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Collaborative learning via social computing

Key words: Context-awareness; Collaborative learning; Social computing; Virtual organizations; Wireless sensor networks; Real time location system

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Motivation

1. The amazing technological evolution has facilitated the inclusion of electronic devices in learning contexts, playing an active part in education and changing perspectives in relation to information and communication technologies (ICTs), including new ways for interaction and communication.

2. The aim of this study is to gain more insights about the use of social computing in collaborative learning processes.

3. Improve the learning process by fostering collaboration, enhancing relationships, and increasing engagement.

4. Describe and evaluate the context-aware framework for collaborative learning applications (CAFCLA) at a technical and social level.

Main idea

1. The framework has been designed from the perspective of social computing and permits practitioners to design, develop, and deploy collaborative learning applications that make use of social and contextual information.

2. Teachers will be able to design collaborative activities of different types.

3. Teachers can define and customize the environment where the learning activity is taking place.

Method

1. The framework integrates resources to manage social interactions and collaboration among students, and between students and practitioners.

2. The framework is supported by virtual organizations of agents that provide intelligence to the learning process.

3. The framework integrates multiple technologies to improve the learning process by fostering collaboration, enhancing relationships, and increasing engagement.

Major results

1. The process of adaptation of students to technology was fast and the learning curve was short (Table 3).

2. The use of social computing substantially enhanced the collaborative learning process within this activity. This is supported by the comparison between the times taken in the activity by the control groups and groups 1 and 2 (Table 4).

3. The flexibility of the framework in integrating technologies makes it applicable to other contexts easily and quickly, covering a wide range of cases of use and learning activities that can be developed.

Major results

Table 3 Results of the Student's *t*-test and a Levene's test performed to assess differences in means and variances between groups 1 and 2*

Variable	Group 1		Group 2		Group 1 vs. Group 2			
	Mean	Std dev	Mean	Std dev	*t*	*P*-value (2-tailed)	*F*	*P*-value
Phase 1								
Identification (t_i)	23:56	02:19	14:58	01:59	5.846	0.001	0.323	0.590
Consensus (t_c)	15:15	01:29	12:59	00:29	2.883	0.028	3.554	0.108
Discussion (t_d)	12:28	00:46	14:29	01:03	−3.084	0.022	0.285	0.612
Phase 2								
Identification (t_i)	10:29	00:27	08:49	00:57	3.125	0.020	0.575	0.477
Consensus (t_c)	13:06	00:49	11:13	00:35	3.697	0.010	0.477	3.697

* Time in min:sec format

Major results

Table 4 Results of the Student's *t*-test and a Levene's test performed to assess differences in means and variances of times between control groups and groups 1 and 2*

Variable	Group 1 + Group 2		Control group 1 vs. Group 1 + Group 2			
	Mean	Std dev	*t*	*P*-value (2-tailed)	*F*	*P*-value
Phase 1						
Identification (t_i)	19:27	05:11	−2.885	0.004	6.414	0.030
Discussion (t_d)	13:29	01:22	−10.375	0.001	0.047	0.833
Phase 2						
Identification (t_i)	09:39	01:08	−2.145	0.018	8.334	0.016
Consensus (t_c)	12:09	01:12	−7.710	0.001	2.391	0.153
Variable	Group 1 + Group 2		Control group 2 vs. Group 1 + Group 2			
	Mean	Std dev	*t*	*P*-value (2-tailed)	*F*	*P*-value
Phase 1						
Identification (t_i)	19:27	05:11	−8.362	0.001	5.862	0.036
Discussion (t_d)	13:29	01:22	−5.574	0.001	1.434	0.259
Phase 2						
Identification (t_i)	09:39	01:08	−5.029	0.001	0.727	0.414
Consensus (t_c)	12:09	01:12	−5.016	0.001	1.109	0.317

* Time in min:sec format

Conclusions

Compared with existing solutions, this framework shows several advantages that benefit the learning process:

1. CAFCLA lets teachers define multiple types of activities through different learning processes and techniques.

2. All these activities are designed to favor the social relationships of the participants, among themselves or with the machines integrated in the process (e.g., sensors).

3. CAFCLA allows a detailed and high granularity description of contextual information by means of real-time localization systems.

Conclusions

4. From the social point of view, the framework allows teachers to manage all the interactions that take place while the activity is being performed, so that the cooperation and participation of all the stakeholders involved in the activity is encouraged.

5. The flexibility of the framework brings added value compared to other solutions thanks to the integration of multiple technologies and communication systems, enabling the implementation of activities in any formal or informal environment.

6. Students reduce their learning time through the use of these kinds of activities, achieving a more effective and self-reported learning.