# Challenging Virtual Mathematical Environments: The Case of the CAMI Project

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**Abstract :** This paper presents several components of a project designed to connect pre-service teachers and students in the classroom with a common goal: exploring mathematics through challenging problems. The project CAMI was developed in September 2000 through a collaborative process between the *District scolaire 1* and the *Faculté des sciences de l'éducation* of the *Université de Moncton* in New Brunswick, Canada. The implementation of the project has shown several positive results: the number of students taking part in the activities of the CAMI grows every year; pre-service teachers are increasing their knowledge of problem solving and assessment strategies; and the feedback from the school system has been positive.

## 1. Introduction

It is well known that the development of problem solving abilities is an important part in the growth of mathematical understanding. Recent work (Lampert & Cobb, 2003; Sfard, 2003; 2001) has also revealed that the role of communication in the learning process is essential to construct a deeper understanding of mathematics concepts. "When students are given the opportunity to communicate about mathematics, they engage thinking skills and processes that are crucial in developing mathematical literacy" (Pugalee, 2001, p. 296). Thus communicating mathematical ideas becomes an important learning and teaching task to help students make sense of mathematics through authentic communication activities. The use of information and communication technologies (ICT) can become an important tool to create such significant activities. As a matter of fact, the *National Council of Teachers of Mathematics* (2000) believes that technology is an essential component to the learning and teaching of mathematics. Not only can technology guide the mathematical concepts that are being taught but it can also increase learning opportunities for students. In fact, the following three assumptions led us to the development of the CAMI project: exploring challenging problems is an essential part of learning mathematics, communicating ones way of thinking about or solving a problem is an important aspect of constructing mathematical understanding, and using technology in a meaningful way can promote at the same time mathematical communication and problem solving activities.

The Internet-based project CAMI (www.umoncton.ca/cami) is one of the didactical resources that have been developed to motivate school students K-12 to solve challenging problems, and thus contribute to the deepening of their understanding of mathematical concepts and the improvement of their abilities to reason and to communicate mathematically. Pursuing a long-time tradition of mathematicians who challenge each other with hard problems by exchanging letters using mail, it turned out to be a valuable example of meaningful integration of technology in a mathematics classroom of the 21st century. The result of a close collaboration between the *Université de Moncton*, and the school system, the project had three original goals: 1) be a tool to help francophone schoolchildren develop problem-solving and communication abilities; 2) be a tool for pre-service teachers to learn how to integrate technology in a mathematics classroom, how to assess problem solving in a formative way, and how to understand children's mathematical reasoning and ideas; 3) be a resource for teachers in the school system. (Vézina & Langlais, 2002).

## 2. Theoretical framework

Several studies conducted in recent years showed the importance of giving schoolchildren access to powerful mathematical ideas (Perry & Dockett, 2002; Solomon, 2001). These studies stress that the student's knowledge of mathematics is formed of internal networks of representations. The understanding of mathematics requires these representations be interlinked through structured coherent networks (Hiebert & Carpenter, 1992). This understanding happens when the learners face a meaningful problem allowing them to build necessary links and connections making sense of mathematical knowledge. Therefore, it is not surprising that most curriculums give a central place to problem solving. Problem solving helps schoolchildren to get access to mathematical concepts and develop necessary thinking tools in order to realize their full potential (MENB, 2003).

In her model for the development of mathematically promising children, Sheffield (1999) opted for the use of multi-dimension tasks within the scope of heuristic and open model, which would contribute to the development of abilities to create, make links, investigate, communicate, and evaluate. Essentially, in order to succeed in teaching mathematics, it is necessary to create a good equilibrium between the routine and well-structured tasks, and those more creative and innovative. The students need to create a solid repertoire of positive experiences in problem solving, which would allow them to develop their self-confidence and potential (Klein, 2003).

While some children are struggling with mathematics, others might loose interest in mathematics because they are not challenged enough (Tempest, 1974). At the same time, the research shows that all children are eager to learn more and are able to learn more. One of our study conducted in a Montreal–based private elementary school, proved to be another case showing that an appropriate challenge can, not only foster a development of mathematical potential in gifted students in early grades, but it could also be beneficial for all students (Freiman, 2003; 2004). Sheffield (1999) calls these children 'mathematically promising' and argues that a challenging program may also introduce them to the joys and frustrations of thinking deeply about a wide range of original, open-ended, or complex problems that encourage them to respond creatively in ways that are original, fluent, flexible, and elegant.

Several recent reflective studies on the use of virtual environments report a positive effect on the pupils' motivation toward mathematics (Piggott, 2004; Renninger & Shumar, 2002). In his study on the use of a virtual environment to promote interactions between teacher training programs and schools, Charbonneau (2000) explores a different way of using technology to explore mathematics by setting up a virtual bank of mathematical problems and a computer environment for discussion and communication. The CAMI virtual learning community can be seen as another example of collaboration between schools and university that promotes changes in motivation and attitudes toward mathematics through the use of problem solving, communication and technology. In the next section, we will examine closely the structure of the CAMI project as a virtual community, as a bank of challenging problems and as a user-friendly computer environment. We will also discuss a research context that is being set up in order to measure the impact of CAMI on different categories of participants.

**3. What is the CAMI Project?**

The functioning of the CAMI is quite simple. For 20 weeks of the school year, four problems are posted on the website every second Monday morning. Problems are divided in the following matter: one problem intended for students at the primary level (Kindergarten to grade 2), one problem for students at the elementary level (grade 3 to grade 5), one problem for students at the middle school level (grade 6 to grade 8), and, finally, one problem for students at the high school level (grade 9 to grade 12). Students have two weeks to send in their solutions, which should include sufficient explanation to meet the goal of communicating mathematical information. Their solutions are submitted using a Web-based form. Once the solutions are received, the pre-service teachers' work begins.

Working in teams, the pre-service teachers have to assess the work that was done by the students. They first look at the problem itself trying to anticipate different strategies and solutions, and to elaborate specific criteria of evaluation. They then do a formative assessment writing a personal comment to each student giving them constructive recommendations about how to improve their problem solving abilities. The messages are personally sent to each student that gave an e-mail address to receive feedback. They also pick, from all the solutions received, some that can be defined as exemplary to be featured on the website. The work in the project gives the pre-service teachers a taste of some aspects of teaching. It helps them to better understand students' mathematical thinking and thus creates a positive dynamic between the pre-service teachers and their future students. At the same time, pre-service teachers improve their own problem solving and communication abilities, as well as teaching and assessment strategies.

The CAMI virtual community is built upon a few basic principles:

- <u>Friendly welcome</u>: Every student from Kindergarten to Grade 12 is welcome to join the community at any time; it is free of charge and obligation.
- <u>Mathematical challenges</u>: Everyone can submit a solution to any challenging problem to our CAMI team.
- <u>Formative feedback</u>: School students who send their solution get a personal comment from a university student; this comment is always positive and encouraging; it aims to motivate each participant to be persistent and continue to participate.
- <u>Variety</u>: The CAMI environment is open to a variety of styles and strategies; we try to understand different ways of thinking.
- <u>Open communication</u>: Communication is an important part of the project as it promotes knowledge sharing and knowledge building through collaboration and discussion.

**4. CAMI: A user-friendly computer environment**

The interface of the Website site is quite simple (see Figure 1.). The starting page gives a short presentation of the project. Three main menu items invite you to solve one of four problems of the week (*Problèmes de la semaine*), to read the analysis of the previous problem (*Solution du dernier problème*), and to search in the archive (*Problèmes archivés*). For students, there is also a possibility to play challenging games through several links to other sites (*Jeux et liens*), for teachers there is a teacher corner (*Information pour les enseignantes et enseignants*). One of the last two items directs to the list of all contributors to the project (team members, university students, consultants, programmers and sponsors (*Remerciements*), another provides visitors with the necessary technical information (*Informations techniques*). The same menu appears on all the screens in the same place making navigation easy and user-friendly.


***Figure 1.*** Interface of the CAMI Website (www.umoncton.ca/cami)

**5. Creating and solving challenging problems**

In determining our choice of challenging problems for the CAMI database, we follow several criteria, preferring the use of open-ended problems that are often imbedded in a real-life context (problem situation) with a challenging mathematical component allowing participants to construct their own mathematical interpretation of the problem, give necessary definitions and communicate their strategy inventing sometimes new language tools (symbols, schemas, formulas, etc.) in order to describe mathematical relationships and structures. Problems are created or selected in order to cover a variety of topics: number sense and operations, patterns and relationships, shapes and space, statistics and probability – four main content strands of the K-12 mathematics curriculum in New Brunswick. Problems for the *Apprenti* category (Kindergarten to grade 2) are created especially for the CAMI project. Problems for the other three categories (*Technicien*, *Ingénieur*, and *Expert*) are chosen with friendly permission from the *MathForum* Problems of the Week (PoW) bank. They are translated and adapted to the New Brunswick curriculum. Figure 2 shows an example from the *Apprenti* category.

***134. Jus d'orange frais!***

Jessica prépare du jus d'orange frais à tous les matins. Habituellement, deux grosses oranges lui permettent de faire un petit verre de jus. Si elle prend plutôt 4 grosses oranges, elle peut obtenir un grand verre de jus.

La mère de Jessica a acheté à l'épicerie une douzaine d'oranges. Elle n'a cependant pas fait attention et elle a mis dans son sac 10 grosses oranges et deux petites. Combien de verres de jus d'orange Jessica peut-elle faire avec les oranges que sa mère a achetées?

N'oublie pas d'expliquer ta démarche et ta solution à l'aide de phrases complètes.

*Pour les as : Peux-tu trouver plus d'une solution à ce problème?*

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*Translation: Every morning, Jessica prepares fresh orange juice for the whole family. Usually, 2 big oranges are enough to make a small glass of juice. With 4 big oranges, Jessica could make a big glass of juice. Jessica's mother has bought a dozen oranges at the local market. Being a bit distracted that day, she took only 10 big oranges while two others were small ones. How many glasses of juice can Jessica make with these12 oranges? Bonus: Can you find more than one solution?*

***Figure 2.*** A problem from the *Apprenti* category

The problem has several of the features mentioned above. It is accessible to young students due to the size of the numbers, but it might be a good challenge to the older ones too. It uses a real-life context familiar to all students. It is open to various interpretations and different strategies. It is related to the school curriculum (number sense and operations, patterns and relationships) setting challenges that go beyond usual classroom routine. Table 1 presents three different approaches children used to meet the challenge presented by the problem in Figure 2.

**Table 1:** *Examples of children's solution to the juice problem*

| Solutions | Translations |
|---|---|
| *Si je pends 2 grosses oranges pour faire un petit verre de jus et 4 grosses oranges pour en faire un grand verre, alors, je vais faire 5 petits verres de jus, en pressant 2 oranges à la fois. Ce qui est de mes 2 petites oranges je les mangerais ou, je me ferais un mini-verre de jus.*<br>*Joannie* | If I take 2 big oranges to make a small glass of juice and 4 big oranges to make a big one, so I will make 5 glasses of juice, squeezing 2 oranges at the time. As for my 2 small oranges, I will eat them or I will very small glass of juice. |
| *Si 4 grosses oranges = 1 verre de jus*<br>*O = 1 grosse orange*<br>*o = 1 petite orange*<br>*OOOOOOOOOOoo*<br>*Prends 4 grosses pour 1 verre, il reste 6 grosses et 2o. Prends les autres 4 grosses, ce qui fait un autre verre, il reste 2 grosses et 2 petites. Prends 2 grosses, ce qui fait un demi verre, et 2 petites font 1 quart.*<br>*R: Elle peut faire 2 verres et 3 quarts.*<br>*Samuel* | If 4 big oranges = 1 glass of juice<br>O = 1 big orange<br>o = 1 small orange<br>OOOOOOOOOOoo<br>Take 4 big ones for 1 glass, you're left with 6 big and 2o. Take the other 4 big, it will give another glass, and you will be left with 2 big and 2 small. Take 2 big, which gives half a glass, and 2 small a quarter of a glass. A: She can make 2 glasses and three quarters. |
| *Bonjour!*<br><br>*Moi, je crois qu'avec 10 grosses oranges et 2 petites oranges, Jessica peut faire 1 demi verre de jus d'orange et 5 autres petits verres.*<br><br>*Pour les as: oui, je crois avoir une autre réponse. Je crois que Jessica peut aussi faire un petit verre de jus d'orange et deux autres gros verres, parce que, si on met deux petites oranges, je crois que ça fait une grande; on peut faire une demie verre, mais il va rester une grosse orange, mais moi, je me dis que deux petites oranges et une grosse orange font deux grosses oranges. Ma réponse est que Jessica peut faire un petit verre et deux gros verres.*<br>*Marie-Ève* | Hi!<br><br>I think that with 10 big oranges and 2 small oranges, Jessica can make 1 half of a glass of orange juice and 5 small ones.<br><br>Bonus: Yes, I think I have another answer. I think that Jessica can also make one small glass of juice and two other big glasses, because, if we use two small oranges, I think it will make one big one, so we can make half of a glass, but we would be left with one big orange, so I said to myself that two little oranges and one big orange count as two big oranges. My answer is that Jessica can make one small glass and two big glasses. |

### 6. Positive impact of the CAMI project

According to the E-stat visitor monitoring system (www.estat.com), the number of visits to the CAMI site constantly grows, as does the number of solutions submitted electronically to our database. The geography of participants is also expending, new schools from New Brunswick and other Canadian provinces discover CAMI and join in the community. It is difficult to evaluate the exact number of CAMI users because many schools use the site without sending solutions. We know that some solutions come from home (they arrive when the schools are closed), but we do not know whether it was an initiative of parents, of children themselves, or if it was a teacher's assignment for homework.

Our conversation with teachers and school administrators revealed the existence of smaller virtual communities using CAMI in different ways. For example, some teachers give problems to students via Internet and children send their solution to the teachers e-mail address. Some teachers make children invent their own problems, post them on the school WEB site and organize a peer evaluation process to assess submitted solutions. One teacher told us that CAMI is her main resource for meaningful problem situations so she constructs her whole teaching based on CAMI problems, which allow her to cover all curriculums.

The CAMI might also become a part of outreach mathematical activities. For example, one school district in New Brunswick organized, once a year, a “Mathematical night” bringing together approximately 150 youngsters from a dozen local schools to spend a whole night in various mathematics competitions, and CAMI is part of these activities. In fact, the growing popularity of the project makes CAMI an interesting object of research.

**7. CAMI: A research context**

The research component of CAMI was not pre-dominant in the first years of its existence. The project was initially created simply as an additional resource in mathematics education for teachers, university students and schoolchildren. In time we realized that the project went beyond its original goals and needs to be more closely examined from a research perspective. Projects like CAMI have a particular place in educational research because of their complexity (project reaching a large audience, involving different level of administration from university to individual school, and using ICT). We are only in the exploratory phase of the research trying to develop an appropriate theoretical framework and methodology. In our work, we are inspired by new paradigms in educational research such as action research, collaborative research and research development (Anadon, 2001).

As of now our research has been centered on trying to answer the question of what role the CAMI plays for both groups of participants (school children and university students) and what are possible advantages and disadvantages of such a project. We are presenting preliminary results of an exploratory study conducted in 2004-2005 in order to understand the impact of CAMI on both school and university participants.

The first survey conducted from March to May 2004 was elaborated for schoolchildren. The second survey was conducted among university students enrolled in our mathematics education courses in the spring of 2005. Both surveys were anonymous. The participation of schoolchildren was voluntary; they simply had to complete the electronic questionnaire and submit it to us. As for the university students (from the K-8 program), we asked those who were present during a specific class to answer the questionnaire that was distributed in a paper format. Students had about 20 minutes to complete the questionnaire. We got overall 96 responses from children and 66 from university students. In this section, we will share some of our findings from the survey that help to get insight into the role of CAMI for both groups of participants, schoolchildren and university students.

*7.1 Findings from children’s responses*

A survey conducted with francophone students using the CAMI site allowed us to collect data presented in this analysis. The survey took place between March and May 2004. We evaluated around 96 participants of which 63% were girls. The age of the participants varied between 8 and 14+ years old; 16% of the participants said they were between 8 and 10, and 56% between 11 and 13, and 28% said they were 14 and older.

Most of the respondents were doing problems from categories *Apprenti* and *Technicien* (69%). To the question “What do you think about the problems of the CAMI site?” 27% of the students answered “Very interesting,” 52% answered “Quite interesting,” and 10% answered “Very annoying.” Thus, in general, the students appreciate the idea of the CAMI site and find its content interesting and at the right difficulty level. Also, 47% of them find the interface of the site “Attractive” and 48% “Quite attractive.”

To the question “How did suggestions sent in messages help you to improve your problem-solving strategies?” 19% of the students answered “Very much,” 40% answered “Somewhat,” 33% answered “A little bit,” and 8% answered “Not at all.” Regarding the question “The use of CAMI site, did it help you to improve your abilities in problem-solving?” 20% of the students answered “Very much,” 46% answered “Somewhat,” 26% answered “A little bit,” and 8% answered “Not at all.”

These results allow us to answer favorably to the first question, which was to determine if the CAMI site helps to improve pupils’ abilities to solve mathematical problems and to increase their interest in mathematics. Noting that 88% of schoolchildren said that they would return to the CAMI next year.

In an open question about CAMI, 27 of 96 schoolchildren gave an explanation of what they like in CAMI. Their answers confirm a positive attitude toward CAMI. Children are saying that they are good, interesting, amusing and enjoyable problems (8 children). The work with our problems helps them to learn how to solve problems and to improve math skills (2 answers). One child mentioned a good variety of problems. Four respondents like computer environment saying that CAMI is a good site, with nice colors; it allows them to use computers and Internet (4 answers). Three respondents share their joy about CAMI (amusement, pleasure, fun), one child says that the work with CAMI makes a math class more interesting. Four children said they like games on the CAMI site. Finally, two more children said that everything on CAMI is good.

*7.2 Findings from the university students' responses*

One of the important questions of this study was to verify if the site CAMI improves pre-service teachers' understanding of students' needs. At least we can say that the majority of the students who participated in the survey recognized the positive impact and importance of the site for their education. The following are comments from students regarding the impact of CAMI on their learning:

- I really like this site for students. They can work by themselves and be valorized at the same time. In the classroom, the problems of the site will be able to serve as a "*mise en situation*" to introduce certain concepts.
- Allows a teacher to incorporate ICT in mathematics.
- Motivates students in their learning.
- I think it allows the students to develop their abilities in mathematics, pushes the good students to go further, and a retroaction can help weaker students.
- Shows a tool that we will be able to use in our classroom.
- Allows thinking about students' mathematical reasoning.

Let's look closer into the data from the closed questions. The first group of questions is related to the opinion of what this project gave to the student in term of the pre-service teachers training program in math education.

The data from Table 2 show that, in general, the university students agree (strongly or partly) that the project is useful for their math education training. If we combine both 'agree' columns, the total will vary from 73% (improving math knowledge) to 97% (process of problem solving). The only item that falls below this interval is related to the question of whether the project helps to understand the new curriculum (41%). When we look at the first column (strongly agree), we can see that agreement with the better understanding of the importance of communication (75%) is significantly higher than other scores. The next items of this kind would be formative evaluation (62%) and understanding of schoolchildren's reasoning (50%). It is worth mentioning that 90% agree that we should continue to integrate the project into math education courses (56% strongly and 34% partly).

**Table 2:** *Results from the university students' questionnaire (impact on their training)*

| Items | % Strongly agree (n = 66) | % Partly agree (n = 66) | % Partly disagree (n = 66) | % Strongly disagree (n = 66) | % Do no know (n = 66) |
|---|---|---|---|---|---|
| The project helps to understand the child's reasoning | 50 | 47 | 3 | 0 | 0 |
| The project helps to understand the process of problem solving | 35 | 62 | 3 | 0 | 0 |
| The project helps to understand the importance of communication in mathematics | 73 | 24 | 3 | 0 | 0 |
| The project helps to understand the new curriculum in New Brunswick | 15 | 26 | 46 | 11 | 2 |
| The project helps to improve my technique of formative evaluation in mathematics | 62 | 32 | 6 | 0 | 0 |
| The project allowed to review mathematical notions | 45 | 27 | 13 | 3 | 2 |
| The project allowed to improve my math knowledge | 39 | 34 | 19 | 5 | 3 |
| The project gave the idea of using computers in the mathematics classroom | 41 | 44 | 11 | 2 | 2 |
| It is worth it to continue to integrate the project in math education courses | 56 | 34 | 8 | 0 | 2 |

The second part of the questionnaire was asking university students' opinion of what the project would give to the schoolchildren. All the answers in this category show that university students agree (strongly or partly) that the project is beneficial to schoolchildren. With a combined score varying from 79% (creativity) to 98% (value of personal comment), they affirm that it increases motivation in mathematics in general and in problem solving in particular. The project helps to develop mathematical communication and creativity, improve mathematical knowledge and reinforce computer skills. It also strengthens interdisciplinary links. If we look closer at some specific results, we can state that 79% of university students think that their work of writing a personal comment is important for schoolchildren. The next popular item is about developing computer skills (65%), competence in communication (61%) and interdisciplinary links (55%).

We also looked at students' opinion related to a category of schoolchildren for which the project would be the most beneficial (they had to select appropriate categories). Upon students' choice, the children that might benefit most from the project are mathematically able students (44 of 66 answers), next come children having difficulties (31 of 66), and slow-working kids (25 of 66).

We also considered students' opinion of what the project gives to the teachers. The data show that university students agree (mostly strongly) with percentages varying from 92% to 97% (for strongly agree – from 66% to 76%) on all items but one (following progress of schoolchildren). This remaining item shows rather reserved approval (72% for combined scores, but only 29% strongly agree).

The last portion of items is related to the content of the site and to its functioning. From these data, we learn that the structure, content and functioning of the Internet site CAMI is well appreciated by the university students. With combined scores varying from 75% to 95%, they approve strongly its facility to use (79%), functioning (77%) and attractiveness (68%). Regarding the content, there is a significant number of students that strongly agree that the site offers a good variety of problems (66%), the problems are affordable to children (62%), and the content corresponds to the curriculum (53%) and allows enriching it (43%). The item regarding the content reveals an important number of students that hesitate to evaluate them (8 to 15% choose the do not know option). Answering the question of how to develop the site, 65% think that we should leave it like it is, 26% think that we should modify it, 9% do not know or hesitate to answer.

**8. Discussion**

In our preliminary analysis of the data, our attention is drawn to the fact that the project CAMI does, indeed, provide a challenging opportunity in mathematical communication for all its participants. Our example of an *Apprenti* problem shows that within a real-life context, different mathematical structures and relationships might be discovered by schoolchildren. The open-ended character of the problem situation allows children to choose different strategies and different ways of communication. University students who evaluate solutions in a formative way giving a personal feedback to each participant have approved these findings.

In fact, the importance of challenge in mathematics through problem solving and communication turns out to be an important discovery pre-service teachers make while doing a CAMI project within mathematics education courses. This evidence is confirmed by schoolchildren who say (although in less numbers) that this feedback helps them to improve their problem-solving skills.

Our findings show also that the university students find CAMI beneficial for the development of mathematical communication in young children. This communication is fruitful when it is bidirectional. This means that pupils are encouraged to communicate their mathematical ideas using a variety of tools. Pre-service teachers should be able to understand this variety, to appreciate it and to guide children through their problem-solving process. As survey results show, the majority of university students see the CAMI project as a valuable tool to penetrate a child's way of thinking. From another side, it is necessary to be objective and be able to challenge children's reasoning when it's incorrect and guide a child through the process of improvement. At the same time, university students seem to be united in the opinion that the project helps them learn how to understand a child's reasoning, to be open to a variety of strategies and tools of communication that children use, and provide a child with a meaningful formative comment, therefore, they want the project to remain a part of their math education training.

This result affirms the importance of a closer contact between pre-service teachers and schoolchildren. The project CAMI can be seen as one of possible ways of such a practice-oriented training, although some students would be more interested in getting a more direct contact with schoolchildren in the real classroom. We can conclude that there is a need for more variety in projects of mathematics education courses.

The next issue coming from our findings is related to the problem of differentiation in the mathematics classroom. As we said in our previous sections, today's mathematics curriculum recognizes differences in how children learn and the right of all children to receive an education that is adapted to their needs. The New Brunswick math curriculum stresses that in order to meet educational need of each student; teachers have to use a variety of approaches. CAMI presents one possible resource that gives pupils a chance to choose an appropriate problem, solve it at their own pace using their own strategy and communication tool. It brings also some informal and challenging elements in the classroom routine. The fact that each participant gets a personal comment from a university student can be seen as a motivating factor for schoolchildren because they see that their work brings the attention of other people and is being socially valorized by personal attention or even a public recognition (children can see this recognition when their solution is posted as interesting or their name is placed on the congratulation list). However, more research is needed in order to study in more detail the factors of intrinsic motivation among participants of the CAMI project.

**9. Conclusions**

In light of all the information that was gathered over the past years, we believe that the CAMI project is an enriching experience for all the people involved (students, pre-service teachers, teachers in the school system, university professors, etc.). Every year, the project has grown, and the interest from everyone involved in it has grown too. We plan to continue the development of the CAMI community adding new functions and new problems. We are working on finding technical and pedagogical solutions on how to give better and faster feedback to the children and make the site more dynamic and attractive. We also want to encourage all participants to contribute to the CAMI by adding problems composed by schoolchildren, their teachers and university students. Bringing together problem solving, mathematical communication, and ICT seem to be a winning combination in bringing more challenge in our mathematics classrooms.

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