

The Autonomous Acquisition of Transversal Competencies by Primary School Children through the Use of Pedagogical Scenarios

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This study aims to obtain a better understanding of how the teacher can support the acquisition of transversal competencies, such as collaboration, creativity and reflection when children aged between 11 and 12 take part in an activity designed to promote autonomous or self-regulatory learning. There is a need to equip the teachers to enable them to scaffold autonomous learning, taking into account the tensions coming to the fore between teacher's interventions and autonomous learning. How can the teacher ensure that the task is completed without interrupting the creative, collaborative and reflective dynamics within the group? How can they support learning becoming progressively more autonomous in each group? How is the flexible classroom organized to promote self-regulatory learning? The pedagogical scenarios presented in this research project have been drafted and trialled to help the teachers do just that. It is a collaborative research project inspired by Desgagné's (2007) procedure as the researcher, teachers and children all worked together at every stage of the study, i.e., the drafting of pedagogical scenarios by teachers in the UK and the trialling of these by teachers on their pupils in Switzerland. These scenarios were built with the purpose of promoting the development of transversal capacities in children at primary school level when engaging in various subjects: L1/L2/Lx, sciences, and maths. These school subjects were matched with a subphase of Zimmerman and Campillo's (2003) model, with one or two transversal capacities and with approaches currently applied to the teaching of these disciplines. Each of these scenarios can be used practically in the primary classroom to develop transversal competencies through autonomous learning.

Keywords: primary school, transversal competencies, autonomous learning, pedagogical scenarios, scaffolding

Introduction

Transversal competencies (TC) are often considered as a secondary preoccupation by teachers who need to get through a heavy curriculum usually centred on subject disciplines. However, TC are mentioned specifically in the French-speaking Swiss National Curricula, the Plan d'études Romand (PER) (2010) and are integral parts of the various subject descriptors. Moreover, TC are to be central to our children's learning and the practitioner's action is crucial to supporting the development of these competencies. Romainville (2006, p. 24) quotes the 'Missions' Act 1997

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where article 8 mentions that ‘knowledge must be envisaged in the perspective that competencies will be acquired’, showing thereby the centrality of these competencies in modern pedagogy. The literature review will look at what these competencies are in terms of their importance in primary education. Self-regulated learning will then be defined, followed by an explanation of the pedagogical scenarios developed for this project. The feedback from teachers who trialled them in their classroom will then be summarised in terms of the links that can be established with Zimmerman and Campillo’s (2003) subphases of autonomous learning.

Literature Review

Transversal Competencies

In Switzerland, TC are an integral part of the school curriculum, with the caveat that there are competencies that seem to relate better to one school subject than others. However, the PER does identify some competencies to be common to several disciplines. Furthermore, student-teachers in teaching practice or novice teachers can find it difficult to imagine that creativity, collaboration, communication and reflection can be directly linked to any particular body of knowledge and that these TC can be practised and embedded in activities set up by the teacher to work on subjects such as maths, language or science. An added issue is that several terms such as competencies, capabilities and competencies are used in the literature, collocated with various adjectives such as transversal, cross-curricular, transferable and soft. There is thus a need to define the way TC are understood in the present study.

Perrenoud (1999, p. 12) makes the distinction between competencies relating to one discipline, competencies relating to several disciplines and competencies not directly linked to any particular subject. This distinction is useful in our study as no competency can be linked to one school subject, giving us some freedom to match them with a discipline, and leading us to the concept of cross-curricular competencies. Perrenoud (1999) adds a caution, stating that these competencies could be described in such a general way that they become almost meaningless. It is therefore essential to tighten the definition of TC as we will match some of them to particular subjects in the pedagogical scenarios drafted for this project.

The words capabilities and competencies are sometimes used as near-synonyms (Giglio, 2013, p. 1; Perrenoud, 1999, p. 6; Gerard, 1997) which is understandable as the PER labels them as capabilities but uses other appellations when mentioning the concepts. However, they are not synonyms. Capabilities (*capacités*) is a condition of a learner who has the capacity of completing a task or an activity but has probably not been achieved yet, so, capability logically comes before competency with the idea that it can be developed, as stated by Lucas (2019, para.3) when quoting Andreas Schleicher, OECD Director for Education and Competencies, who ‘called on schools to focus on the development of transferable competencies’. Again, there is a certain amount of imprecision in the

terminology but the idea of development is interesting and the process by which capabilities can be turned into competencies is where the practitioner's role is situated.

Competencies, on the other hand, are what children need to call on in order to achieve a goal through measurable results. Perrenoud (1999, p. 1) makes the link between knowledge and competencies as the former becomes a tool which can be 'transferred, adapted to the circumstances, shared, tinkered with (...) at work and outside of work'. Furthermore, Romainville (2006, p. 25) reiterates the 'Missions' Act 1997 definition of a competency: 'ability to call on an organised pool of knowledge, competencies and attitudes which enable one to complete a number of tasks'. So, competencies are made of an integrated network of resources already mastered to some degree and which include knowledge but also cognitive, socio-affective and motor competencies and which need a specific situation to be called upon. In the same vein, Gerard (1997) views a competency as an integrated collection of capabilities which can be called on when needed. He takes the example of an architect who has the capability to measure the length of a room but this capability is essential to be competent in drawing a house blueprint. He makes the point that the same skill can be viewed as a capability or as a competency, depending on the level of the task at hand. We would argue that capability comes before competence and seems to be considered a lower concept, one that needs a process added on to become a competency. Transversal competencies as explained above is therefore the term adopted in the present project.

Autonomous or Self-regulated Learning

Autonomous or self-regulated learning is a concept which seems to be a little premature to explore as early as in the primary school context but Fleisher (2009, p. 1) claims that: 'learning is enhanced as children become in charge of their learning by being supported in autonomy as well as the development of academic competencies'. A primary school teacher can therefore support younger children in acquiring autonomy which, in this case, does not mean 'no teaching' but calls for different teacher's actions, which are evident from the pedagogical scenarios in the context of the development of TC during group activities. Schunk (2005) explains that looking at children's competencies and abilities alone did not always justify their achievement, which meant that other variables such as motivation and self-regulation were important to get the full picture.

Autonomous learning is a complex process which integrates metacognitive, cognitive and affective aspects. A robust body of literature has explored these over the past 25 years but these studies investigate a lot of similar features (Zeidner, Boekarts, & Pintrich, 2000). One of the definitions which will be adopted for the purpose of this study is Pintrich's (2000, p. 453), who defines it 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 in the environment'. This definition interests us as it implies that autonomous learning is made up of various phases, i.e., the setting up of goals, the monitoring and control of various

constituents and an element of guiding, which in our study are defined as the teacher's actions. Adding to this definition, Pintrich and De Groot (1990, p. 33) identify three main components in self-regulated learning:

First, self-regulated learning includes children's metacognitive strategies for planning, monitoring, and modifying their cognition (...). Children's management and control of their effort on classroom academic tasks has been proposed as another important component (...). A third important aspect of self-regulated learning that some researchers have included in their conceptualization is the actual cognitive strategies that children use to learn, remember, and understand the material.

They state, however, that cognitive and metacognitive elements are not enough to explain children's engagement and ultimate achievement. Motivation has to be taken into the equation and they further unpack this element of affect into three components (Pintrich & De Groot 1990, p. 33): expectancy, value and emotional reactions to the task.

The model proposes that there are three motivational components that may be linked to the three different components of self-regulated learning: (a) an expectancy component, which includes children's beliefs about their ability to perform a task, (b) a value component, which includes children's goals and beliefs about the importance and interest of the task, and (c) an affective component, which includes children's emotional reactions to the task. Self-motivation beliefs are a subprocess of Zimmerman and Campillo's (2003) model which was drawn on for the theoretical paper (Bosmans, 2022, in press) underpinning the pedagogical scenarios developed for the present study. Self-motivation beliefs are part of the Forethought phase of the model and are an essential element to explore in relation to autonomous learning. Cleary and Zimmerman (2004) state that teenagers want more autonomy when engaging in learning activities but this is often being resisted by teachers, resulting in a lack of motivation and frustration with learners. Admittedly, the pedagogical scenarios have been developed for the last years of primary education but the findings of our theoretical paper show that a lack of auto-motivation is not often addressed by teachers in their primary classroom. Zimmerman and Campillo's (2003) model used to underpin the pedagogical scenarios incorporates all three cognitive and motivational components identified by Pintrich and De Groot (1990) but these are listed more practically and they have all been matched with a corresponding scenario to enable children to focus on one of the model phases.

There are, moreover, some assumptions that are made in most models of self-regulated learning and it is important to mention them here as stated by Schunk (2005, p. 87):

First, learners are active and constructive participants in learning rather than passive recipients. A second assumption is that learners have some choices or the potential for control over key activities. Third, many models of self-regulation assume that learners have a goal or criterion level of performance against which they can assess progress. Finally, most models assume that self-regulatory processes mediate the relation between personal factors and performance outcomes.

Zimmerman (2002, p. 64) states that few teachers currently prepare children to learn on their own. Twenty years later, the introduction of flipped classrooms and post-pandemic flexible and hybrid learning contexts have bettered the situation but there is still improvement to be had, resulting in a robust rationale for the use of our scenarios. Another current issue is caused by immigration waves giving rise to classrooms with very spiky profiles and special learning needs when attempting to address allophone populations' needs. Zimmerman adds that teachers not only have to be aware of their children's strengths and limitations but should promote children's own awareness of their needs and therefore learn to develop the capacity to self-regulate. This will stand them in good stead for the world of work where a lot of competencies are acquired on the job, as Zimmerman (2002, p. 66) maintains that 'self-regulation is important because a major function of education is the development of lifelong learning competencies'. He adds that 'recent research shows that self-regulatory processes are teachable and can lead to increases in children's motivation and achievement' (Zimmerman, 2002, p. 69). Children who manage to achieve good grades and enjoy the learning process is certainly the best justification for promoting autonomous learning and the development of transversal competencies, which will all set them right for their future careers.

Methodology/Materials and Methods

Pedagogical Scenarios for the Teacher Community

Schunk (2005, p. 91) states that:

Research is needed on contextual influences on self-regulation and especially in different content areas. Principles of self-regulation are assumed to generalize across contexts, but contexts affect children's choices and thus the amount and type of self-regulation possible. Research is needed on self-regulation in content areas such as science, mathematics, and languages.

In order to address this need for more research identified by Schunk, and in order to develop a practical application of our theoretical paper findings to be used in the classroom, three pedagogical scenarios were drafted in collaboration with the teachers who took part in the theoretical research project. These three scenarios were to be articulated along subject lines (languages, maths, sciences as identified by Schunk, 2005) matched to transversal competencies more easily developed in their respective subjects as can be seen in Table 1. A further requirement was to match these to one of the subphases of Zimmerman and Campillo's (2003) model to ensure that the three scenarios would cover all transversal competencies and all phases of the self-regulated learning model, thereby following the advice given by Zimmerman (2002, p. 66) that the self-regulation of learning 'involves the selective use of specific processes that must be personally adapted to each learning task'.

Table 1. General Theoretical Framework for the Three Pedagogical Scenarios

Subject	Transversal Competencies	Zimmerman and Campillo's (2003) Model Phase
Foreign Language or L1/L2	Collaboration and communication	Task analysis and self-motivation belief
Maths	Learning strategies and creativity	Self-control and self-observation
Sciences	Reflexion	Self-judgment and self-reaction

Previous work from Giglio (2004) was used for the general framework of these scenarios but the inclusion of all transversal competencies as defined by the PER and the self-regulated learning model (Zimmerman & Campillo, 2003) allowed us to depart quite drastically from these earlier offerings. The new scenarios were also developed directly from the findings in Bosmans (2022, in press), and they were written in collaboration with the teachers who took part in the United Kingdom as subject specialists and, following their translation into French, trialed and evaluated by the teachers in Switzerland, making the project a truly international partnership between researchers and teachers as researchers and co-constructors of knowledge (Desgagné, 2007). The English version of these scenarios can be found in Appendix 1. Italics indicate the amendments resulting from the Swiss teachers' feedback. The scenarios were trialed in Swiss primary schools and were tested in December 2021 and January 2022. The children participating in these experiments were aged 11 to 12. The demographics of children who tested these scenarios are shown in Table 2.

Table 2. Demographics of Children who Tried the Pedagogical Scenarios

Subject	Number of Children	Average Age	Comments
Foreign Language or L1/L2	20	11 years old	
Maths	22	11 years old	
	22	11 years old	
Sciences	18	12 years old	Two groups of 9 children
	22	11 years old	

Following extensive feedback from the Swiss teachers, these scenarios were amended accordingly and then published separately in a Swiss professional teacher education journal, *l'Éducateur* (2022)¹, in order to make them easily available to teachers. Not only were the scenarios themselves the object of extensive and very precise feedback but there was also more general and useful feedback on transversal competencies and self-regulated learning which is explained in the next section.

¹*l'Éducateur* (2022). Available at <https://www.le-ser.ch/educateur>.

Findings

General Points

Several findings were observed through the trial phase of these three scenarios. The teachers' feedback is noted in italics in the scenarios in Appendix 1. More findings are presented and discussed below following a framework similar to the literature review above. Thus, the results focus first on transversal competencies, conative dimensions and self-regulation of learning. The findings are then looked at through self-directed and self-regulated learning where the hypotheses and proposals of the various authors are confronted with the observations made. Finally, a reflection on the sub-phases of Zimmermman and Campillo's (2003) model and their link with transversal competencies is offered.

Transversal Competencies, Motivation and Auto-regulated Learning

Schunk (2005) notes that student competencies alone do not explain children's success as motivation and self-regulation are also salient features. In the three scenarios that were tested, motivation is at the heart of student engagement. Thus, in the purification of water science scenario, the enthusiastic children in the second class remained active throughout and carried on searching for the best purification sequence whilst their mates from the first group did not invest themselves in it in the same way. In the maths experience, the ability to self-regulate was sometimes lacking and eluded some children whilst others were heavily invested. An identical observation was made in the language breakfast scenario. These findings confirm the importance of the three components of motivation identified by Pintrich and De Groot (1990), where emotional reactions most often constitute the determining factor in children's initial engagement. The other two elements seem to be more decisive in maintaining student engagement, where expectation in one's ability to succeed and the value associated with the task appear to be the drivers of sustaining commitment to the task.

An element not mentioned by the literature which would be interesting to add here consists in the children's previous knowledge and, as a result from our observation, the parents/guardians' socio-professional category where, depending on the family educational culture, children could have been previously motivated in the concepts covered during the lesson.

Children's Engagement and Learning

In the language scenario, the children of two groups hesitated between different countries, the criterion retained for the choice lying in their opinion that they would be able to succeed in making the chosen breakfast. Similarly, this expectation component (Zimmermann & Campillo, 2003) also came into play in the maths activity where children who felt competent were engaged whilst other classmates withdrew for fear of not succeeding in completing the task. The value component of self-directed learning (Zimmermann & Campillo, 2003) was

expressed differently for the three scenarios. Children perceived the interest of the language task when concretely preparing breakfast and they engaged with interest and conviction to purify the water. However, their maths classmates did not take the time to listen to the presentations of the other groups to enable them to successfully complete the proposed activity.

Discussion

Several assumptions can be made about factors impacting the student's engagement in the scenario activities, such as:

- the children's age,
- group numbers,
- the traditions, beliefs and habits in the three disciplines for both children and teachers and
- the working and learning context created by the scenarios.

Indeed, if the child believes that it is necessary to have a correct result in maths, he or she will probably miss the process to arrive at the result and if the student is convinced that it is necessary to mobilize an experimental method in science, the error status will not have the same impact as in a right/wrong situation.

Thus, the value component seems to be linked to the final result (breakfast), to the interest of the activity (water purification) or to a certain social acknowledgment in the class (maths). The scenario and the beliefs linked to the various activities imply that the value component is not necessarily oriented towards the learning object.

Furthermore, emotional reactions seem to be intimately linked to the value component, where children engaged in the science process display enthusiastic attitudes, while tensions to arrive at the result were observed in the maths activity, as well as in certain groups of young children when choosing the country for the breakfast activity.

According to the observations made, commitment and its maintenance over time seemed easier when the three components (value, expectation and affect) were present simultaneously and when the value component was process-oriented.

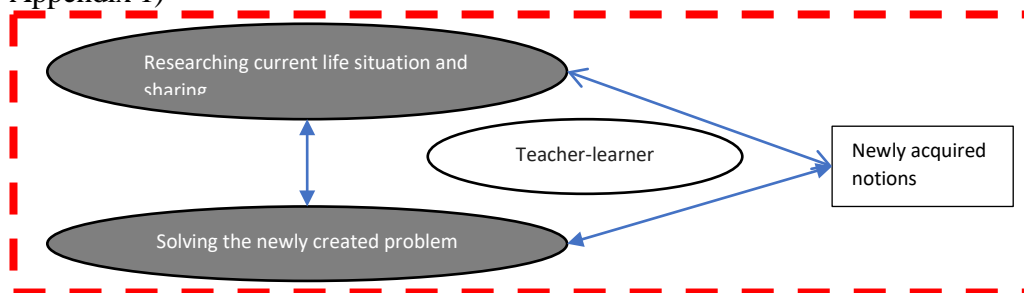
When children committed to the task, they also self-regulated in several situations to maintain this commitment. In the water purification experiment, children repeated trial and error situations to find the best purification solutions and in the breakfast scenario children reviewed their criteria to find the most suitable country. Through these tests or the reconsideration of criteria, they modified their cognition or understood the use of the equipment (Pintrich & De Groot, 1990). When they listed difficult breakfast words and shared them to the entire class, they controlled their efforts (Pintrich & De Groot, 1990) to aim for greater efficiency.

With regards to the maths scenario, the children managed to enter into discussions as they solved the problem they had drafted. In this experiment, the

children, in order to enter into metacognitive reflection, seemed to evolve within a loop between problem creation, problem resolution and the confrontation with new knowledge. It is in this back and forth between the making up of a situation, its resolution and the mobilization of new notions that the children question themselves about their activity, their inferences, their way of working, and the meaning of what they do. It should be noted that it is also at this moment that the teacher enters into a dialogue with the various groups by questioning them: “What answer should be obtained?”, “How did you start and then what did you do?”, “For what purpose are you doing this?”, etc.

For the teacher, when setting up a didactic sequence, the search for this type of loop between creation, resolution and confrontation with new knowledge should be a means of controlling the quality of the sequence. Moreover, setting up such a framework for analysing a didactic sequence allows the teacher to determine where and when they should give impetus or on the contrary withdraw and let the children learn autonomously. This will enable the children to enter into metacognitive reflection. According to the observations made, it would seem that the teacher-student interactions within this loop are the most effective in initiating learning and this is illustrated in Figure 1. We also need to highlight here that the teachers who participated are not used to interacting with students at this metacognitive level and that, due to a lack of such practice, teachers do not come into these learning areas very easily. They tend to return to more familiar grounds and their preferential teaching and learning patterns. In this study, we relied a lot on the students, and understandably so, as this is about the development of their autonomous learning, but the teaching position could also be commented on here, as it was done in Bosmans (2022, in press).

Figure 1. Creation-resolution-new Notions Loop of the Math Scenario (See Appendix 1)



For Schunk (2005), learners are active and constructive participants in learning. This is evident in the children’s ability to bring together their existing knowledge to list new breakfast lexis or to improve the planned organization through pooling. The maths groups all mobilized different strategies based on the various ideas expressed in the groups. Finally, in the science group, the 12-year-old children were very active through the many tests to get to the best purification solutions. One element remains common to all scenarios, the moment of institutionalization of knowledge and its anchoring. Indeed, this moment seems necessary so that the notions discovered can be firmly fixed.

Schunk (2005) also mentions that learners have the potential to exercise control over key activities. This can be seen in the breakfast scenario where the children exercised control over the selection criteria or the organization in the groups, as well as in the water purification scenario where the children acted on the choice and the ways to filter water and purify it. In maths, children found it more difficult to gain control over key moments when moving from problem solving to problem creation. They were faced with a double task: to draft a problem and to find it related to everyday life. This complexity held them back. However, this complexity seems to be an element to be explored in order to determine to what extent a dual cognitive task obliges the student to reason in a metacognitive way in order to identify original problem-solving solutions. Imagining such solutions through a metacognitive approach seems to be a way to develop transversal competencies.

Finally, for Schunk (2005), learners have an objective or a performance criterion against which they can evaluate their progress. The three scenarios offered varied answers to this third point. In terms of water purification, the main performance criterion was very easily accessible: water purification and the functionality of purification methods. Children could easily measure their progress through these fairly easily observable elements. For the other two experiments, the performance criteria allowing the observation of progress were less obvious. For the breakfasts, these criteria would be found in the actual making up of breakfasts and the learning of a new vocabulary. In maths, the student would be able to identify a better understanding and ability to solve mathematical problems related to the notions studied. However, for both breakfasts and maths, progress would be quite measurable at the end of the activity while for the science scenario, progress would be assessed more continuously. The comparison of the three scenarios suggests that it is easier to inhibit frustration and disappointment if the performance criterion is visible, immediate and permanent.

Sub-phase of Zimmermann and Campillo's (2003) Model and Development of Transversal Competencies

Language scenario (Breakfasts)

The first scenario proposed consisted of the sub-phases of task analysis and self-motivation beliefs. These sub-phases were linked to the transversal competences of collaboration and communication. The division of tasks and the distribution, more or less chosen, revealed a variable amount of motivation among the children. Some found tasks to carry out that suited them well and others found themselves with less interesting tasks impacting on their engagement. Thus, self-motivation could be partly associated with the student's feeling of competence.

In view of the results of the first scenario, the ability to analyse tasks and the distribution of duties seems to be a necessary prerequisite for the construction of transversal competencies of communication and collaboration which in turn and, through their development, reinforces this analytical ability.

Maths Scenario (Sharing)

The dominant subphase of Zimmerman and Campillo's model in the maths scenario was self-mastery and self-observation. Many situations in the completion of this scenario showed these two skills. Indeed, during the group work presentation, the children found themselves in a condition of social acknowledgment. This situation required a certain amount of self-control to meet the demands required. The debates and confrontations of ideas in the various groups also required good self-control and a certain ability to observe oneself in order to maintain a critical eye on one's own functioning.

Other situations arose where self-control was required, such as:

- maintaining attention in a situation where the link between the task and knowledge was not self-evident;
- the intra-group conflicts due to the frustration of not having answered all the questions and not listening to the other groups during the presentations,
- the sharing of ideas and the collective construction of a solution,
- the management of the dual task,
- being faced with the solutions of other groups and leaving an initial solution in favour of another group's solution.

When it came to self-observation, when it was necessary to move from the resolution of a proposed problem to a problem to be drafted, the children found themselves in a situation of insecurity. To help them observe themselves and take a step back from the activity and their work, the teacher questioned them about what they did, why they did it, etc. These sub-phases of self-mastery and self-observation was particularly visible in the development of creativity. It is through self-control and self-observation that the student manages to inhibit certain spontaneous behaviours to engage in thoughtful and constructed behaviours or in the exploration of new ideas.

In the creativity-resolution-new notions loop, children must inhibit certain spontaneous thoughts, such as resorting to the first maths activity by replicating it or old notions, in order to be able to integrate the new knowledge into the newly-drafted problem. For this, good control and good self-observation facilitate the back and forth between creativity, resolution and integration of new concepts. The teacher's role at this stage is essential to guarantee this dynamic.

Science Scenario (Water Purification)

In the water purification scenario, self-assessment and self-reaction were introduced as well as the *reflection* competence. Children were placed in a situation of reflection, creation and trial and error in this scenario. Each attempt in the experimental part offered a result that had to be accepted, analysed and improved. To enter into this progressive and creative process, children must necessarily be able to self-assess in the activity and self-regulate between

enthusiasm and disappointment. It is in this self-evaluation and this self-regulation that the student manages to remain on task and to progress.

Conclusion

In conclusion, the trialling of these three scenarios allowed for the validation of the best subject/phase/TC match when endeavouring to develop autonomous learning through group activities. It also allowed for a refining of the scenarios following the teachers' feedback and a robust analysis of children's interaction with the activities being offered. In view of these three scenarios and related experiments, it is worth noting the contribution of the sub-phases of Zimmerman and Campillo's (2003) model in understanding the development of transversal competencies. If TC are known and displayed in the French-speaking study plan, Zimmerman and Campillo's model and, more specifically, its sub-phases propose concrete elements to be introduced into the educational activities offered to children. These sub-phases also present themselves as beacons to mark out the pedagogical scenarios imagined by teachers who would like to engage in this type of approach.

Finally, all the teachers who participated in the implementation of these scenarios noted an element to add. All thought that students should record discoveries, important moments, choices, ideas, etc. in a diary. For example, in the breakfast scenario, the children could write the idea of pooling resources in their diary and then work on this notion. This perspective could probably allow them to improve their future collaborations. In the same vein, the student could write in his logbook the series of questions asked by the maths teacher and reuse them in the resolution of a future problem or to build a method or a resolution algorithm. Teachers thought that this diary could constitute the essential element promoting the transition from cognition to metacognition. Indeed, moving from cognitive to metacognitive reflection is not easy; however, the keeping of a diary listing children's experiences, reflections, ideas, and resolutions, which would sometimes be used or analysed, would allow children to move from cognitive to metacognitive reflection, perhaps the object of a subsequent study.

Acknowledgments

Our thanks go to the school, teachers and parents who have allowed us to try out these pedagogical scenarios and, of course, to the children who took part and enabled us to obtain constructive feedback on them.

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Appendix 1

Three educational scenarios aimed at building an environment conducive to the developing of transversal competencies in primary school children through self-regulated learning.

Scenario 1 – Collaborating and talking about the design of a mini-project for the organization of an event, a mini-project that fits into the task-based learning perspective

Organization of an event such as, for example, an international or intercantal breakfast, a fashion week at school, a *Switzerland's Got Talent* or a *Spelling Bee* competition in French or English or any other event that could be organized in a primary school. The theoretical framework is summarized in Table 2. This scenario is appropriate for classes from Year 5.

Table 2. Theoretical Framework for Pedagogical Scenario 1

Subject	Transversal Competencies	Zimmerman & Campillo's Model Phase	Pedagogical approach
Languages (L1, L2, L3, Lx)	Collaboration and communication	Forethought Phase (task analysis and self-motivation belief)	Task-based Learning and plurilingualism

Version 1

This is a project where children play the role of organizers of an international breakfast for which they had to work on the dietary differences, the culinary specialties of the countries represented in the student population of the school, learn the associated vocabulary in French, English, and one or two other languages represented, prepare the organization (invitations and trilingual or quadrilingual lexical labels for each food presented) and receive their guests in the lingua franca, i.e., in English.

The final task thus consists in an interlinguistic and intercultural exchange on a situation of everyday life through the staging of an international breakfast.

Aims

- 1) Cultural openness to eating habits between the indigenous population and the different linguistic communities represented in the school
- 2) Health education through awareness of good eating habits
- 3) Work on language competencies in L1, L2, and L3
- 4) Work on socio-linguistic and cultural competencies
- 5) Work on the pragmatic competencies of organizing an event

Version 2 (in the case where no children from immigrant parents are in the school)

This is a project where children play the role of organizers of an intercultural breakfast for which they had to work on the dietary differences, the regional culinary, learn the associated vocabulary in French, German and English, prepare the organization (invitations and trilingual lexical labels for each food presented) and receive their guests in the lingua franca, i.e., in English.

The final task thus consists in an interlinguistic and intercultural exchange on a situation of everyday life through the staging of an intercultural breakfast.

Aims

- 1) Cultural openness to eating habits between the four linguistic communities in Switzerland
- 2) Health education through awareness of good eating habits
- 3) Work on language competencies in L1, L2, and L3
- 4) Work on socio-linguistic and cultural competencies
- 5) Work on the pragmatic competencies of organizing an event

The Scenario

- 1) The teacher presents to the children a scenario which proposes the organization of an event held at the school and which supports the acquisition of the CTs of collaboration and communication, reactivates linguistic knowledge already acquired, in order to engage the children in taking action (TBL perspective) and to plan everything that is necessary for the organization of the event of an international nature.
- 2) In a first phase, the children will work in groups of four and will choose the languages represented as well as the regional or international specialties to be included in the breakfast. They should also write down the tasks to be performed by each member of the group. This phase allows task analysis and prompts children to share their self-motivated beliefs (see Figure 2). It also encourages children to work together to reach common decisions.

Figure 2. Forethought Phase and Organization of Tasks by Zimmerman and Campillo (2003)



- 3) Secondly, the groups present their choices to the other children and justify them by explaining how they arrived at a joint decision. Each member of the group also explains their specific tasks. This second phase develops the children's communication competencies and allows them to set the operational objectives of each group. The teacher notes on the board the negotiation strategies used by the children, as well as the content and knowledge involved during this phase of forethought and organization.
- 4) The last phase is the teacher's feedback which synthesizes with the children the strategies of collaboration and negotiations employed by all the groups, the positive and negative points of the various children's presentations, as well as the objects of knowledge essential to the accomplishment of the mini -project.

The details of the scenario steps are given in Table 3.

Table 3. Detailed Scenario Steps

Step 1	5 – 10 min	The teacher presents the children with the outline of the mini-project, i.e., the organization of an event (international or intercounty breakfast) held in the school, and gives instructions both on the content required and on the need to collaborate and communicate. <i>This activity requires another period to complete Step 4.</i>
Step 2	15 – 20 min 25 – 30 min	Children work in groups of four. They choose the languages represented in the project as well as the specialties. They plan and define the tasks of each member of the group and write their choices on an A3 poster. <i>The teacher writes on the board the double task (organisation and choice of country) to support group work.</i>
Step 3	15 – 20 min	The groups explain, justify their choices and talk about how they negotiated during a short plenary presentation. The other children give suggestions.
Step 4	5 – 10 min 25 min + 1 more period of 45 min	Each group corrects and improves their poster based on feedback from their classmates. Posters are displayed after correction. <i>The teacher asks children to find books and documents which could help them in their project. She/he also asks the children who are bilingual to look up vocabulary. Following step 4, the teacher asks children to write down individually how they collaborated, how they communicated, which difficulties were encountered and what strategies they can use to move forward together.</i>
Step 5 (4 th period)	10 – 15 min 20 min	The teacher gives feedback and lists on the board the main negotiation strategies mentioned by the children, as well as the content and needed knowledge explained during the presentations.
Step 6 (4 th period)	10 – 15 min 25 min	The children discuss the collaboration and communication strategies, the content and the knowledge explained and the organization of the mini-project. They note the key words and important aspects of the collaborative strategies thus explored and facilitated by the teacher. <i>She or he contextualizes the project as follows:</i> <i>The groups are kitchen teams who have to prepare breakfast for:</i> <ul style="list-style-type: none"> - All the other children in the class - The main teacher - The school Headteacher <i>Reflection to be completed on the breakfast content but also on the environment (decorations, tables, etc.)</i>
Step 7	45 min (5 th period)	Children plan and organize the mini-project. This phase can take a double period if necessary. <i>Project being implemented: each group does it according to their mindmap. Children distribute tasks and organise themselves to complete the project.</i>
Step 8	Indefinite (6 th and 7 th period)	Implementation of the mini-project. The number of tables set up will correspond to the number of groups.

Scenario 2. Create a maths problem and think about learning strategies when resolving it

Children write a new maths problem with the teacher endeavoring to raise their awareness of learning strategies to solve it. The problem will be written in L1 and may call on other disciplines in its formulation (history, geography, physical education, ACVM, etc.). The goal is for children to think about learning strategies and to be aware of children's task control that will help solve the problem (self-instruction, imagery, focused attention & task strategies) as well as self-observation (metacognitive monitoring and self-recording) throughout its execution. The problem is designed for Upper KS2 children which is an age range from 9-11 years old. The theoretical framework is summarized in Table 4.

Table 4. Theoretical Framework for Pedagogical Scenario 2

Subject	Transversal Competencies	Zimmerman & Campillo's Model Phase	Pedagogical Approach
Maths	Learning Strategies and Creativity	Self-control and Self-observation	Collaborative and Inquiry Based Learning.

This is a project where the children play the role of writers of a new maths problem for which they will have to draw on already acquired knowledge.

The children will be presented with a task which develops discussion around specific aspects of fractional understanding as well as the concept of sharing. They will be shown how a simple context can have mathematical understanding drawn out. Further suggestions to further the depth of enquiry will be demonstrated in adding variables that were not in the original problem, giving children the chance to be creative and seek other ways to challenge participants.

The final task therefore consists of an exchange on the learning strategies used to solve a maths problem written by the children and a reflection on metacognitive control and monitoring throughout the problem-solving task.

Aims

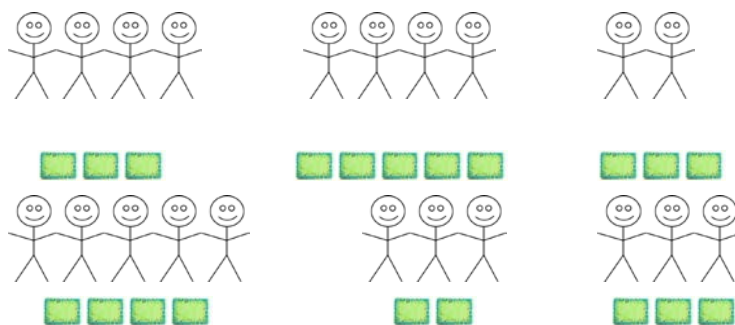
- 1) Consider application of maths competencies to other contexts
- 2) Develop ability to think creatively
- 3) Take note of the learning strategies used to create and resolve the problem
- 4) Improve mathematical language and vocabulary
- 5) Work on presenting competencies
- 6) Develop knowledge and understanding on fractions and sharing

The Scenario

- 1) The teacher presents the children with a scenario that suggests writing a new maths problem that supports the acquisition of transversal competencies such as learning strategies and creative thinking. The teacher makes the children

aware of the type of problem to be written and explains some learning strategies that can be applied in solving the problem.

- 2) In a first phase, the children will work in groups of four. They will be given these diagrams and be asked first to consider what can they work out from the groups of individuals and rectangular cakes.



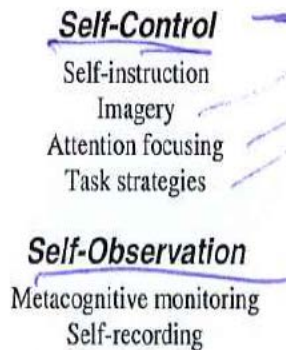
After a short time to be able to explore this by themselves, ask the children which group will receive the most cake if all the cakes in the group are shared equally. It is worth giving the class a few moments to ponder each question before asking for oral responses.

Encourage children to draw and discuss their ideas. Once they work out which group would get the most, ask which group would get the least amount of cake. Focus discussion on fairness and how the size of the group matters just as much as the amount of cake to share.

- 3) Once clear ideas and discussion have been developed, suggest to children that this scenario can be replicated in a number of ways with a variety of objects. Elicit ideas to support the process that they will be asked to undergo. Move children to recognise that there could be space to include different types of cakes (different shapes, different textures, different flavours, etc) and they could explore different proportions across different groups.
- 4) Children will then need to design their own context which could use cakes (perhaps some other context) where objects need to be shared and they will have to pose questions which other groups will need to answer using similar competencies but can include their own original ideas (e.g., instead of focusing on which group gets the most, explore which group would be better for you if you prefer chocolate cake and so on)
- 5) They will also have to write up the monitoring and control tasks to be carried out by certain members of the group who must be designated by the group at the start of the activity. This phase allows children to already think about the learning strategies that will be necessary for the other groups to solve their problem and prompts the children to use their creative thinking when writing it (see Figure 3). It also encourages children to consider how to explain a mathematical task and guide others through the thinking process if they need support.

Figure 3. Performance Phase and Self-control and Self-observation Concepts by Zimmerman and Campillo (2003)

Performance Phase



- 6) Secondly, the groups present their problem to the other children and mention the learning strategies that will be necessary to solve it. Each member of the group also explains their specific tasks. This second phase develops children's awareness of learning strategies and allows them to set operational goals for each group. The teacher notes on the board the learning strategies used by the children, as well as the content and knowledge involved during this phase of execution. Children then act on the feedback and criteria further explained by the teacher.
- 7) The last phase is the teacher's feedback which synthesizes with the children the learning strategies employed by all the groups, the positive and negative points of the creativity shown by the children as well as the objects of knowledge essential to the resolution of the problem.

The details of the scenario steps are given in Table 5.

Table 5. Detailed Scenario Steps

Step 1	5 – 10 min	The teacher presents the criteria to draft a good maths problem and gives an example.
Step 2	15 – 20 min	The teacher <i>gives her instructions and</i> elicits from the children and teaches overtly some learning strategies appropriate to resolve a maths problem. <i>Pay attention to how the groups are made up as their understanding of maths may vary. Think about presenting the project in different ways to motivate everyone in the groups. For instance, one child can have part of the problem and the pulling together of all parts can lead them to discover the activity.</i>
Step 3a following feedback		<ul style="list-style-type: none"> - The teacher helps children to identify real life situations where things need to be shared and elicits two to three simple examples when this happens in real life - It would be useful to explore with children how a maths problem is structured (data, context, schemata, question, etc.) and to define a methodology to construct a problem. - Children are encouraged to make their situations/problems more complex.
Step 3	15 – 20 min	Children work in groups of four and draft their maths problem on the sharing of cakes or other items. They plan and define the learning strategies that will be needed to resolve the problem and write their choices on an A3 poster. <i>Teacher's instructions: You are going to create a problem about sharing which you could get in real life and write down your strategies (we thought about this, we tried that, etc.)</i>
Step 4	5 – 10 min	Presentation of the posters or other sharing activity, such as the World Café method (in which case, this step would take more time. During a World Café, the participants analyse the object, discussing in small groups set at different tables for several subsequent periods of 10 minutes. The participants move to the next table after each period in order to enrich their discussions thanks to the ideas presented at the other tables.)
Step 5	10 – 15 min	Feedback from the teacher on the posters, using the equipment of their choice and in a plenary session.
Step 6	10 – 15 min	<i>Another possibility: Mix the groups to obtain a richer discussion, each child having their notes on strategies (Step 3). The children discuss the learning strategies, the content and the knowledge explained and the maths problem to be resolved. They note the key words and important aspects of the creativity and learning strategies thus explored and facilitated by the teacher. Look out for potential conflicts due to the various strategies used by the children. Prepare some group management rules.</i>
Step 7	45 min (3rd period)	The children write their second draft of the problem and list learning strategies needed.
Step 8	Indefinite	The children work on all maths problems and resolve them.

Scenario 3 - Choose a scientific procedure with built-in reflective practice (for children to reflect on how things went or how effective their procedure is)

This is a project where the children play the role of scientists testing a scientific procedure for which they will have to draw on already acquired knowledge. The task which will be an example for KS2 Year 5 children (9-10), topic materials, to use is described below. They will first mimic sea water pollution by incorporating all sorts of pollutants into salty water. They will then experiment with the various sieves to filter the water and reflect on the best filtering sequence. They will then apply a scientific procedure to turn salty water into water ready for human consumption. The final task consists into reflecting on the state of our oceans, how to filter pollution and make soft water out of salty water. More importantly, children will evaluate the way they have applied the various procedures and reflect on how they arrived at their choices. The theoretical framework is summarized in Table 6.

Table 6. Theoretical Framework for Pedagogical Scenario 3

Subject	Transversal Competencies	Zimmerman & Campillo's Model Phase	Pedagogical Approach
Sciences	Reflexion	Self-reflexion Phase (Self-judgment and self-reaction)	Kinaesthetic Task

Aims

- 1) Raise awareness of water pollution on our planet
- 2) Work on scientific procedure and sequences (the best way to filter rubbish out of water)
- 3) Reflect on most efficient scientific procedure
- 4) Use scientific procedure to clean sea water
- 5) Work on scientific experiment – turn salty water into soft water

The Scenario

- 1) The teacher presents to the children a scenario which raises awareness of sea water pollution and proposes various scientific procedures to clean the water and make it ready for human consumption. It is a scenario that supports the acquisition of reflexion, one of the transversal competencies identified in the PER. Discuss with children what substances you might expect to find in the sea and prepare a jug of dirty water. This can be done some days before the activity to give you time to collect the items, such as sand, grass and plastic, or you can prepare a collection in advance and as they suggest each substance add some of it to the jug of water, stirring thoroughly. If creatures are mentioned discuss but do not add!
- 2) In a first phase, children will work in groups of four and are challenged to produce clean water from dirty water they are given, using a range of filters to

achieve their goal. The filters suggested in this experiment are a sieve, a sand filter and filter paper but the teacher may choose to use other items. Children can try using the filters in different orders to see what happens and note down the result to reflect on the most effective approach (which is to use the sieve first, as this has the largest holes and will remove the bigger pieces of rubbish, the sand filter second to remove smaller items and the filter paper or cloth last as this has the smallest holes.) This phase allows children to already reflect on various procedures and what reasoning was used to come to their choice (see Figure 4).

Figure 4. Self-reflection Phase and Self-judgment and Self-reaction Concepts by Zimmerman and Campillo (2003)

Self-Reflection Phase

Self-Judgment

Self-evaluation
Causal attribution

Self-Reaction

Self-satisfaction/affect
Adaptive/defensive

- 3) Secondly, and once the children have filtered out what dirty materials they can, the teacher then evaporates and collects the water to show the salt and any other dissolved materials left behind. It is recommended that this is done as a teacher demonstration as a heat source is required to evaporate the water. Children should pour some of the water that has passed through all the filters into a foil pie case, about half a centimetre deep (a smaller amount of water will give a rapid result). These foil cases will be collected by staff. The foil cases with filtered water are placed on the warmer a safe distance from the children. A cold metal tray is held at an angle, about 45 degrees, over the foil cases facing the children. This will soon collect some condensed water which can be pushed into a clean tray. Following a careful check, this water will be cool enough for the children to touch.
- 4) The last phase is the teacher's feedback which synthesizes with the children the items of reflection mentioned by all groups, the positive and negative points of the procedures used by the children as well as the objects of knowledge essential to the resolution of the scientific problem.

The details of the scenario steps are given in Table 7.

Table 7. Detailed Scenario Steps

Step 1	5 – 10 min	The teacher presents the two scientific tasks to complete after having raised the children's awareness of water pollution on our planet. <i>Contextualisation of the task essential, PPT available on request.</i>
Step 2	15 – 20 min (this will vary depending on children's age)	Children work in groups of four (<i>groups downsized to 3 if possible</i>). They choose the best water filtering sequence and note down results and their reflexion on it using the worksheet which can be available on request.
Step 3	15 – 20 min	The groups explain and justify their choices during a short plenary presentation. The other children give suggestions and note down other groups' ideas whilst the teacher records their reflection on a computer using software such as Audacity (or other recording equipment or software.) <i>The teacher should ask them about their procedure to avoid groups presenting similar ideas.</i>
Step 4	5 – 10 min	Each group prepares their clean water foil case and give it to the teacher. <i>If a break is taken at this stage, when the children reconvene, the teacher adds a second plenary where children can present their results and difficulties they met. They should also answer the questions on Appendix 2 and share their ideas orally.</i>
Step 5	10 – 15 min	The teacher goes through the evaporation and collection of soft water procedure. <i>The children were very enthusiastic and could complete this step by themselves (depending on Health and Safety rules in your country).</i>
Step 6	10 – 15 min	The teacher plays the recording, children listen and read what the teacher notes on the board, i.e., the various points highlighted in the children's reflexion. <i>A conclusion on existing solutions for depolluting oceans is quickly presented through the use of videos (Ocean Cleanup).</i>
Step 7	45 min (3rd period)	The teacher gives his/her feedback on the most effective scientific procedure and on the children's reflexion about the most efficient way to choose the correct procedure to solve a scientific problem. The teacher will now introduce and propose a further activity on another pollution problem to be explored and solved during the next session. <i>(Feedback Questionnaire on the activity available on request).</i>

Appendix 2

How Can We Clean This Dirty Water?

Water covers most of the earth and is vital for life. Of all the world’s water, approximately 97% is found as salt water in the seas and oceans. Although it may look clean, the seas are becoming more polluted with rubbish. There are large and small items being dumped in the sea, from pieces of wood to tiny beads of plastic from products such as face creams. All of this makes sea water a mixture that is unsafe to drink. As well as this, salt is dissolved in sea water making it a solution. Land animals need to drink water every day to stay healthy but cannot drink sea water. Do you think we can turn dirty, salty water into something that animals can drink?

Your task: Use the filters given to you to remove as much dirt and other material as you can from the dirty salty water you have been given.

Each group will be given a tray and three filters; a sieve, a sieve with scourer pad holding sand and a sieve holding a piece of filter paper or material.

Results

Filter name	Which order for filters?	Prediction I predict this filter will remove . . .	Results What substances has this filter removed?

After filtering, I predict the water is/is not safe to drink because

.....

After evaporating, I predict the water is/is not safe to drink because

.....

The first task is for each group to decide the best order to use the filters in and explain their sequence of filters. The children then fill in their predictions of what they think each filter may remove in the results table, as shown:

Each group will get a plastic cup of dirty salt water. Children will stir this and slowly pour about three-quarters through filter 1 so it collects in a clean plastic cup underneath. They should compare this filtered water to the quarter of dirty salt water left behind in the beaker and note any changes in the results table (is it cleaner/dirtier/clean?).

Children take the water that has passed through filter 1 and pour three-quarters of it through filter 2. Compare the water that has passed through filter 2 to the water left from filter 1.

Children take the water that has passed through filter 2 and pour three-quarters of it through filter 3. Compare the water that has passed through filter 3 to the water left from filter 2.

Children should discuss what the different filters have removed and whether the filtered water is clean.

Questions: What have the different filters removed? Is the water at the end clean?