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Sharing contextual knowledge information via asynchronous distance learning:
Insights from a context-based research project in primary schools

Partage d'informations contextuelles via l'apprentissage à distance asynchrone : Aperçus d'un projet de recherche contextuel dans les écoles primaires

Compartiendo información de conocimiento contextual a través de aprendizaje a distancia asíncrono: Reflexiones desde punto de vista contextual en un proyecto de investigación en escuelas

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ABSTRACT

This paper expands on the effective implementation of collaboration platforms for research purposes in primary education settings. In our study, Edmodo has been introduced as a medium for facilitating the asynchronous discourse between learners of Guadeloupe and Quebec. The following analysis is based on the digital traces derived from the online activity of users working on two different disciplinary research projects: one in linguistics and one in education for sustainable development (ESD). In essence, this paper covers the procedure of introducing a collaborative tool for educational purposes to an audience with diverse expertise in understanding and using it. In addition, it provides a conceptual analysis for understanding the online messages exchanged during these context-related interactions.

Keywords: Edmodo, asynchronous communication, distance learning, context-based exchanges, primary school

RÉSUMÉ

Cet article présente l'implantation de plateformes de collaboration à des fins de recherche dans les établissements d'enseignement primaire. Dans notre étude, Edmodo a été introduit comme média pour faciliter les discours asynchrones entre des apprenants de la Guadeloupe et du Québec. L'analyse suivante est basée sur les traces numériques issues d'une activité en ligne entre des apprenants travaillant sur deux projets de recherche de deux disciplines différentes : l'un en linguistique et l'autre en éducation pour le développement durable (EDD). Cet article traite essentiellement de la procédure d'introduction d'un outil de collaboration à des fins éducatives à un public possédant des compétences diverses en matière de compréhension et d'utilisation. En outre, il fournit une analyse conceptuelle pour comprendre le contenu des messages échangés en ligne au cours de ces interactions liées au contexte.

Mots-clés : Edmodo, communication asynchrone, apprentissage à distance, échanges contextuels, école primaire

RESUMEN

Este trabajo de investigación profundiza en la implementación efectiva de plataformas colaborativas para la investigación enfocadas a la educación primaria. En nuestro estudio se presenta a Edmodo como un medio para facilitar un diálogo asíncrono entre los alumnos de la Isla Guadalupe y la provincia de Quebec. La análisis presentada está basada en los vestigios digitales derivados de las actividades en línea de usuarios trabajando per dos proyectos de investigación de disciplinas distintas: una de ellas en lingüística y la otra en educación para el desarrollo sustentable (ESD por sus siglas en inglés). En esencia, esta investigación comprende el proceso de presentar una herramienta colaborativa para propósitos educativos a una audiencia con distintos niveles de comprensión y experiencia en su uso. Del mismo modo, provee un análisis conceptual para la comprensión de los mensajes en línea que fueron intercambiados durante estas interacciones las cuales están relacionadas según su contexto.

Palabras clave: Edmodo, comunicación asíncrona, aprendizaje a distancia, intercambios basados en el contexto, escuelas primarias

Introduction

Nowadays, information and communication technologies (ICTs) provide teaching and learning communities with numerous opportunities regarding the development of peer relationships and the facilitation of social interactions between them. In order to design innovative uses of ICT-based tools for educational purposes, the determinant of human collaboration should be taken into consideration at every opportunity (Lawson, 2004). Innovation in socio-cultural contexts, seen as the process of developing, transforming and transferring knowledge, requires building social networks between groups of people to foster conceptual change (Adam & Westlund, 2013). Shifting to the 21st-century society, a knowledge society based in science and technology, a set of key competencies has been identified as compelling and essential to be developed in every young learner (P21 foundation, 2007). In innovative learning environments, these competencies are usually referred as 21st century skills - 4 Cs, including creativity, critical thinking, collaboration and communication as core concepts. In the sense of delivering teaching and learning materials which can encourage children to develop these competencies, computer-based environments offer great perspectives. Drawing upon computer-mediated communication (CMC), the design of distance learning situations is evolving, showing strong potential for advancements both in human-human interaction (HHI) and human-computer interaction (HCI) research fields. Versatile communication tools, synchronous and asynchronous, are being used to support the connection and the social networking of children in primary school. As Harasim (1989) stated, interactivity between participants in virtual environments consists of a stimulating process which alters the nature of learning and contributes to its quality. As defined by Roschelle & Teasley (1995) and Dillenbourg (1999), collaborative learning supports mutual engagement of learners in a joint effort to construct knowledge and solve problems together.

Project details

This paper is a part of a wider research project aiming the validation of a context-based teaching approach between learners in Guadeloupe (French West Indies) and Quebec (Canada). Diverse teaching experimentations have been organized across schools in Guadeloupe and Quebec, having as basic elements the incorporation of contextualized elements in humanities and science learning (socio-history, geothermal science, linguistics and sustainable development). It involves testing and implementing a pedagogical innovation in learning science by the confrontation of external environmental contexts in distance (in our case between students in Guadeloupe and Quebec) within the study of the same scientific object of study, for example production of geothermal energy, folktales and more. In short, context effects are pedagogical events which occur when there is a “clash” between students’ conceptions, coming from distinct cultural environmental contexts when a common topic is being studied. These effects can happen during communications between individuals and they are observable when learners realize the existing differences in their conception of a same object. These effects can lead to the construction of richer and more complete conceptions of a given subject (Forissier, Bourdeau & Psyché, 2018). The identification of differences in the object of study between the two contexts provides the opportunity to create collaborative scenarios aiming at producing these context effects. The model applied is called CLASH model and the methodology used is founded on Design Based Research (DBR). To predict the potential emergence of context effects, a computer artifact was designed to parameterize contexts and calculate their differences. The ultimate aim of this artifact is to provide input needed for the effective design of learning scenarios based on the context effects. Furthermore, connectivism, a learning theory in the digital era, emphasizes the importance of context in the process of knowledge construction within and

across networks (Siemens, 2004), taking advantages of online distance tools (Depover, 2014). Seeking out ways to facilitate and strengthen the communication between the participants of our experimentations who work in distance, there are two-way communication channels used: one in real time (synchronous) and the other with a time lag (asynchronous). In our case, the tool selected for this asynchronous communication is Edmodo, a social networking platform used in primary education.

Area of focus

During the first year of this project, four experimentations have been realized. Two of them involved students and teaching staff in elementary schools. For the current study, data extracted and used are from two experimentations whose field of study was [1] Education for sustainable development (ESD) and [2] Linguistics. Each experimentation has an approximate duration of two months, kicked-off with a 2-hour opening icebreaker and introductory session. Then, it was followed by group or sub-group discussions respectively (see Table 1). A sub-group was in average formed with 3-4 participants.

Table 1

Overview and details of experimentations

Field of study	[1] Education for sustainable development	[2] Linguistics
Object of study	Sugar/sweeteners a) Sugarcane b) maple	Storytelling a) West indian folk-tales b) Québec folk-tales
Subgroups themes	a) History b) Biology c) Agriculture d) Agro-transformation e) Health f) Sustainable development	a) Narrative schema b) Characters c) Places & space d) Words & expressions e) Cultural reference
No. participants	23 (Guadeloupe), 26 (Québec)	20 (Guadeloupe), 17 (Québec)
Period	February - April 2018	April - May 2018

Theoretical framework

Collaborative learning in virtual communities

The uses of social learning platforms such as Edmodo can nourish online learning experiences and communication between classrooms in different parts of the world. Social constructivism, as an important theory of knowledge developed by Vygotsky (1978), highlights the importance of one's learning process in accordance with its cultural and social context. The immersion of the learner into the knowledge community is predominant in Vygotsky's theory. The Community of Inquiry (CoI) model (Garrison, Anderson & Archer, 1999) draws on the important elements in online learning communities from a social constructivism perspective. According to this model, learning in a community, a group of individuals, can be supported and enhanced when three interdependent elements are combined: social, cognitive and teaching

presence. This framework was further developed, analyzed and validated by providing categories and indicators that could facilitate the interpretation of these model elements and the discourse analysis and coding if needed (Garrison & Anderson, 2003; Garrison & Arbaugh, 2007; Swan *et al*., 2008; Swan, Garisson & Richardson, 2009). Furthermore, past research (Marimuthu, Shun Chone, Teck Heng, Foo Terng & Ann Nah, 2015) suggests Edmodo as a tool that can bring positive change on effective advocacy and collaboration approaches between young learners, underlying the inclusion of the three components of the CoI framework. Among others, student learning is maximized when participants work in small groups rather than individually and over an extended period of 2-3 weeks rather then over one session (Herrington, 1997).

Collaborative learning in a computer-supported environment

Computer mediated communication (CMC) is described as a human interactive activity facilitated using networked computers, in a synchronous way -in a real time manner- or in an asynchronous way -with a time lag. Synchronous communication enables a real-time discourse and instant feedback, while asynchronous communication does not require an immediate response among participants. CMC involves the exchange of text, audio and video exchanges in one-to-one, two-way or many-to-many communication. Along the following lines, a special focus put on asynchronous communication, as the prime tool analyzed in this paper, Edmodo, is an asynchronous support channel. Asynchronous learning environments, such as discussions forums, are considered extremely flexible as they provide learners the opportunity to take time, reflect upon a subject and share their reactions with others. One has the possibility to deal with the information overload, to process information and take decisions concerning its learning process. It is expressed that in a situation where learners self-regulate and organize their way of learning, it can result in having a great level of autonomy, hence a high cognitive engagement (Corno & Mandinach, 1983). Yet, asynchronous online discussions require more time to formulate ideas, to put them in words, or even reach consensus with the other participants (Wang & Woo, 2007). Individuals can choose the moment of their participation in an asynchronous activity, regardless of time and space. Likewise, a learner can place its learning needs at the centre of the use of an asynchronous platform and adapt it according to them.

Participants' collaboration mode in synchronous and asynchronous online discussions depends on many factors that can affect their inter- and intra- personal communication and organizational functioning. The introduction, the use and the acceptance of technological tools and resources from users can be described by the Davis' technology acceptance model - TAC (Davis, Bagozzi & Warshaw, 1989). Perceived usefulness and ease-to-use are seen as the prime characteristics of intending to use technology, like a computer-supported environment. Even though social dialogue and group interactivity are in prominent position in CMC communications (Henri, 1992), the perceptions of children and teachers (users in our case) towards technology can alter learner-learner, learner-instructor and learner-content interactions – three types of interactions identified by Moore (1989).

Methodology & Analysis

Participants

The participants were children aged between 10 and 12 years old, most of them being students in the final year of the elementary school. As shown in Table 1, the experimentation in "Education for sustainable development" enrolled 23 participants from Guadeloupe and 26 from Quebec. For the experimentation in "Linguistics", 20 participants were from Guadeloupe and 17 were from Quebec. As mentioned before, participants were divided into smaller groups of 3 to 4 individuals.

Data Analysis

MERGING LEARNING AND RESEARCH IN CLASSROOM

Firstly, this paper discusses the multi-step process of introducing a collaborative digital tool in learners -with little to no experience in using it- in order to retrieve efficiently some research data. An introductory presentation was designed for introducing Edmodo as an asynchronous medium for communication between participants aged 10-12 years old in Guadeloupe and in Quebec. The aim of this presentation was the demonstration of the two principal channels of communication between the participants: ZOOM (synchronous) and Edmodo (asynchronous). Demonstrations were given by the research assistants (for the experimentation in “Education for sustainable development”) and by the research assistant and the teacher (for the experimentation in “Linguistics”). The synchronous communication takes place in the presence of student teachers and the research staff as the sessions are being filmed. Therefore, a special focus during this introductory presentation was put on the use of the asynchronous tool. At present, the efficiency and the richness of the exchanges between participants depends on many additional elements rather than the motivation and the engagement of participants. Three targeted challenges influence the interactions between the participants: a) the level of expertise of children and teachers, b) technological resources available for use in every school, c) internet connection in classrooms. Support tools (presentation) and time for practice using tablets were used during this session in order to leverage the situation and provide the opportunity for students to practice together using Edmodo. In addition, it is vital for time efficiency and effectiveness in use that the research team organizes in advance the virtual environment where they will work. Figure 1 shows an example of a rudimentary organization of this digital platform, so it will be ready to use. Edmodo is a platform for educational purposes that was modeled after social networks. Via this web tool, it is possible to share files, links and assignments and to participate in the discussion forums, among other features. Its interface is quite similar to Facebook.

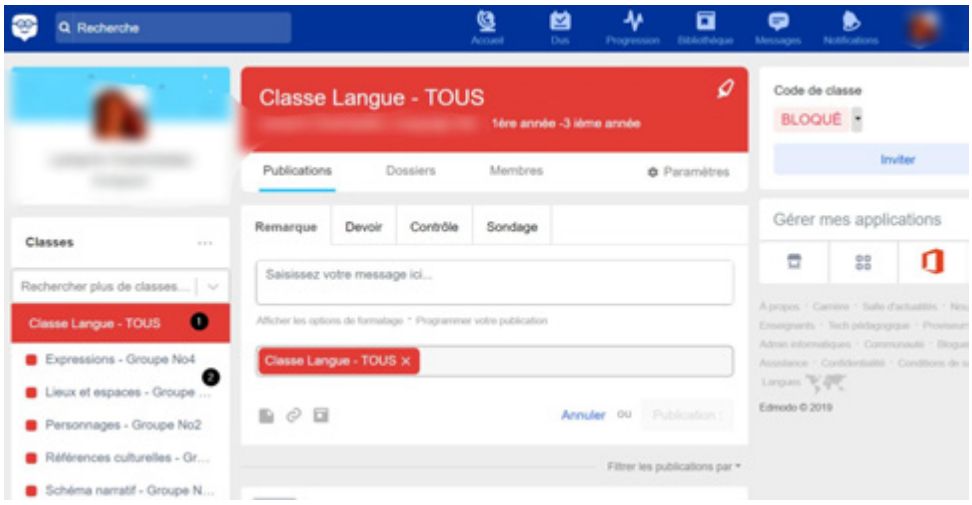

Figure 1. Overview of Edmodo in experimentation “Linguistics”, 2019

For each experimentation we have created a “class” called after the name of the experimentation [1]. As the participants were divided into smaller working groups, for every sub-group of each area (Guadeloupe, Quebec) we have created a pseudo-profile. In each “group” in Edmodo (subpart part of the “class”) [2], team-mirrors were added according to the sub-group that they participate in. For example, the working sub-group “Characters” of Quebec was a member of the class “Linguistics” and it was able to communicate

with all participants from Guadeloupe and Quebec. Simultaneously, the same group was a member of the class “Characters” and it was able to communicate as well with the sub-group “Characters” of Guadeloupe. In every class/group, teachers and the research staff were also members having the role of “teacher” in Edmodo. It is worth mentioning that students were using tablets all along these experimentations.

DIGITAL INTERACTION IN CONTEXT-BASED CONVERSATIONS

Exploring the role of interaction between participants of diverse cultural and social contexts and context-based information retrieval within their online exchanges are particularly in our interests. For the purpose of this paper, different methodological approaches related to content analysis have been looked upon (e.g. Bales, 1950; Chou, 2002; Erlin, Yusof & Rahman, 2008; Henri, 1992). We finally decided to use and re-adapt the coding scheme framework for online discussions proposed by Vuopala, Hyvönen, and Järvelä (2015). According to Vuopala *et al*., three interaction categories concern the exchange of messages (messages notes, media shared): task-related, group-related and off-task topics.

Table 2

Types of interactions in context-based scientific learning situations

Main category	Subcategory	According to Vuopala et al. (2015)	Coding rule adapted
Task-related interaction	New knowledge	Theory-based Experience-based Statement	Providing context-related information
		New question	Bringing a new question/topic related to the subgroup theme
	Question	Clarifying question Suggestion	Clarifying an aspect of the scientific object of study
Group-related interaction	Answer or comment	Declaratory comment Comment with explanation	Scheduling upcoming group work
	Coordination of group activities	Organizing ongoing activities Organizing upcoming activities	Reminding work to deliver
	Socio-emotional expressions	Evaluating group work Technological issues	Providing cultural artifacts for better comprehension
		Expressing cohesion Decreasing tension	Providing feedback on experience
		Laughing, joking Accompanying	
Off-task interaction			Team introduction Testing the platform Social interest questions

To illustrate the proposed framework, we provide some examples of data (digital traces) retrieved from the online exchanges between learners in Guadeloupe and in Quebec (Appendix A, B and C).

Results & Discussion

In this article, we presented our vision for including the social learning platform Edmodo in research studies involving children of primary school age. By demonstrating the implementation of Edmodo in two case studies, we identified some benefits and limitations of its practical use, especially when a research team introduces a collaboration tool to monitor and to evaluate communication between participants.

Benefits: Asynchronous communication tools such as Edmodo provide a secure digital environment for young participants to contribute at their own pace to the discussion, with no time constraints. Individually or in small groups, it seems that the incorporation of educational social networks can enhance the communication of participants outside the planned video conferencing sessions. We need to highlight that learners in both experimentations used Edmodo, even though most of them had no prior knowledge of it. During the “Linguistics” experimentation, teachers from both contexts exchanged messages through this platform, thus Edmodo was perceived as a two-way channel of communication and engagement. Furthermore, in the “Linguistics” experimentation, participants used the global group and the sub-groups, while in the “ESD” experimentation the learners used the sub-groups’ virtual settings. This observation reveals that different levels of learners’ enthusiasm showed different communication behaviors when using the same online tool. Additionally, it is important to note that context-information is better conveyed when media file formats (photos, videos) are attached.

Limitations: In order to get tangible results when proposing Edmodo as an asynchronous tool for research purposes, it is essential to provide options concerning the technical skills required from participants and teaching staff (via trainings and constant support from the research team), as well as to resolve problems related to technical issues (internet connection, digital resources at school) as much as possible. In addition, asynchronous communication is a one-way communication. That means that the participants do not have instant feedback. Their online conversations via Edmodo become extremely time-consuming. Therefore, several posts did not have direct reactive responses.

Based on the exchanges retrieved, we have encountered some elements that helped us further develop the existing framework of Vuopala *et al*. (2015) on online content and messaging. Referring to this work and emerging from our analysis, this article releases a revised framework for describing contextual information shared in a virtual collaborative environment. In our study, we observed that in one case participants exchanged mostly task-related messages (ESD experimentation) and in the other one, mostly group-related messages (Linguistics experimentation).

In conclusion, this article outlines some elements of the online behaviors of students in primary school when documenting their work, sharing useful materials and resources concerning a given object of study and creating better social links with their peers. Normally Edmodo has been used as a tool, which facilitates the communication between the instructor and the learner or group of learners. However, in our case, it is notable that participants were able to manage their learning given that they have access to tablets with internet connectivity. From this standpoint, initiatives like these can provide clearer perceptions on children’s preferences when using information and communication technology and can advise on how to design and implement effectively any digital interfaces for them.

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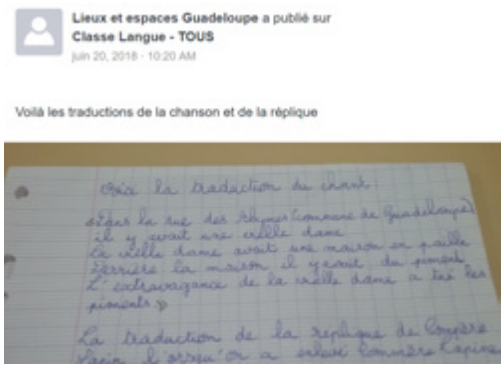
Appendices

APPENDIX A

Types of Task-Related Interaction

	“Hello what is the color of the maple leaf?”
	“We make the maple water during winter”
	“Hello how are you? We read the rest of the text you sent us and we appreciate it. Our class propose a continuation, the end of the story and as a title: An incredible adventure in the forest. What do you think?”

	"Here are the translations of the song and of the replica"

APPENDIX B

Group-related Interaction Examples

	Information: The gwoka is a musical genre originally from Guadeloupe. It was mentioned during the exchanges between the participants in the experimentation in Linguistics.
	"Hello how are you? We have not heard from you since May 24th. Have you advanced on the second part of the story?"

APPENDIX C

Off-Task Interaction Examples

	"Hello. We don't hear from you anymore. We send you a photo of a rhyme"
	"Hello. We are happy to do this project with you. We are Jacob, Nathaniel et Sara-Maude. Here, the snow starts to melt."
	"Good morning, how are you? We, we are doing great. We really liked this project with you because we have discovered new things in our folktale and in yours, we also discovered things about you and your country. We really appreciated all passed moments together, those shares, those exchanges."