'université ou au lycée. Juste quelques études ont pris en considération les étudiants en formation professionnelle. Cependant, nous pensons qu'il est également très important de comprendre comment les étudiants de l'école professionnelle appliquent leurs stratégies d'apprentissage et comment ces stratégies d'apprentissage influencent leur performance. Par conséquent, nous avons conçu cette étude dans le but d'enquêter l'utilisation des stratégies d'apprentissage à l'école et pendant les stages par les élèves de l'école de formation professionnelle (Assistants-es en Soins et Santé Communautaire - ASSC).

Un autre aspect qui est très important pour notre étude est l'utilisation d'ordinateur pour l'apprentissage collaboratif (CSCL). Le lien entre les connaissances acquises à l'école et au travail est très important. Par conséquent, les technologies peuvent jouer un rôle très important à combler l'écart entre ces deux lieux d'apprentissage, donc le but de ce projet de maîtrise, était d'étudier l'effet des stratégies d'apprentissage utilisées sur une tâche d'écriture collaborative effectuée sur la page wiki de l'école professionnelle.

Une expérience a été menée dans cette étude, où 14 étudiants ont d'abord été invités à déclarer leur utilisation de stratégies d'apprentissage à l'école et au travail, en répondant à un questionnaire qui était suivi par une tâche collaborative assistée par ordinateur où ils devaient décrire une situation critique dont ils ont fait face pendant leur stage, et de l'écrire sur le wiki de l'école , et par la suite deux étudiants devaient commenter à chaque situation décrite et l'auteur de la situation a dû réagir aux commentaires . En outre, nous avons également demandé à 40 autres élèves de remplir le questionnaire sur l'utilisation de stratégies d'apprentissage à l'école et au travail, sans réaliser les tâches collaboratives.

Les résultats de l'étude ont montré que l'application pratique comme stratégie comportementale d'apprentissage, est utilisé plus souvent au travail qu'à l'école. En outre, les résultats montrent également que les étudiants qui ont une expérience de travail précédente utilisent moins les stratégies d'aide interpersonnelle, et plus les stratégies de recherche d'aide écrite quand ils sont confrontés à des problèmes au cours de leur étude et de leur travail .En ce qui concerne l'impact des stratégies d'apprentissage sur une tâche collaborative assistée par ordinateur, nous n'avons malheureusement pas trouvé de corrélation significative entre la longueur du texte écrit et l'utilisation des stratégies d'apprentissage cognitives, et pas de corrélation entre la précision de la description de l'expérience et de l'utilisation des stratégies d'apprentissage métacognitives comme nous l'avions prédit basé sur la littérature. Cependant, nous avons également prédit que les élèves qui utilisent la stratégie d'apprentissage d'élaboration pourraient se référer plus souvent à la même situation en commentant sur les expériences des autres. Pour cette prédiction, nous avons trouvé une forte tendance à une corrélation, qui peut devenir important si nous avons plus de participants à la tâche d'écriture collaborative assistée par ordinateur.

Key words: Learning strategies, Computer supported collaborative learning, vocational education.

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1 Introduction

In the past years, there has been a significant increase in the research on computer supported collaborative learning (CSCL). First, the studies focused on analysing discussion forums. Later, with the advancement of the research, studies started focusing more on other types of activities and tasks where the relation between the tasks given to the students and the interaction processes in which these students get involved is studied.

Furthermore, research on CSCL started employing theories from the field of learning strategies, which is a large and old field of studies in which many relations have been defined with other different facts like self-efficacy, reported learning ability, motivation, anxiety, educational achievement and other demographic variables. Some of the studies have examined the relationship between the learning strategies and the performance of learners in collaborative learning tasks, especially for university students and schools for young learners, but very few studies have been applied to vocational school students. Some of the studies focusing on vocational school students have tried to find solutions to create better links between the theoretical knowledge learned at school and the practical knowledge learned at the workplaces with the objective of making learners perform their work better.

Within the framework of learning strategies and CSCL, the present work intends to investigate the learning strategies used by students of vocational schools, in both the school and the workplace, and study the effect of these strategies on a writing task in a collaborative platform.

2 THEORETICAL FRAMEWORK AND RESEARCH QUESTIONS

2.1 Vocational School and Dual-T Program

In the vocational school, learners are taught the general skills needed to perform specific professions. This education is divided into a theoretical section taught at the school and a practical section in which the trainees apply what they have learned in theory at school to the workplaces, where they develop many competencies too.

Usually the practical part is applied by doing an internship in a working environment with a professional group. However, during this internship, learners do not often get the opportunity to practice all the skills they have been learned at school. In her study, Tynjälä showed the importance of collaboration between education and work and the development of the workplaces as a learning environment (Tynjälä, 2008). She presented several models of learning at workplaces and showed that practice and theory cannot be separated from each other. One of these models is the integrative model in which Tynjälä proposed that theoretical knowledge, practical knowledge and self-regulative knowledge should be integrated. This model can be similar to the problem solving process in which learners have to solve practical problems and related conceptual problems by transforming formal knowledge into practical skills.

The author also added that learning at work should be organised and guided to insure that the knowledge and skills are well maintained by the learners.

Every student might get exposed to a different situation at the workplace where she/he would probably acquire new knowledge for this situation. If this newly acquired knowledge stays at the workplace and is not shared at school with the other students, it will stay an individual experience that will not be improved and oriented correctly by the tutor or the teacher responsible of the students.

Therefore, technologies are there to fill the gap between learning at school and learning at the workplace, particularly through the use of CSCL, which we will explain in the next section. By using technologies, we can create collaborative activities that can help students learn from each other by sharing knowledge and experiences in different working situations. This way, students will develop new practices and reflect on critical aspects of their work. By that, they can be prepared to perform better any recommended task related to their field of study in the future.

2.2 Computer Supported Collaborative Learning (CSCL)

As the reflection on work experience has an important role in the learning procedure and the learner development, one of the tools that can help learners to reflect on their work and learning is writing activity, such as writing a learning journal, which includes analytic tasks, portfolios and self-assessments.

The other tool for the reflective skills is the discussion with a tutor or a group. Here collaboration with others becomes very important. According to Tynjälä, collaboration helps achieve higher level outcomes than working alone, and the knowledge is co-constructed

through the interaction between the participants. For that, collaborative writing tasks can combine the benefits of the writing and the discussion together (Tynjälä, 2008).

In a collaborative writing scenario, the author plans, translates and reviews her/his text and additionally she/he tries to reach an agreement with others. Planning includes organising information, setting objectives and generating the information. Translating or drafting, is transforming plans and notes into text. Reviewing is evaluating, revising and editing the text. These processes may be repeated several times and do not have to be sequenced (Lowry, Curtis, & Lowry, 2004).

Computer supported collaborative learning (CSCL) is a research domain that addresses the challenge of combining education and technology to effectively enhance the learning (Stahl, Koschmann, & Suthers, 2006). In reaction to software that forced students to learn as isolated individuals, CSCL arose in the 1990s and proposed the development of new software and applications that bring learners together and offer creative activities of intellectual exploration and social interaction.

CSCL proposes and evaluates learning strategies that push students to collaborate and through this collaboration they will co-construct their knowledge, learn by expressing their questions, pursue lines of inquiry together and learn how others are learning. The idea of having the learners build on each other's contributions helps achieve these goals (Onrubia & Engel, 2009).

The development of CSCL started at the end of the 1980s. One of the early projects on CSCL was the ENFI project, which was designed to support a new form of meaning-making by providing a new medium for textual communication (Gruber, Peyton, & Bruce, 1994). The first public and international use of the term of CSCL was in 1989 in the Maratea workshop. Other developments in the field followed with focus on different models and forms of communication, such as the form of email, chat, discussion forums, videoconferencing, instant messaging, etc. Additionally, artificial intelligence techniques were also employed to support sociability by monitoring interaction patterns and providing feedback to the students. In most cases, the role of the computer is secondary to the interpersonal collaboration process among the students. The software is designed to support and not to replace these human and group processes (Stahl et al., 2006).

An affective collaborative scenario requires permanent interaction and communication between the participants. This communication enables an argumentation, negotiation, discussion and sharing of common ways and sense. Moreover, we can find in this environment many inter-psychological, socio-cognitive and behavioural mechanisms as help-seeking and mutual emotional and motivational control take a place in a collaborative writing group (Onrubia & Engel, 2009). These mechanisms are part of the learning strategies categories that are the core of our research, which we will present later in this manuscript.

As Lowry and colleagues stated "Collaborative writing is a useful form of group work because of its many potential benefits, such as learning; socialization and new ideas; maximum input, varying viewpoints, checks and balances, experience, joint knowledge,

writing expertise, accuracy, and more understandable documents; higher document quality; and enhanced interpersonal relationships” (Lowry et al., 2004, p.70). Furthermore, many quantitative measurements can be considered to know if a student manages well her/his writing tasks, such as frequency, duration, number of messages and the exchanged documents (Onrubia & Engel, 2009).

In the nowadays-available online technologies, wikis can be seen as the most ideal tool for managing collaborating writing (Ortoleva, 2012). They offer plenty of features to support the complex process of collaborative learning such as the unlimited possibilities to create and modify documents, the option to use hyperlinks, multi-media content (images, video, audio), font styles and references in the documents and the possibility to track and manage the modifications made to documents over time.

The outcomes desirable for a normal collaborative writing task are productivity, quality and learning from each other. In our research, we can consider the text provided as a draft and the comments of the participants (the reviewers) as feedbacks to this text, which can improve the quality of this text and make it more clear and meaningful for the external readers.

2.3 Learning Strategies

Learning strategies are strategies that learners can use to facilitate their acquisition and understanding of new knowledge and skills, but also the later application and transfer of this newly acquired knowledge and skills. These strategies may involve thoughts, behaviours, beliefs or even emotions (Weinstein, Husman, & Dierking, 2000).

2.3.1 The categories of learning strategies

To understand learning strategies, it is very important to categorise them based in their characteristics. As illustrated in Table 1, Warr and Downing categorised learning strategies into three groups and which are cognitive, behavioural and self-regulatory strategies (Warr & Downing, 2000). Based on many studies that have focused on students acquiring knowledge from textual resources, cognitive strategies have been always the first tools used for learning. This type usually includes three strategies: rehearsal, organisation and elaboration (Pintrich & de Groot, 1990). However, Warr and Downing preferred to merge the two strategies of organisation and elaboration into one strategy (Active reflection) in their study. This merger is done mainly to differentiate the two strategies from the rehearsal strategy. Organisation and elaboration focus on the meaning of the content and are both procedures to create mental structures and links and they produce similar outcomes of learning according to different studies (Warr & Downing, 2000). Behavioural strategies involve many interactions with others, personal search for information and many practical applications. Furthermore, self-regulatory strategies focus mainly on the control of emotions and avoidance of anxiety by the learners, the motivation control by the learners during the procedure of learning and at the end the insurance that they have achieved their learning goals by the strategy of comprehension monitoring.

Table 1 The learning strategies according to Warr and Downing

Cognitive learning strategies	Behavioural learning strategies	Self-regulated learning strategies
<ol style="list-style-type: none"> 1. Rehearsal 2. Active reflection (Organisation, Elaboration) 	<ol style="list-style-type: none"> 1. Interpersonal help-seeking 2. Written help-seeking (from non-social sources, documents, manuals, computer programs...) 3. Practical application 	<ol style="list-style-type: none"> 1. Emotion control 2. Motivation control 3. Comprehension monitoring

The study of Berger and Karabenick examines the relation between motivation and the learning strategies used by 9th grade students in high school mathematics classes (Berger & Karabenick, 2011). In their study, learning strategies are classified differently. The classification was based on the study of Pintrich and his questionnaire the MSLQ (Motivated Strategy for Learning Questionnaire) (Pintrich & de Groot, 1990).

The strategies in the MSLQ are: cognitive strategies (rehearsal, organization and elaboration), resource management strategies (help seeking, time and study environment management), and metacognitive strategies (planning, monitoring and regulating). As can be noted in Table 2, Berger and Karabenick prefer to use the term “metacognitive learning strategies” for the third category instead of self-regulated learning strategies. In this category, they define regulation as a single subcategory that includes all the regulatory strategies (e.g. motivation control and emotion control). Further, contrary to Warr and Downing, Berger and Karabenick also introduced planning as a separate metacognitive learning strategy.

Table 2 The learning strategies according to Berger and Karabenick

Cognitive learning strategies	Resource management strategies	Metacognitive learning strategies
<ol style="list-style-type: none"> 1. Rehearsal 2. Organisation 3. Elaboration 	<ol style="list-style-type: none"> 1. Help-seeking 2. Time and study environment management 	<ol style="list-style-type: none"> 1. Planning 2. Monitoring 3. Regulation

2.3.2 Our categorisation of learning strategies

After studying the common points of the categorisation made by Warr & Downing and by Berger and Karabenick but also by other articles discussing the same topic (Glogger, Schwonke, Holzäpfel, Nückles, & Renkl, 2012), we created our own categorisation of learning strategies. In Table 3 we present this categorisation, which consists of the strategies most appropriate to the needs of our research with vocational school learners. We started by

defining the main categories for the strategies and to prevent confusion between the different terms, we selected the three well-known psychological categories (cognitive, behavioural and metacognitive).

Table 3 Our categorisation of learning strategies by merging Warr & Downing and Berger & Karabenick

Cognitive learning strategies	Behavioural learning strategies	Metacognitive learning strategies
<ol style="list-style-type: none"> 1. Rehearsal 2. Organisation 3. Elaboration 	<ol style="list-style-type: none"> 1. Help-seeking (Interpersonal, Written help-seeking) 2. Practical application 	<ol style="list-style-type: none"> 1. Planning 2. Monitoring (Comprehension Monitoring) 3. Regulation (Emotional Control, Motivation Control)

2.3.2.1 Cognitive learning strategies

The term “cognitive learning strategies” is a well-established category for learning strategies and has been used in many studies with the exact term and with the same subcategories. In our categorisation, this category consists of the following learning strategies:

1. The first cognitive strategy is Rehearsal, which is the process of mental or oral repetition of information learned in order to commit it to memory.
2. The second cognitive strategy is Organization. This strategy is the process to create mental structures by listing and highlighting the most important ideas needed to learn.
3. The third cognitive strategy is Elaboration. This strategy helps in building mental links between previous knowledge and a new learning material.

According to Pintrich, cognitive learning strategies foster the cognitive engagement in learning, which leads to a higher level of achievement (Pintrich & de Groot, 1990). Further, he also claims in his study that students who believe that they are capable to perform a task are more likely to use cognitive learning strategies.

2.3.2.2 Behavioural learning strategies

For the second category of learning strategies, we have chosen to use the name “Behavioural learning strategies” similarly to Warr and Downing instead using the term “Resource management strategies” as was done by Berger and Karabenick. We found that the term “Behavioural learning strategies” is more significant in the psychology and it reflects better the meaning of the concepts it consists of. In our categorisation, this category consists of the following learning strategies:

1. The first behavioural strategy is *Help-seeking*. Help-seeking in Warr and Downing study was divided into interpersonal help-seeking and written help-seeking. Interpersonal help-seeking is the strategy to obtain assistance and help from other people, but written help-seeking is searching for help from non-social sources, documents, manuals, computer

programs, etc. Because written help-seeking was not mentioned in other studies as a separate subcategory, we preferred to keep it under help-seeking in general. Seeking help from others is very important strategy in our research. Especially because of the social interaction, whether in the collaboration during the learning tasks online or in the workplaces where the students develop a lot of their skills.

2. The second behavioural strategy is the *Practical application*. This concept is well related to our participants and their field of studying in the health assistance school and the practical activities that are part of their learning programme. We are interested to know how much important it is for those students to increase their learning by trying out things in practice. The practical application was found by Warr and Downing to be significantly associated with knowledge acquisition in a technical course.

Furthermore, Berger and Karabenick nominate time and study environment management as a learning strategy after help-seeking in their study. However, we found this strategy more appropriate to be part of the planning strategy in metacognitive learning strategies instead of being part of behavioural strategies.

2.3.2.3 Metacognitive learning strategies

The third category of strategies in Berger and Karabenick's study is the metacognitive learning strategies. We found this term more appropriate to be as subcategory. After previewing many researches (Glogger et al., 2012; Tavakolizadeh & Ebrahimi-Qavam, 2011; Weinstein, Acee, & Jung, 2011) we preferred to name the category Metacognitive strategies because this term can give the possibility for wider choice of subcategories.

1. The first metacognitive strategy is *Planning* strategy, which includes the planning of the goals, the way and the time needed to learn any material.
2. The second metacognitive strategy is *Monitoring*, or comprehension monitoring as it is called in many studies. This strategy is for self-assessment of the learning degree of a material by asking questions about the topic learned and by testing the comprehension level.
3. The third metacognitive strategy is *Regulation*. In the study of Berger and Karabenick, there are two subcategories: Motivation control and emotional control. However, we found it more logical to have these two strategies as part of the regulation strategy. Additionally, as the emotions motivate the organism to cope effectively with the adaptational demands confronting it, we see that these two strategies are related and both regulate the learning (Lazarus, 1991). According to Lazarus, our regulation mechanisms improves gradually by age due to exposure to social life experiences and therefore, how older how better humans can regulate emotions.

Regulation is defined by Pintrich (2000) as an “ active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation and behaviour guided and constrained by their goals and the contextual features of the environment (Ozan, Gundogdu, Bay, & Celkan, 2012). Beside, according to Pintrich and colleagues, the self-regulated learners are able to perform better (Pintrich & de Groot, 1990).

Back to the research of Tynjälä and the learning in workplaces, she has emphasized also on the importance of developing student's metacognitive, self-reflection and self-assessment skills, which reaffirms the importance of the learning strategies not only in school but also in workplaces according to the constructivist learning theories (Tynjälä, 2008).

2.3.3 Selection of learning strategies

When introduced to learning strategies for the first time, it is very difficult for most people to understand which learning strategy they are normally using. However, even after they define their own learning strategy, it still might change over time because of experience in different educational level and because of age. Learning strategies are flexible and are not immune to change. In fact, they can change in a very short time (Berger & Karabenick, 2011).

In the most times, we learn our learning strategies either from our teachers, our parents, our friends' advices or from our mistakes and failures. The selection of these strategies is dependent on several factors such as our ability to deal with distractions, the commitment to our goals and our prior achievement and experience (Weinstein, 2001). In addition, self-efficacy also plays a very important goal. Being confident in our ability to learn leads to the use of deeper and more sophisticated strategies (Berger & Karabenick, 2011).

Self-efficacy is regarded as a positive factor on educational achievement and writing ability. However, we have also to be aware that too much self-confidence can have a negative outcome too. Twenge and colleagues stated: "You need to believe that you can go out and do something but that's not the same as thinking that you're great" (Twenge, Campbell, & Gentile, 2012). They suggest that a good way would be that a person should believe that they are able to acquire certain skill. It goes wrong when too much self-confidence causes the person to believe that she/he already has certain skill, which she/he has not. We can conclude from this that a person should not have too high self-esteem, but just high enough to achieve her/his goals. Therefore, to increase positively the self-efficacy, we need to improve the learning strategies skills of students to exceed the learning difficulties they face in many learning experience (Weinstein, 2001).

Twenge and colleagues showed in their previously mentioned study that self-efficacy in learning is positively correlated with the writing ability (Twenge et al., 2012). Others also claim that there is a mutual influence between self-efficacy and self-regulated learning (Ozan et al., 2012). Furthermore, it is also suggested that there is a correlation between the three elements of self-efficacy, academic achievement and self-regulated learning (Tavakolizadeh & Ebrahimi-Qavam, 2011). A summarization of these claims would suggest that self-efficacy is the most important concept with direct relationship with self-regulated learning, academic achievement and writing ability as conceptualized in Figure 1. As the focus of our study is CSCL and particularly collaborative writing, we assume that learning strategies can have an impact on collaborative writing.

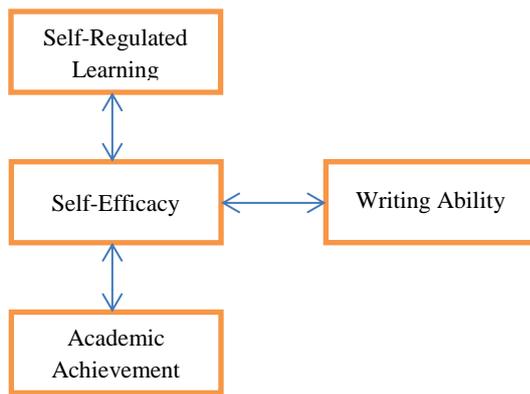


Figure 1 the relationship between self-regulated learning, self-efficacy, academic achievement and writing ability

A lot of research has been conducted in the field of learning strategies and its effects on different aspects, but most of these studies were about university students or regular education school system students (e.g. (Onrubia & Engel, 2009) (Berger & Karabenick, 2011)). We believe that it is also important to study these aspects with students of vocational schools. The ability to learn and being confident with this ability are not very strong aspects of these students and we are curious to know how this might influence their use of learning strategies. Vocational school students experienced lower scores in their previous education and these low scores can affect their self-efficacy according to previous research (Diseth, 2011; B. J. Zimmerman & Bandura, 1994; Barry J Zimmerman, Bandura, & Martinez-Pons, 1992). This study focuses on the vocational school students with the goal of observing what kind of strategies they normally use to learn at school and at the workplace and what the impact is of their learning strategies on computer supported collaborative writing tasks.

2.4 Research Questions and Hypotheses

In this research, we investigate the learning strategies used by the students of the vocational school of health assistance and study the effect of these strategies on the writing task performed on the Wiki page of the school. Because previous research has mainly been conducted with university and high school students, there is a scientific curiosity to know how vocational students apply learning strategies and how these learning strategies influence their performance. Contrary to high school and university students, vocational students do learn new knowledge and skills not only at school, but also at the workplace where they do internship. Significant age and experience differences between the students of vocational education are other factors that differentiate vocational schools from regular universities and high schools. Therefore, it is important to investigate the influence of all the mentioned aspect on the use of learning strategies in vocational schools. Based on this, we defined three research questions to investigate in our study. Assumptions based on evidence from related studies conducted with university and high school students that were discussed in the previous sections are used to create hypotheses for these research questions. The research questions and their hypotheses are:

RESEARCH QUESTION 1: *Are there any differences between the learning strategies reported by vocational students in school and during the internship?*

This research question should lead to hypotheses that emphasise differences in use of learning strategies between school time and internship. Evidence in literature shows that “practical application” as a behavioural strategy is associated with practical situations (Warr & Downing, 2000) and therefore we assume that students might use this strategy more often at work than at school. Thus, we can state the following hypothesis:

H1: Students use practical application strategies more often at work than at school

Further, previous research with university and high school students has shown that cognitive strategies are always the first tool to use for learning strategies (Warr & Downing, 2000). Of course, these schools are mainly theoretical and since vocational schools have a theoretical part and a practical part we assume that vocational school students also use cognitive when they are at school (theoretical) but less when they are at work (practical). This leads to the following hypotheses:

H2: Students use cognitive strategies more at school than at work

RESEARCH QUESTION 2: *Do relevant previous job experience, the number of years at school and the age of students have an impact on their use of learning strategies?*

This research question leads to hypotheses testing the influence of job experience, the number of years at school and the age of students on the use of learning strategies. The study of Warr and Downing shows that students with a relevant previous job experience reported less interpersonal help-seeking and we think the same will be true for the subjects in our study (Warr & Downing, 2000). Therefore, we define the following hypothesis:

H3: Vocational students who have previous work experience use less interpersonal help-seeking strategies.

That students with previous work experience use less interpersonal help-seeking strategies shows that experience makes students able to work more independent. This independence means that instead of asking others, these students prefer to solve their problems by themselves and thus use more written help-seeking strategies:

H4: Vocational students who have previous work experience use more written help-seeking strategies.

Warr and Downing’s claim that experience reduces the use of interpersonal help-seeking, can also apply to the years they spent on school. We think that students at the final years of their study would apply less help-seeking strategies than students in the beginning of their study. This prediction results in the following two hypotheses:

H5: Vocational students who are longer at school use less interpersonal help-seeking

H6: Vocational students who are longer at school use more written help-seeking

Research in emotions and emotion regulation has shown that the human emotion system develops gradually through exposure to experiences in life (Lazarus, 1991). The older the

person the more capable she/he becomes in regulating her/his own emotions and coping with stressful situations. Therefore, we think that older students in our subject-group will be using more regulation strategies than the younger ones.

H7: Older students use more regulation learning strategies than younger students

RESEARCH QUESTION 3: *Do the learning strategies reported by vocational students have an impact on their computer supported collaborative writing task?*

According to Pintrich, cognitive learning strategies foster the cognitive engagement in learning, which leads to higher level of achievement (Pintrich & de Groot, 1990). As writing is related to high cognitive skills and strategies (organising information, setting objectives and generating the information), we suppose that:

H8: Students who use cognitive learning strategies often produce more text when writing.

Learning strategies can also have influence on the quality of the performance of the students. According to Pintrich and colleagues, self-regulated learners are able to perform better (Pintrich & de Groot, 1990). Thus, we suppose:

H9: Students who use metacognitive strategies often are able to describe their experiences more accurately

Furthermore, as elaboration helps in building mental links between previous knowledge and a new learning material (Pintrich & de Groot, 1990), we suppose that students who often use this strategy describe events in much better way than others do. This leads to the following hypothesis:

H10: Students who use elaboration strategy often refer to similar situation when commenting on the experiences of others

3 METHODOLOGY

3.1 Background and Population

In collaboration with the vocational education school for *Social and Health Care Assistants* in Geneva (*Assistants-es en Soins et Santé Communautaire - ASSC*), in the framework of the project Dual-T and in collaboration with Giulia Ortoleva and reuse of the data collected in one of her study (Ortoleva, 2012), the current study was implemented.

Ortoleva's study is using technologies in the vocational education to make correlation between the practical workshop and the theoretical part of learning at schools. The study wants to test the effectiveness of Computer supported collaborative writing activities on several aspects: the acquisition of competencies, the self-efficacy beliefs and the professional identity. Our study and Ortoleva's study both were synchronous and based on the same collaborative writing scenario.

The collaboration with the research of Ortoleva has helped to avoid many difficult stages that normally any researcher would face, such as asking for permission from the school to conduct the research, persuading teachers to collaborate and persuading learners to perform the recommended tasks. Another beneficial point of the collaboration was the fact that in Ortoleva's study wiki was used with the same students one year earlier and therefore we did not face any problem with using the wiki as they already used before. Ortoleva has a very good relationship with the vocational school teachers, which made the atmosphere very comfortable to work and the teacher responsible was very eager to help.

3.2 Participants

The full experiment, which includes the questionnaires and the writing activity, was conducted during a normal school day with 14 students in the second year of their study. They were invited to the computer room and were asked to fill in the questionnaire about their learning strategies at school and their internship. After answering the questionnaire, they were asked to perform a collaborative writing task.

Due to the fact that our study was done in collaboration with Ortoleva's study, we were only able to perform the full experiment with the mentioned students. However, to collect more information about the used learning strategies, we have also asked 40 other students (20 students in the first year of studying and 20 in the third year) to fill in our questionnaire about their learning strategies used in school and workplace, without doing the collaborative writing task.

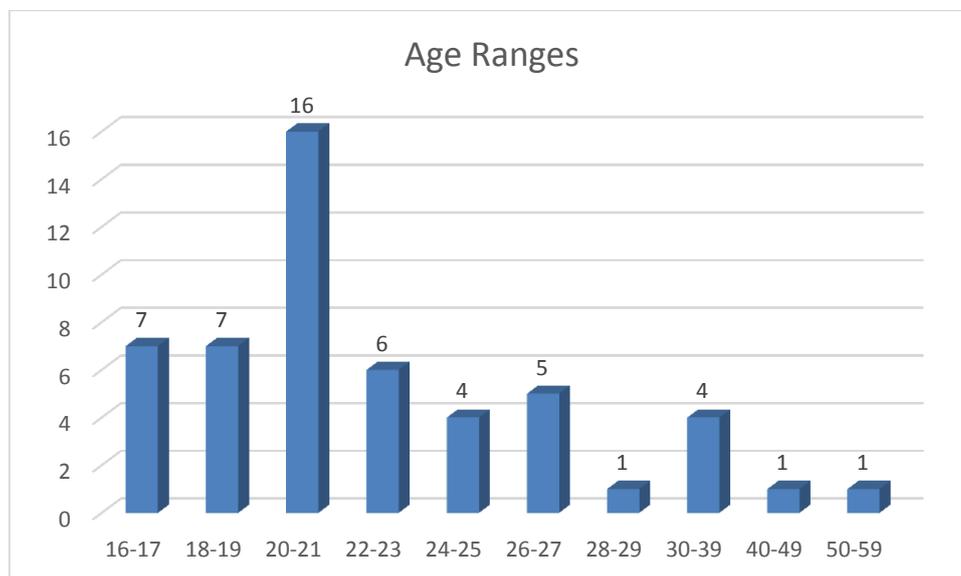


Figure 2 Age ranges of the experiment population

Thus, the total number of questionnaires collected from the students was 54 questionnaires and their ages were between 16 to 51 years old. As shown in Figure 2, the majority of the students are less than 30 years old and only 6 of the students are above 30 of which 4 are between 30 and 39, one between 40 and 49 and one between 50 and 59.

3.3 Procedure

The study was divided into two parts; the first part was the questionnaire of learning strategies used at school and at the workplace. Our questionnaire which can be found in Appendix A (in French), was based on the questionnaires of Pintrich & DeGroot (Pintrich & de Groot, 1990) and modified according to the questionnaires of Berger & Karabenick (Berger & Karabenick, 2011) and of Pillay & Abrami (Pillay & Abrami, 2007). We needed to adapt our questionnaire to the situation of the vocational school and therefore we had to ask the students about their learning strategies at school and at their internship, which made our questionnaire a little bit longer but more specified. Therefore, the questionnaire was divided into two parts, learning strategies at school and learning strategies at work. In each part, we had for each learning strategy two or three questions, while for the strategy of help-seeking we needed five questions to specify from which source they request assistance. Either the teacher in school, the supervisor in the workplace, colleagues at school, colleagues at work, or the student searched for help from written resources. This questionnaire was conducted with the full sample of 54 students from different scholastic year.

The second part of the study is the collaborative writing task. The scenario of the writing activity was already developed by Giulia Ortoleva before the current study. We were able to conduct this writing activity with 14 students from the second scholastic year. The 14 students had to describe a critical situation that happened to them at the workplace by focusing on the following three questions:

1. What happened?
2. How did you react?
3. What were the consequences?

After writing the description of the critical situation, each apprentice comments on the experiences of two colleagues, and then at the end the author responds to colleagues' questions and comments.

The complete experiment exists of the following four stages:

1. Learning Strategies questionnaire
2. Writing critical experience
3. Two cycle peer commenting
4. The author responds to the comments

assc-promo11.wikispaces.com/\

Racontez un épisode particulièrement significatif que vous avez vécu et qui concerne votre relation avec un-e patient-e ou un soin ou encore une relation avec un membre de l'équipe. Concentrez-vous sur les aspects suivants :

1. Qu'est ce qui s'est passé ?
2. Comment avez-vous réagi ?
3. Quelles ont été les conséquences ?

EN English (United States) ? Help

Votre Texte

1. Qu'est ce qui s'est passé ?

HUG

Un matin je devais faire 3 prises de sang chez des patients différents car, les piqueuse était absente ce matin là. Donc on m'a demandé de les faire et j'ai accepté. Cela ne me dérange pas au contraire. Les 2 premières piqûres se sont bien passés sauf la dernière. J'étais stressé du fait que je n'ai pas réussi à prélever chez ce patient, j'ai essayé de déplacé l'aiguille afin de ne pas repiquer mais je n'ai pas réussi. Je n'ai plus osé le repiquer une deuxième fois, j'avais perdue mes moyens. Donc j'ai prévenu l'infirmière.

Comment 1

Mais pourquoi étais-tu moins bien pour le 3ème patient? Étais-tu déjà stressé avant la prise de sang? Parce que j'ai cru trouvé la veine. Non je n'étais pas stressé, c'est juste au moment ou j'ai vu que j'avais pas réussi après la tentative de bouger l'aiguilles....j'ai perdu mes moyens et c'était le stress totale

Reaction

Mais si t'as déjà réussi deux prise sang il faut pas te laisser prendre pour le stress et si tu n'arrive pas toute les prise du sang c'est ne pas grave tant que t'as garde l'asepsie bisou.

Comment 2

2. Comment avez-vous réagi ?

Cela m'a fait perdre mes moyens à ce moment et j'étais très stressé de ne pas avoir réussi. Quand je ne réussie pas la prise de sang au 1er coup, je perd aussi mes moyens et je suis incapable de le refaire. Moi aussi j'ai raté une prise du sang et pour tant j'étais sur de moi et la veine pour tant j'ai raté, l'infirmière m'a dit que le s plus importante c'est de prendre du temps et sentir la veine car le geste était super bien selon le protocole don c pas souci si tu raté de prise du sang.

3. Quelles ont été les conséquences ?

Cela m'a fait perdre confiance en moi car je n'osais plus faire des prises de sang par la suite. Ensuite j'ai en parler du problème à une infirmière de mon unité du fait à que je bloquais lorsque il y avait une prise de sang. Moi je perd confiance pour ce moment là mais après, j'ai envie de recommencer jusqu'à ce que je puisse bien réussir les prises de sang. Je pense que les erreur nous fond des meilleurs personne ne prend pas comme un échec, prend ça comme un saute pour continuer. Merci les filles, actuellement j'ai repris à nouveau confiance en moi jusqu'à la prochaine que je raterais.hihihh

Figure 3 A screen shot of the Wiki page of the school

4 Results

4.1 Analysis of the results

Following the data collection phase, all the results collected have been statistically analysed with the purpose of testing the proposed hypotheses. Student's t-test has been used to evaluate the difference between distinct samples and Pearson's product moment coefficient has been used to calculate the correlation between several factors that are important for our hypotheses.

For each subject in our experiment, the questionnaires resulted in scores indicating how much each specific learning strategy is used. Using specific learning strategies, we calculated the values for the categories of the learning strategies. The value of each category was calculated as the mean of the strategies belonging to it. For example, the value of the category "Cognitive Strategies" for each subject was the average of the values of rehearsal, organisation and elaboration strategies.

4.2 Differences between school and internship

We started by comparing between the learning strategies used in school and the ones used in the internship by calculating the significance of observed differences between the means of each strategy (Table 4) using the Student's t-test with significance level of 5%. As can be seen in Table 5, we found significant differences of use for six strategies. Rehearsal strategy and written Help-seeking strategy have been used more in school than the internship. While the strategies of Elaboration, practical application, planning and emotional control have been used more during the internship.

Table 4 Means & statistics of learning strategies at school and at the internship

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Rehearsal School	3.2963	54	0.46091	0.06272
	Rehearsal Internship	2.6667	54	0.91115	0.12399
Pair 2	Organisation School	2.8025	54	0.57011	0.07758
	Organisation Internship	2.7037	54	0.90344	0.12294
Pair 3	Elaboration School	2.9444	54	0.76889	0.10463
	Elaboration Internship	3.6296	54	0.48744	0.06633
Pair 4	Cognitive Strategies School	2.9775	54	0.42011	0.05717
	Cognitive Strategies Internship	3	54	0.50573	0.06882
Pair 5	Interpersonal Help-Seeking School	2.9491	54	0.55334	0.0753
	Interpersonal Help-Seeking Internship	2.963	54	0.56512	0.0769
Pair 6	Written Help-Seeking School	3.15	52	0.916	0.127
	Written Help- Seeking Internship	2.9	52	1.015	0.141
Pair 7	Practical Application School	2.7593	54	0.88882	0.12095
	Practical Application Internship	3.2407	54	0.77545	0.10553
Pair 8	Behavioural Strategies School	2.9432	54	0.3786	0.05152

	Behavioural Strategies Internship	2.9981	54	0.4221	0.05744
Pair 9	Planning School	3.1296	54	0.72804	0.09907
	Planning Internship	3.5463	54	0.47849	0.06511
Pair 10	Comprehension Monitoring School	3.3457	54	0.34848	0.04742
	Comprehension Monitoring Internship	3.3796	54	0.46516	0.0633
Pair 11	Emotional Control School	2.9815	54	0.78885	0.10735
	Emotional Control Internship	3.3981	54	0.45949	0.06253
Pair 12	Motivation Control School	3.5185	54	0.60628	0.0825
	Motivation Control Internship	3.4074	54	0.90112	0.12263
Pair 13	Metacognitive Strategies School	3.2566	54	0.33229	0.04522
	Metacognitive Strategies Internship	3.4365	54	0.31813	0.04329
Pair 14	Writing Strategy School	3.1204	54	0.67247	0.09151
	writing Strategy Internship	3.3426	54	0.56488	0.07687

In addition, the calculations show that the use of the metacognitive strategies as a category including several strategies is in general higher during the internship than the school. Furthermore, for the writing strategies, the results show higher use during the internship.

For the first hypothesis (H1), we predicted that students use practical application strategies more at work than at school. The results support the hypothesis significantly and show that students indeed use practical application more often during their internship than at school.

In the second hypothesis (H2), we predicted that students use cognitive strategies more at school than at work. The results supported the hypothesis only for the strategy of rehearsal. For the organisation strategy, we did not find differences of use between school and work. On the other hand, the results for the use of elaboration strategy show the opposite of our hypothesis. They show that the use of elaboration strategy was higher during the internship.

Table 5 Student t-test of learning strategies at school and at the internship

		Paired Differences mean	t	df	Sig. (2-tailed)
Pair 1	Rehearsal School Rehearsal Internship	0.62963	4.439	53	0
Pair 2	Organisation School Organisation Internship	0.09877	0.808	53	0.423
Pair 3	Elaboration School Elaboration Internship	-0.68519	-6.676	53	0
Pair 4	Cognitive Strategies School Cognitive Strategies Internship	-0.02249	-0.269	53	0.789
Pair 5	Interpersonal Help-Seeking School Interpersonal Help-Seeking Internship	-0.01389	-0.214	53	0.831
Pair 6	Written Help-Seeking School Written Help- Seeking Internship	0.25	2.444	51	0.018

Pair 7	Practical Application School Practical Application Internship	-0.48148	-4.744	53	0
Pair 8	Behavioural Strategies School Behavioural Strategies Internship	-0.05494	-1.073	53	0.288
Pair 9	Planning School Planning Internship	-0.41667	-3.445	53	0.001
Pair 10	Comprehension Monitoring School Comprehension Monitoring Internship	-0.03395	-0.49	53	0.626
Pair 11	Emotional Control School Emotional Control Internship	-0.41667	-3.918	53	0
Pair 12	Motivation Control School Motivation Control Internship	0.11111	0.83	53	0.41
Pair 13	Metacognitive Strategies School Metacognitive Strategies Internship	-0.17989	-2.882	53	0.006

4.3 Previous work experience and the help seeking strategy

In the third hypothesis (H3), we predicted that vocational school students who have previous work experience use less interpersonal help-seeking strategies. Using Pearson's product moment coefficient, we calculated the correlations between previous work experience duration and the learning strategies. As can be seen in Table 6, the significance level of 0.05 for averaged interpersonal help-seeking strategies was not reached in both school ($P=0.133 > 0.05$) and internship ($P=0.211 > 0.05$). However, if we look at specific interpersonal help-seeking strategies illustrated in Table 7, we see significant negative correlations between work experience and help-seeking from classmates at school ($P=0.001 < 0.05$) and from work-colleague at the internship ($P=0.010 < 0.05$). This significant negative correlation means that the longer the duration of the student's previous experiences is, the less the student requires interpersonal help-seeking strategies and by this we consider the hypotheses H3 as supported.

Table 6 Correlations between previous experience duration and learning strategies at school and internship

	Previous Experience Duration		
	Pearson Correlation	Sig. (2-tailed)	N
School: Rehearsal	-0.017	0.904	54
Internship: Rehearsal	-0.094	0.499	54
School: Organisation	0.161	0.246	54
Internship: Organisation	0.093	0.504	54
School: Elaboration	0.105	0.450	54
Internship: Elaboration	0.093	0.501	54
School: Cognitive strategies	0.120	0.387	54
Internship: Cognitive strategies	0.029	0.836	54
School: Interpersonal help-seeking	-0.207	0.133	54
Internship: Interpersonal help-seeking	-0.173	0.211	54
School: Written help-seeking	0.321	0.019	53

Internship: Written help-seeking	0.301	0.030	52
School: Practical application	-0.229	0.095	54
Internship: Practical application	-0.009	0.947	54
School: Behavioural strategies	-0.147	0.290	54
Internship: Behavioural strategies	-0.035	0.800	54
School: Planning	0.165	0.233	54
Internship: Planning	-0.145	0.295	54
School: Monitoring	0.109	0.433	54
Internship: Monitoring	0.193	0.161	54
School: Emotion control	-0.133	0.336	54
Internship: Emotion control	-0.017	0.903	54
School: Motivation control	0.024	0.866	54
Internship: Motivation control	0.043	0.758	54
School: Metacognitive strategies	0.113	0.415	54
Internship: Metacognitive strategies	0.029	0.836	54

The fourth hypothesis (H4), which predicted that vocational school students who have previous work experience use more written help-seeking strategies was also supported. We found significant positive correlations with the written help-seeking strategies in both school ($P = 0.019 < 0.05$) and internship ($P = 0.030 < 0.05$). This means that the longer the duration of the student's previous experiences, the more the student uses written help-seeking strategies.

Table 7 Correlations between previous experience duration and specific interpersonal help-seeking strategies at school and internship

	Previous Experience Duration		
	Pearson Correlation	Sig. (2-tailed)	N
School: Help from teacher	0.012	0.932	54
Internship: Help from Teacher	-0.098	0.494	51
School: Help from supervisor	0.022	0.878	51
Internship: Help from supervisor	0.177	0.204	53
School: Help from classmate	-0.428	0.001	53
Internship: Help from classmate	-0.154	0.281	51
School: Help from work-colleague	-0.135	0.335	53
Internship: Help from work-colleague	-0.354	0.010	52

4.4 The year of study and the interpersonal and written help-seeking strategies

In the fifth hypothesis (H5), we predicted that vocational school students who are longer at school use less interpersonal help-seeking strategies. Again, using Pearson's product moment coefficient we calculated the correlation between school year and the learning strategies. Table 8 illustrates the correlation between the school year and learning strategies and Table 9 shows the correlation between the school year and the specific interpersonal help-seeking

strategies. As can be seen in Table 8, the significance level of 0.05 for averaged interpersonal help-seeking strategies was not reached in both school ($P=0.742 > 0.05$) and internship ($P=0.629 > 0.05$). However, if we look at specific interpersonal help-seeking strategies illustrated in Table 9, we see significant negative correlations between school year and help-seeking from work-colleague at the internship ($P=0.016 < 0.05$). However, we did not find any significant correlation for interpersonal help-seeking at school. Yet, there is a trend towards negative correlation in the results. With only one significant correlation, we are not allowed claim that the hypothesis H5 has been supported, but we have to admit that the results are very close.

Table 8 Correlations school year and learning strategies at school and internship.

	School Year		
	Pearson Correlation	Sig. (2-tailed)	N
School: Rehearsal	-0.118	0.396	54
Internship: Rehearsal	-0.024	0.864	54
School: Organisation	-0.076	0.584	54
Internship: Organisation	0.288	0.034	54
School: Elaboration	0.155	0.262	54
Internship: Elaboration	0.045	0.749	54
School: Cognitive strategies	-0.016	0.909	54
Internship: Cognitive strategies	0.172	0.214	54
School: Interpersonal help-seeking	-0.046	0.742	54
Internship: Interpersonal help-seeking	0.067	0.629	54
School: Written help-seeking	0.024	0.864	53
Internship: Written help-seeking	0.108	0.444	52
School: Practical application	-0.024	0.861	54
Internship: Practical application	0.084	0.546	54
School: Behavioural strategies	-0.042	0.763	54
Internship: Behavioural strategies	0.142	0.304	54
School: Planning	-0.045	0.748	54
Internship: Planning	-0.159	0.251	54
School: Monitoring	-0.083	0.550	54
Internship: Monitoring	-0.023	0.867	54
School: Emotion control	0.138	0.321	54
Internship: Emotion control	0.118	0.395	54
School: Motivation control	0.036	0.797	54
Internship: Motivation control	-0.337	0.013	54
School: Metacognitive strategies	-0.009	0.947	54
Internship: Metacognitive strategies	-0.166	0.231	54

The sixth hypothesis (H6), which predicted that vocational school students who are longer at school use more written help-seeking strategies was unfortunately not supported. We found no significant correlations with the written help-seeking strategies in both school ($P = 0.864 >$

0.05) and internship ($P=0.444 > 0.05$). Still again, there is a trend towards a positive correlation.

Table 9 Correlations between school year and specific interpersonal help-seeking strategies at school and internship.

	School Year		
	Pearson Correlation	Sig. (2-tailed)	N
School: Help from teacher	-0.128	0.356	54
Internship: Help from Teacher	0.047	0.743	51
School: Help from supervisor	0.061	0.668	51
Internship: Help from supervisor	0.132	0.346	53
School: Help from classmate	-0.110	0.435	53
Internship: Help from classmate	0.264	0.061	51
School: Help from work-colleague	0.043	0.761	53
Internship: Help from work-colleague	-0.333	0.016	52

4.5 The age of the learners and the use of regulation learning strategies

The ages of the students participating in this study was ranging between 16 and 51 years, but the majority of them were between the age of 17 and 22 years.

In the seventh hypothesis (H7), we predicted that older students use more regulation learning strategies than younger students do. Table 10 illustrates the correlations between age and different learning strategies according to Pearson's product moment coefficient. We found a significant correlation between the age and one of the regulation strategies, the motivation control at school. However, we could not find any correlation with the emotional control strategy neither in school nor in internship, wherefore we could not confirm our hypothesis.

However, the results show other interesting correlations between the age and other learning strategies, such as Organisation, Elaboration, planning and monitoring. This indicates that the older the person is, the more she or he uses learning strategies.

Table 10 Correlations between age and learning strategies at school and internship.

	Age		
	Pearson Correlation	Sig. (2-tailed)	N
School: Rehearsal	0.084	0.552	54
Internship: Rehearsal	-0.130	0.357	54
School: Organisation	0.297	0.033	54
Internship: Organisation	0.031	0.828	54
School: Elaboration	0.372	0.007	54
Internship: Elaboration	0.204	0.147	54
School: Cognitive strategies	0.375	0.006	54
Internship: Cognitive strategies	0.006	0.965	54
School: Interpersonal help-seeking	-0.006	0.968	54

Internship: Interpersonal help-seeking	0.168	0.233	54
School: Written help-seeking	0.078	0.586	53
Internship: Written help-seeking	0.255	0.073	52
School: Practical application	-0.118	0.404	54
Internship: Practical application	0.099	0.484	54
School: Behavioural strategies	0.008	0.955	54
Internship: Behavioural strategies	0.290	0.037	54
School: Planning	0.297	0.033	54
Internship: Planning	-0.183	0.195	54
School: Monitoring	0.236	0.092	54
Internship: Monitoring	0.278	0.046	54
School: Emotion control	-0.149	0.290	54
Internship: Emotion control	-0.069	0.627	54
School: Motivation control	0.303	0.029	54
Internship: Motivation control	0.092	0.518	54
School: Metacognitive strategies	0.319	0.021	54
Internship: Metacognitive strategies	0.050	0.724	54

4.6 Relation between the length of written text and cognitive learning strategies

In the eighth hypothesis (H8), we predicted that students who use cognitive learning strategies more often, produce more text when writing. To test this hypothesis, we calculated the correlations between the length of the text written and the use of cognitive learning strategies using the Pearson's product moment coefficient. These correlations are illustrated in Table 11. Unexpectedly, the results were totally contradictory to our hypothesis. The majority of the cognitive strategies tend toward a negative correlation with the length of written text, meaning that the more cognitive strategies are used the shorter the text is. Of course, this claim cannot be strongly supported, since the rehearsal strategy at school is the only strategy reaching the significance level of 5%. However, the fact that none of the cognitive strategies is tending towards positive correlation, makes it clear that there is a strong trend towards a negative correlation and thus the rejection of our hypothesis.

Further, the results in Table 11 also show that the length of written text is correlated with the interpersonal help-seeking, meaning the more people ask help from others, the more they write.

Table 11 Correlations between length of written text and learning strategies at school and internship

	Length of Written Text		
	Pearson Correlation	Sig. (2-tailed)	N
School: Rehearsal	-0.553	0.040	14
Internship: Rehearsal	0.060	0.837	14
School: Organisation	-0.039	0.893	14

Internship: Organisation	-0.248	0.393	14
School: Elaboration	-0.402	0.154	14
Internship: Elaboration	-0.346	0.225	14
School: Cognitive strategies	-0.336	0.240	14
Internship: Cognitive strategies	-0.271	0.349	14
School: Interpersonal help-seeking	0.546	0.044	14
Internship: Interpersonal help-seeking	0.359	0.208	14
School: Written help-seeking	0.264	0.383	13
Internship: Written help-seeking	0.198	0.517	13
School: Practical application	-0.321	0.263	14
Internship: Practical application	-0.326	0.255	14
School: Behavioural strategies	0.268	0.353	14
Internship: Behavioural strategies	0.091	0.757	14
School: Planning	-0.111	0.706	14
Internship: Planning	-0.217	0.457	14
School: Monitoring	-0.138	0.637	14
Internship: Monitoring	-0.098	0.739	14
School: Emotion control	0.307	0.285	14
Internship: Emotion control	0.291	0.312	14
School: Motivation control	0.040	0.892	14
Internship: Motivation control	-0.128	0.663	14
School: Metacognitive strategies	0.002	0.995	14
Internship: Metacognitive strategies	-0.063	0.829	14

4.7 Relation between accuracy and metacognitive strategies

In the ninth hypothesis (H9), we predicted that students who use metacognitive strategies more often are able to describe their experiences more accurately. To test this hypothesis we analysed the situations described by the students and rated them. For the rating, we used the indicators of accuracy such as name of workplace, name of the department, dates, time, specific numbers and details. Descriptions that satisfy these indicators were rated as “1”, while the ones that do not were rated as “0”. Between the 14 students who participated in the collaborative writing task, eight were able to describe situations in a way that satisfies many of the mentioned indicators. For example, student 1 in the second year started the description of the situation directly by saying: “A colleague always talk to me badly” without explaining where she is doing the internship or in which department the situation happened. On the other hand, student 2 mentioned from the beginning HUG as the place of her internship, then she started her description with a precision of the time and the numbers saying: “One morning I had to do 3 blood tests for different patients because the nurse was absent that morning. The first two injections went well, except the last one.”. In these two examples, student 1 missed important details, even though she reported a high use of metacognitive strategies in general, even little bit higher than student 2 who described her situation more accurately. In another example, student 3 started her description of the situation without mentioning the workplace. However, she mentioned two other indicators of accuracy; the duration of the situation and

the year of study of her colleagues, when she said “I remained in charge of the floor with another trainee in 3rd year during 1:30 as nurses while the assistants were in meeting”. Even though, some indicators were missing, description as this one we rated as “1” because other important specific details were mentioned.

Using Pearson’s product moment coefficient, we calculated the correlations between the learning strategies and the accuracy scores we have given to the situation description. As can be seen in Table 12, there was no significant correlation between accuracy and metacognitive strategies. In fact, there seems to be a trend in all metacognitive strategies towards negative correlations, except for emotion control at school. This trend indicates that more use metacognitive strategies more likely result in lower accuracy instead of higher as we predicted in our hypotheses.

Table 12 Correlations between accuracy and learning strategies at school and internship

	Accuracy		
	Pearson Correlation	Sig. (2-tailed)	N
School: Rehearsal	0.120	0.683	14
Internship: Rehearsal	-0.061	0.835	14
School: Organisation	0.090	0.760	14
Internship: Organisation	-0.171	0.559	14
School: Elaboration	0.275	0.341	14
Internship: Elaboration	-0.043	0.884	14
School: Cognitive strategies	0.215	0.461	14
Internship: Cognitive strategies	-0.167	0.569	14
School: Interpersonal help-seeking	0.143	0.627	14
Internship: Interpersonal help-seeking	0.131	0.654	14
School: Written help-seeking	-0.256	0.398	13
Internship: Written help-seeking	-0.305	0.311	13
School: Practical application	-0.293	0.309	14
Internship: Practical application	-0.025	0.933	14
School: Behavioural strategies	0.018	0.950	14
Internship: Behavioural strategies	0.112	0.703	14
School: Planning	-0.135	0.645	14
Internship: Planning	-0.512	0.061	14
School: Monitoring	-0.171	0.559	14
Internship: Monitoring	-0.094	0.749	14
School: Emotion control	0.198	0.497	14
Internship: Emotion control	-0.167	0.569	14
School: Motivation control	-0.101	0.732	14
Internship: Motivation control	-0.228	0.433	14
School: Metacognitive strategies	-0.104	0.724	14
Internship: Metacognitive strategies	-0.366	0.198	14

4.8 Relation between referring to similar situations and elaboration strategy

In the last hypothesis (H10), we predicted that students who use elaboration strategy often refer to similar situation when commenting on the experiences of others. To test this hypothesis we analysed the students' comments and rated them. Comments that referred to similar situations were rated as "1", while the ones that did not were rated as "0". We found that 6 of the 14 students referred to similar situations when commenting on their colleagues situations. This was often done with the goal of encouraging their colleagues and show some empathy. For example, student 8 has referred to similar situation by saying "I understand what you feel, because during my first evaluation the nurses have blamed me too and that was not fair. It was almost like they were not talking about me, but about someone else". In another example, student 5 attempted to encourage her colleague not to be stressed by saying "I also failed in one attempt of taking blood. Even though I was very confident of the position of the vein, I missed it. The nurse told me that the most important is to take time and feel the vein, as the gesture was great according to the protocol, so do not worry if you fail an attempt of taking blood."

Using Pearson's product moment coefficient, we calculated the correlations between the learning strategies and the scores for references to similar situations. As can be seen in Table 13, there was no significant correlation between elaboration and the scores of similar situation references. However, there seems to be a trend towards a positive correlation in the results, which can result in a significant correlation if more data was collected.

Table 13 Correlations between similar situations and learning strategies at school and internship

	Similar Situations		
	Pearson Correlation	Sig. (2-tailed)	N
School: Rehearsal	0.048	0.871	14
Internship: Rehearsal	-0.367	0.197	14
School: Organisation	0.450	0.106	14
Internship: Organisation	-0.342	0.232	14
School: Elaboration	0.130	0.657	14
Internship: Elaboration	0.043	0.884	14
School: Cognitive strategies	0.276	0.339	14
Internship: Cognitive strategies	-0.417	0.138	14
School: Interpersonal help-seeking	0.313	0.276	14
Internship: Interpersonal help-seeking	0.460	0.098	14
School: Written help-seeking	0.098	0.751	13
Internship: Written help-seeking	0.305	0.311	13
School: Practical application	-0.023	0.939	14
Internship: Practical application	-0.149	0.612	14
School: Behavioural strategies	0.238	0.412	14
Internship: Behavioural strategies	0.458	0.099	14
School: Planning	0.556	0.039	14
Internship: Planning	0.000	1.000	14

School: Monitoring	0.512	0.061	14
Internship: Monitoring	0.225	0.438	14
School: Emotion control	-0.025	0.933	14
Internship: Emotion control	-0.028	0.925	14
School: Motivation control	0.101	0.732	14
Internship: Motivation control	-0.091	0.756	14
School: Metacognitive strategies	0.611	0.020	14
Internship: Metacognitive strategies	0.089	0.762	14

5 Conclusion and Discussion

The aim of this study was to focus on vocational students and to investigate the learning strategies used by these students at school and at the workplace and to study the effect of these strategies on the collaborative writing task performed on the Wiki page of the school.

As the vocational learning is divided into theoretical education in school and practical learning in the work place, we compared between the learning strategies used in these two places, and we predicted in the first hypothesis that students are using the practical application as a behavioural strategy, more often at work place than at school. The results supported our first hypothesis significantly. This is in line with previous evidence from Warr & Downing where they showed that practical application is associated with practical situations (Warr & Downing, 2000).

In the second hypothesis, we predicted that the cognitive learning strategies are more often used at school than at work. Between the three cognitive strategies, rehearsal strategy was the only one used more often at school than at work by the students. However, it was surprising to find out that the elaboration strategy is used more often at work than at school, which is the opposite of our hypothesis. This means that we were wrong with our reasoning that students would need all the cognitive learning strategies less often during internship than at school. It seems that mainly the elaboration strategy is very important for practical work, as it is the strategy responsible of building mental links between previous knowledge and a new learning material. This explains the importance of using this strategy at work specially when the student is trying to make links between what he had learned at school and what he is doing at his work.

Considering the differences in age, school year and work experiences of the students in vocational school, it was interesting to study the impact of these factors on the use of learning strategies. We predicted in the third and fourth hypotheses that vocational students, who have previous work experience, use less Interpersonal Help-seeking and more Written Help-seeking. The same was also predicted in the fifth and sixth hypotheses for students in later school years in comparison with students in early school years. The third and fourth hypotheses were significantly supported meaning that previous work experience has a significant impact on the use of interpersonal and written help-seeking strategies. These results are also in line with the findings from Warr & Downing with high school and university students (Warr & Downing, 2000). For the fifth and sixth hypotheses, which focus on the relation between the help-seeking strategies and the school year, there were unfortunately no significant correlations as we predicted. However, there was a trend in the results toward our predicted correlation meaning that more extensive testing with a larger population might result in significant correlation. The use of school year as a variable might not be the best choice for statistical analysis since the duration of the training for *Social and Health Care Assistants* at the vocational school in Geneva takes 3 years and thus the value of this variable can be either 1, 2 or 3. Next to a larger population, we suggest that in a more extensive evaluation the data collection should occur in different points of time in the year

and probably in each three months resulting a better correlation between how long the student is at school and her/his use of learning strategies. Such an extensive study is definitely worth to evaluate in future work.

Regarding the factor of the age, we predicted that older students use more regulation learning strategies than younger students. Unfortunately our hypothesis was not completely confirmed and we found positive correlation only with one of the regulation strategies; namely the motivation control strategy at school and not at the internship. This is contrary to Lazarus' theory regarding human emotion system, which suggests that the older the person is, the more she or he uses emotion regulation strategies (Lazarus, 1991). However, our contradictive results might be related to the fact that the majority of participant were under 30 and only 6 students were above 30. A population existing of more equal number of participants for each age category might result in a correlation between the age and the use of regulation learning strategies. Away from this hypothesis and due to the importance of the age factor we tried to see if there is an impact of this factor on the use of other strategies. Unexpectedly, we found interesting correlations with the strategies of organisation, elaboration, planning, motivational control at school, and the comprehension monitoring at the internship. Those correlations are definitely worth investigating in the future.

We predicted in our eighth hypothesis in relation with the collaborative writing task, that students who use cognitive learning strategies more often, produce more text when writing. The results did not support our hypothesis, meaning that more use of cognitive strategies did not result in longer text for most participant. Surprisingly, the results have shown a strong trend towards a negative correlation between the length of the text and the use of cognitive strategies, which is contrary to our prediction. Our prediction was based on Pintrich's suggestion that the use of cognitive learning strategies leads to higher level of achievement (Pintrich & de Groot, 1990) and we used the length of the written text as an indicator for higher level of achievement. However, afterwards we are not sure anymore if this was a good indicator for measuring the user achievement. Further, a larger number of subjects performing the collaborative task might also be advices for better results. In our experiment, only 14 students were able to participate in the collaborative task, because of the many absences during the writing session.

Furthermore, by calculating the correlations between the length of the written text and other learning strategies we found a very interesting positive correlation with the interpersonal help seeking in school. This correlation rises the idea that personality might be one of the factors that has influence on the length of written text. In contrary to introvert persons, extravert persons are more likely to engage in interactions with others, which can be related to interpersonal help-seeking (McCrae & John, 1992). On the other hand, extravert persons are more known as very talkative and better in expressing themselves. This means that in a writing task they would be able to expressive themselves much better and in more written words. The two mentioned facts about extraversion might explain why there is a correlation between interpersonal help-seeking and the length of the written text. As a result, we think

that the relation between personality, collaborative writing and use of interpersonal help seeking strategy is a very interesting subject to be investigated in the future.

In our ninth hypothesis, we predicted that students who use metacognitive strategies more often, are able to describe their experiences more accurately. To calculate the accuracy of the described experience, we used different indicators of accuracy such as time, date, numbers and names resulting in accuracy judgement for the written text. However, after analysing the data we were unable to find any significant correlation between the use of the metacognitive strategies and the accuracy of the described student experience. There was even a trend towards a negative correlation which is contradictory to our prediction. Again, we think that the limited number of participants does not allow us to have any conclusion based on the results. We suggest that an extensive experiment in the future might be needed to see if the use of metacognitive strategies results in lower accuracy of experience description as the trend in our current data suggests. In case this is true, it is also interesting to know why this happens.

For the last hypothesis, we predicted that students who use elaboration strategy more often, refer to similar situation when commenting on the experiences of others. This was mainly based on Pintrich's suggestion that elaboration helps in building mental links between previous knowledge and a new learning material (Pintrich & de Groot, 1990). The results have unfortunately not shown any correlation. However, the results show a trend towards positive correlation. This means that in case more data can be collected, it might be possible to prove our prediction that use of elaboration strategies might result in more references to similar situation when commenting on others.

We conclude this manuscript with a small summarization of our experiment. From the ten hypotheses of our experiment three were significantly supported, four were rejected and another three showed a trend towards what we predicted in our hypotheses. However, the small number of participants in the experiment might have had an influence of the results and that is why we suggest that future investigation of our theory should be conducted with a larger number of participants. Further, we also suggest that such an experiment should be conducted in more points of time to be able to measure the progress of the user in term of the use of learning strategies. Furthermore, we also think that personality is a factor that definitely should be included in future experiments to understand more the use of certain learning strategies.

6 Limitations

As discussed in the previous chapter, this study had some limitation that might have had an effect of the study.

First, we think it was not a good choice the use the school year as a variable for statistical analysis, due to the short duration of the training for Social and Health Care Assistants at the vocational school in Geneva, which is 3 years. It might have been better to collect data each three months for example and thus have a variable representing how long the students are at school in months instead of years.

Secondly, our contradictive results in relation between the age factor and the regulation strategies, might be related to the fact that the majority of participant were under 30 and only 6 students were above 30. Theories from Emotion research that claim that older people are more likely to use regulation strategies are based on larger age differences. In our study, a population existing of more equal numbers of participants for each age category might result in a correlation between the age and the use of regulation learning strategies.

Finally, the biggest limitation in our study was the limited number of the students who performed the writing task on the collaborative platform. This number was much too low and made it difficult for us to conduct a good statistical analysis of the results.

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Appendix A: Questionnaire

Questionnaire Stratégies d'apprentissage

Nous vous remercions de prendre le temps de remplir ce questionnaire concernant vos stratégies d'apprentissage et d'écriture.

Les informations sont confidentielles et aucun accès ne sera donné aux enseignants.

Nom et Prénom:

Âge:

Aviez-vous une expérience professionnelle dans le domaine des soins avant de commencer dans cette école?

Oui Non

Si oui, combien de temps avez-vous travaillé dans ce domaine?

.....

À l'école

	Presque toujours	Souvent	Parfois	Jamais
Quand j'étudie				
1. Je mémorise ce que je dois apprendre en relisant plusieurs fois	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. J'écris les choses importantes afin de les mémoriser	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Je souligne les phrases importantes afin de mettre en évidence ce que j'apprends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Je fais des graphiques et des tableaux pour organiser ce que j'ai appris.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Je note régulièrement ce que j'apprends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Je fais des relations entre ce que j'apprends en cours professionnels et ce que j'apprends en cours de culture générale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Je fais des liaisons entre les nouvelles choses que j'apprends et ce que je sais déjà	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Si je ne comprends pas quelque chose à l'école, je demande de l'aide :				
8. A mon enseignant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. A mon maître de stage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. A un-e étudiant-e de ma classe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. A un(e) collègue en stage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Dans les documents, manuels, programmes informatiques, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Avant de commencer à étudier:				
13. Je réfléchis bien aux objectifs que je dois atteindre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Je prévois de réserver le temps dont j'aurai besoin pour apprendre un sujet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Quand j'étudie

**Presque
toujours**

Souvent

Parfois

Jamais

15. Je me demande régulièrement si j'atteins les objectifs fixés

16. Je me pose des questions pour m'assurer que je comprends bien le matériel que j'étudie

17. Si je ne suis pas certain-e d'avoir compris quelque chose, je reviens en arrière pour essayer de le comprendre

18. Je suis tellement nerveux-se lors d'un test que je ne me souviens plus de ce que j'ai appris

19. Quand le matériel à étudier est difficile, je laisse tomber et j'étudie juste les parties faciles

20. J'apprends des choses en les faisant en pratique, plutôt qu'en étudiant un livre ou en parlant avec quelqu'un

Quand j'écris un texte pour l'école:

21. Avant de commencer, je note les idées et les points les plus importants que je dois écrire

22. Je relis bien ce que j'ai écrit pour être sûr-e que mes idées sont claires pour les autres

Lors des Stages

Quand je travaille

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Je remplis mon journal d'apprentissage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Je note régulièrement ce que j'apprends | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Je fais des relations entre ce que j'apprends en stage et ce que j'ai appris à l'école | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Si je ne comprends pas quelque chose en stage, je demande de l'aide :

- | | Presque toujours | Souvent | Parfois | Jamais |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 4. A mon enseignant à l'école | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. A mon maître de stage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. A un-e étudiant-e de ma classe | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. A un-e collègue en stage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Dans les documents, manuels, programmes informatiques, etc. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Avant de commencer un soin:

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 9. Je réfléchis bien et planifie les actions que je dois faire | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Je pense à plusieurs façons pour résoudre un problème et je choisis la meilleure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Quand je travaille

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 11. Je me demande régulièrement si j'atteins les objectifs demandés | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Je me pose des questions pour m'assurer que je réalise correctement la tâche | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Si le soin est compliqué je ralentis et je prends tout le temps pour le faire correctement | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

14. Quand je fais un soin pour la première fois, je suis trop stressé et je perds mes moyens

15. Quand un soin me parait trop compliqué, je laisse tomber et j'attends l'arrivée d'un-e collègue pour qu'il/elle continue le soin

16. Je comprends les choses en les pratiquant plutôt qu'en lisant ou en demandant conseil à quelqu'un

Lors que je fais une transmission par écrit à mes collègues :

17. Avant de commencer, je note les idées et les points les plus importants que je dois écrire

18. Je relis bien ce que j'ai écrit pour être sûr-e que mes idées sont claires pour les autres