CSEDU 2012

4th International Conference on
Computer Supported Education

Proceedings

Vol. 1

Porto, Portugal
16 - 18 April, 2012

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Selected Papers Journal

A short list of papers presented at CSEDU 2012 will be selected for publication of extended and revised versions in the Journal of Education and Information Technologies. This selection will be done by the Conference Chair and Program Co-chairs, among the papers actually presented at the conference, based on a rigorous review by the CSEDU 2012 Program Committee members.

FOREWORD

This book contains the proceedings of the 4th International Conference on Computer Supported Education (CSEDU 2012) which was organized and sponsored by the Institute for Systems and Technologies of Information, Control and Communication (INSTICC) and technically co-sponsored by SPEE (Portuguese Society for Engineering Education), IGIP (International Society for Engineering Education), ROLE (Responsive Open Learning Environments) and IFIP TC3 (International Federation for Information Processing – Technical Committee 3 – ICT and Education).

CSEDU has become an annual meeting place for presenting and discussing learning paradigms, best practices and case studies that concern innovative computer-supported learning strategies, institutional policies on technology-enhanced learning including learning from distance, supported by technology. The Web is currently a preferred medium for distance learning and the learning practice in this context is usually referred to as e-learning or technology-enhanced learning. CSEDU 2012 is expected to give an overview of the state of the art in technology-enhanced learning and to also outline upcoming trends and promote discussions about the education potential of new learning technologies in the academic and corporate world.

This conference brings together researchers and practitioners interested in methodologies and applications related to the education field. It has five main topic areas, covering different aspects of Computer Supported Education, including "Information Technologies Supporting Learning", "Learning/Teaching Methodologies and Assessment", "Social Context and Learning Environments", "Domain Applications and Case Studies" and "Ubiquitous Learning". We believe the proceedings, demonstrate new and innovative solutions, and highlight technical problems in each field that are challenging and worthwhile.

CSEDU 2012 received 243 paper submissions from 58 countries in all continents. A double-blind review process was enforced, with the help of the 297 experts who are members of the conference program committee, all of them internationally recognized in one of the main conference topic areas. Only 29 papers were selected to be published and presented as full papers, i.e. completed work (10 pages in proceedings / 30' oral presentations). 73 papers, describing work-in-progress, were selected as short papers for 20' oral presentation. Furthermore 37 papers were presented as posters. The full-paper acceptance ratio was thus 12%, and the total oral paper acceptance ratio was less than 42%. These ratios denote a high level of quality, which we intend to maintain and reinforce in the next edition of this conference.

The high quality of the CSEDU 2012 programme is enhanced by three keynote lectures, delivered by distinguished guests who are renowned experts in their fields, including (alphabetically): Joseph Trimmer (Ball State University, United States), David Kaufman (Simon Fraser University, Canada) and Hugh Davis (University of Southampton, United Kingdom).

For the fourth edition of the conference we extended and ensured appropriate indexing of the proceedings of CSEDU including DBLP, INSPEC, EI and Thomson Reuters Conference Proceedings Citation Index. Besides the proceedings edited by SciTePress, a short list of papers presented at the conference will be selected for publication of extended and revised versions in the Journal of Education and Information Technologies. Furthermore, all presented papers will soon be available at the SciTePress digital library.

The conference is complemented with two special sessions, focusing on specialized aspects of computer supported education; namely, a Special Session on Enhancing Student Engagement in e-Learning (ESEeL 2012) and a Special Session on Serious Games on Computer Science Learning (SGoCSL 2012).

Building an interesting and successful program for the conference required the dedicated effort of many people. Firstly, we must thank the authors, whose research and development efforts are recorded here. Secondly, we thank the members of the program committee and additional reviewers for their diligence and expert reviewing. We also wish to include here a word of appreciation for the excellent organization provided by the conference secretariat, from INSTICC, who have smoothly and efficiently prepared the most appropriate environment for a productive meeting and scientific networking. Last but not least, we thank the invited speakers for their invaluable contribution and for taking the time to synthesize and deliver their talks.

Looking forward to an inspiring world-class conference and a pleasant stay in the beautiful city of Porto for all delegates, we hope to meet you again next year for the 5th CSEDU, details of which will be available at http://www.csedu.org.

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Dublin City University, Ireland

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DIALOGICAL INTERACTIONS CONCERNING THE SCIENTIFIC CONTENT USING THE PLANNING TOOL, THE ARGUMENTATION TOOL AND FACE TO FACE COMMUNICATION

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Keywords: Dialogical Interactions, Modern Learning Platform, Planning Tool, Argumentation Tool (LASAD), Physical Sciences.

Abstract: This study is devoted to the qualitative analysis of dialogues conducted between students in a modern learning platform in which students learn how to learn together, argue and construct plans to resolve problems concerning scientific matters. The challenge-based scenario used in this research is related to the "Shots". We are interested in the way students interact when using two types of pedagogical tools (Planning Tool, Argumentation Tool) in the Metafora Platform, as well as through Face to Face Communication. Results of analysis demonstrate that verbal communication has a coherent structure, when groups try to resolve the common challenge through the Argumentation Tool.

1 INTRODUCTION

Scientists acknowledge the necessity of exploring the relation between the characteristics of the dialogues and the impact of those on learning. In particular, we are interested in the role dialogical interactions play in learning new scientific concepts as well as in the acquisition of skills.

The open problem of this research will not be solved by each of the students (12 students) on their own but in collaboration with other classmates and in different situations (synchronous, asynchronous). Students will, work in subgroups each one on their own computer. The communication among the subgroups will be synchronous through the Metafora platform.

The objective of this paper is the study of how Greek students of the 8^{th} class (13-14 years old) interact when using the planning tool that is based on the theoretical structure of inquiry as well as the argumentation tool that is based on the theoretical structure of constructionism and of argumentation theory. Both include visual language.

2 THEORETICAL FRAMEWORK

Lasad and Planning tool are based on inquiry based learning. The scientific process or exploratory learning is the modern theoretical framework that attempts to describe the complex processes taking place in the learning process but also the skills to be acquired by students. There are various forms of inquiry (Zacharia and Anderson, 2003), including: reflective enquiry (Kyza & Edelson, 2003), scientific inquiry-based learning context (de Jong, 2006), dialogical processes of enquiry (Grandy & Duschl, 2007). In Metafora Learning, inquiry-based learning has been described through 5 different approaches (Wegerif & Yang, 2011): personal inquiry framework (Scanlon et al. (In press), generic inquiry cycle (Shimoda et al., 2002), case- , problem-, and project-based inquiry learning (Schwartz et al., 1999), constructivist inquiry cycle (Llewelyn, 2002) and progressive inquiry (Hakkarainen, 2010). Challenge based, is embedded in inquiry-based learning and so does modelling as a process of thinking, reasoning and expression (Smyrnaiou & Dimitracopoulou, 2007).

Challenge and modelling are both related to the actions of students in the domain tool of Metafora, the Physics microworld, 3d juggler. There, they will select the objects, their attributes, and relationships among them. They will construct and deconstruct their microworlds, they will test them through visual feedback (Kynigos, 2007). In Physics microworlds modeling is a central cognitive process on the one hand and a product of reasoning with flesh and bones on the other, which at the same time is a model (fabrication/artefact). In Metafora Learning, the use of the Visual Language is suggested (Wegerif & Yang, 2011).

In Physics we are interested in what they learn about the scientific content (Psillos & Niedderer, 2002). We know from relevant research that the creation of scientific meanings starts from the intuitions (Kynigos et al., 2010), the initial representations of students (Viennot 1996), the phenomenological descriptions, the descriptions of actions or events perceived as scientific concepts and relationships between concepts (Smyrnaiou & Weil-Barais, 2005). Moreover, whether they use arguments (Scheur et al., 2010) or not in their plans since at the Metafora there is the argumentation tool which affects the whole process and so do other tools (scaffolding tools) as students enter and exit the 3 tools throughout the process of solving the challenge.

To understand collaborative learning experience, it is useful to distinguish individual behavior and group behavior, because different individuals develop their different collaboration styles throughout the collaborative project. We can conduct a content analysis of the individual discourse to characterize the topics and key words of the messages and trace individual learning trajectories in the group (Wegerif &Yang 2011).

Based on the theory of inquiry, of constructionism as well as of dialogical interactions, we created a framework to analyze our experimental data.

3 DESCRIPTION OF THE STUDY

There are not many surveys-as derived from our search-concerning the dialogical interactions between students when trying to construct a plan for resolving a challenge and when trying to explain with arguments the entire procedure to their classmates in a shared screen of a platform as well as through face to face communication.These issues become more interesting when students use different tools, like planning tool, argumentation tool and constructionist tool to solve a challenge in the Metafora platform. The mission of the two subgroups is coping with a common challenge in the 3d juggler microworld. In order to communicate, they use the Argumentation tool (LASAD) as well as the Planning tool for the construction of the joint plan. Both tools use cards that must be completed. Some cards of Lasad were for instance “Comment”, “Microworld idea”, “Claim”, while some cards of Planning tool were “Define our assumptions”, “Experiment”, Conclude”.

To familiarize the two subgroups with the tools of the Metafora Platform, students have to cope with a brief challenge (Warm-up). The students of both subgroups were widely separated, so they had to communicate through LASAD and aimed at the construction of a common plan in the Planning tool with the moves that led to the solution of the challenge.

The study examined three research questions:

- What is the role of dialogical interactions in creating scientific meanings through Planning tool and Argumentation tool?
- What are the characteristics of the dialogues emerged from the use of the tools?
- What are the roles of the tools to stimulate and sustain the dialogues?

Based on the theoretical framework discussed earlier, we constructed a framework with which we will analyze the plans that will be designed by the students in the pilot study. So, we assume that their discussions when they are trying to construct their plans will be different and will contain data from inquiry, constructionism, computer-supported collaborative learning, scientific content, argumentation.

4 RESEARCH METHOD-PROCEDURE

The students who participated in the pilot study were divided into subgroups of two, in order to cope with a common challenge. To familiarize them with the three tools: LASAD, Planning tool, 3d Juggler Microworld of the Metafora Platform, they were asked to navigate to them in order to comprehend their functionalities. Then, they were given a warm-up challenge, as presented below: “Keeping the blue and the green balls still, shoot the red ball vertically upwards”. After this, they were given the main challenge, as presented below: “The red ball should hit the blue ball’s base”.

This study was implemented with 3 groups of 4 students but we focused on 1, because it was pilot and we were interested in the detail of what was told as well as done, in order to draw conclusions for the design of the main study which will be carried out in the next phase.

5 RESULTS

In the initial stage of the warm-up, we observe that the two subgroups (subgroup A consisted of a boy and a girl),(subgroup B consisted of two boys), communicated with each other through LASAD in order to resolve the challenge. Then, they transferred to the Planning tool in order to construct a joint plan with the moves that led to the solution of the challenge and the dialogue that takes place in LASAD relates to their moves in the Planning tool. LASAD was necessary for the communication of the two subgroups since they were far apart and had no other means of communication. It furthermore became obvious that subgroup A had disagreements while subgroup B worked properly without any disagreements.

We observe that even though subgroup A started the dialogue, it was not so willing to share its ideas with the other subgroup. In contrast, subgroup B easily shared its ideas and informed subgroup A for the changes in the variable values that led to the solution of the challenge. In addition, we notice that subgroup A was trying to take a leading role in constructing the plan in the Planning tool, assuming that they work better than their classmates.

Subsequently, the two subgroups try to construct a joint plan in the Planning tool with the moves that lead to the solution of the challenge. As illustrated by the continuity of the dialogue, the two subgroups argue about the fact that each one of them changes or puts in row the cards of the other subgroup. Subgroup A seems to be more competitive in the whole challenge, since it does not provide any answer to the other subgroup.

Afterwards, though, it appears that they cooperate very well, since the one subgroup complements the other in order to create a joint plan. From the cards that were chosen and the order in which they were placed in the Planning tool, it appears to have approached properly the scientific method.

In the middle of the process, there was an inability of understanding, so the students of subgroup B deleted all the cards from the surface of the Planning tool, assuming that subgroup A deleted some of the cards that they had written. However, there is again an attempt to consult and the two subgroups start to construct the joint plan.

In the main challenge, we observe that the cooperation between the two subgroups is evolving quite well, since they discuss on the alterations of the values in the variables that led to the solution of the challenge. Subgroup A seems to initially question the values that subgroup B gave to some variables and suggests some others. In contrast, subgroup B does not disagree but argues that the values they also gave to the variables, can lead to the same result.

Subsequently, we notice that the dialogue between the two subgroups is related to the completion of the cards in the Planning tool, where they try together to construct a joint plan. Subgroup A proceeds to comment concerning the content that the other subgroup writes on the cards. Subgroup B requests to contribute in the construction of that plan too, with ideas about what they could note on each card, indicating thus, that they seek cooperation with the subgroup A.

Overall, we notice that the students of the two subgroups try to record their assumptions concerning the way in which they could resolve the challenge. Initially, the two subgroups do not cooperate well, since we discern that they chose cards with the same title and they note different data. They chose the same card and each subgroup wrote its own ideas.

Afterwards, a new effort of collaboration begins between them for the joint plan. Subgroup A corrects the content of some cards and in the end with the participation of both subgroups, they appear to form the joint plan.

It is also worth mentioning that from the choices students made concerning the cards and their order, it seems that they have approached correctly the scientific method. In addition, the cards of the planning tool contributed to the construction of the joint plan, while the wrong choices regarding the cards of LASAD did not stimulate and sustain the dialogues.

6 CONCLUSIONS

The results of this study demonstrate that inquiry-based and modelling-based instruction promoted effectively the communication.The use of LASAD contributed to the exchange of views between the two subgroups which was crucial for resolving the challenge and subsequently for constructing a common plan in the Planning Tool.

Concretely, for the students of our study, LASAD was used in order to ask questions, express agreement or disagreement and report the values that were given to the variables to resolve the challenge.

Even though in the stage of the warm-up, LASAD was not used appropriately in exposing students' ideas of the one subgroup, in the stage of the main challenge, LASAD was exploited in a more substantial degree, since it was observed that both subgroups contributed with their ideas for resolving the common challenge by exposing their ideas. However, this did not happen in the stage of constructing the plan, since they did not use it as means to communicate.

The use of the Planning Tool has been made exclusively for the construction of a common plan by the students of the two subgroups in which their moves were recorded on how they eventually reached the solution of the challenge. Also, the cards they used and the order they chose, reveal that they have approached properly the scientific method and through planning tool they were led to the creation of scientific meanings. This conclusion is not apparent for LASAD.

Overall we argue that initially the two subgroups did not have effective cooperation but then, they seem to cooperate.

Additionally, students became, in a greater depth, able to plan procedures for investigation, build models using technology-based learning environment, record results and draw conclusions. The largest gains were obtained for the skills of planning, modelling and drawing a conclusion.

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