Exploring Hashtags Collaboratively to Facilitate Learning and Knowledge Construction

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Exploring hashtags Collaboratively to Facilitate Learning and Knowledge Construction

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***Abstract*—In the era of mobile learning and digital native students, concepts like seamless learning, situated learning and rhizomatic learning gain importance as the current technology is able to support them by developing new kinds of applications for mobile devices. At the same time, social network platforms like Twitter are also being studied as a way to boost communication supporting collaborative knowledge construction since they are available everywhere and students are familiar with their use. This paper highlights an experience in which a mobile application called *FeedbackApp* was developed and used for these purposes. The main characteristic of this application is that it uses various ways to explore the information generated while searching and sharing information and discussing the learning topics, using concept maps, geographical maps and text lists. A preliminary experience shows that this application might encourage students to be more participative in discussions and exchange of ideas.**

Collaborative Learning, Knowledge Construction, hashtags, Twitter.

I. INTRODUCTION

According to [1], knowledge construction is the process of meaning-making by receiving and processing new information in the process of interacting with teachers, peers, and/or the environment, which is interpreted uniquely based on the existing knowledge of the learner. Knowledge construction is rooted in both social cognitivist and constructivist theory. Social cognitivist theory indicates that learners acquire knowledge and skills that they attain from the external contexts. They then internalize them within their own minds through schema construction, as for instance by the use of concept maps [2]. Constructivism theorists consider learning to be the active process of making meaning from on-going experiences and interactions by applying one's personal, historical understanding to the current experience [3]. Both theories require the learners to operate at a higher cognitive level, making them responsibility for arriving at a self-chosen cognitive position, which they consider acceptable based on their own, and others' interpretations. In recent years, research has moved away from individualistic perspective making collaborative knowledge construction an area of principal interest for educational researchers due to the rapid emergence of collaborative platforms and social networking applications that provide mechanisms to facilitate interactions among the digital native learners [3, 4].

Considering the current popularity of Twitter, that includes communication and interaction features for capturing, storing, exploring and processing content, jointly with other technologies like geo-referencing and concept maps, we want to take advantage of these mechanisms and interaction patterns to generate meaningful experiences in order to support collaborative knowledge construction based on the mentioned theories. Few works propose models based on knowledge construction, which use the collective exploration of hashtags in Twitter, together with geo-referencing, using conceptual maps in order to integrate learning activities inside the classroom [5, 6]. Based on our past experience from previous projects, we consider it possible to support knowledge construction via the following technologies. a) *Mobile computing (Smartphones, Tablets),* which allows for use of Twitter anywhere and anytime, considering that it is the basis for situated and seamless learning. b) *Geo-referencing* that introduces the location and environment dimension through the location information associated with the knowledge being created, which is a condition for situated learning. c) *Conceptual maps* as a way to organize the information, which in this work will be used as the basis of a construction schema, and it is a requirement for rhizomatic learning [13].

Therefore, the purpose of the study is to learn how collaborative knowledge construction takes place, in the context of students exploring hashtags from Twitter messages, using geo-referencing and concept maps in a microblogging-based learning scenario. This will allow us to understand learner interaction during the knowledge construction process in such circumstances. In order to perform this study, a web-based application using Twitter has been developed (called *FeedbackApp* hereinafter), based on learning and collaborative knowledge construction theories. This application provides views for facilitating the access, creation, validation and distribution of the learners' knowledge, thus promoting learning on various topics of interest for the user. The above can be adjusted to the user context (co-located or remote, synchronous or asynchronous) to where this knowledge is acquired or used, supported by mobile technologies (Smartphones, Tablets), or desktop computers. We performed a three-week exploratory study using case-study research design in a hybrid learning scenario with both face-to-face and online environments. We collected 109 chat messages produced by twelve students participating in a hashtag-exploring activity using Twitter. The learning interactions among students were coded according to their content within their contextual setting and a modified version of a conceptual model of learner interaction in knowledge construction.

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II. TWITTER AS A PLATFORM TO SUPPORT LEARNING

Twitter is a lightweight online application that allows its users to publish short messages and share them with people worldwide on the web. It has been used as a tool integrated into both individual and collaborative learning environments for knowledge construction, [5-7]. The instant and participatory communication implemented by Twitter provides considerable opportunities which teachers can integrate to meet the diverse needs of learners in both formal and informal contexts, [5, 6]. Tang and Hew [5], summarized six ways of using Twitter in education. For this work, we specifically consider one of them, consisting in exploring, sharing and communicating hashtags for educative purposes. According to [5, 8], it is unclear how students construct knowledge when they explore hashtags of Twitter with the support of a collaborative application. Therefore, there is a gap of research in this area in order to examine and understand the process of knowledge construction by evaluating and measuring interactions in which learners are engaged. These results can be used to better design learning applications using Twitter.

III. LEARNING AND KNOWNLEDGE CONSTRUCTION

Learning is a process that leads to change, which occurs as a result of experience and increases the potential for improved performance and future learning [9]. Moreover, learning is omnipresent in our daily activities, as it does not necessarily depend on instructors, books, self-study programs, or coaching [10]. There are several theories that aim to understand how people learn and which strategies can be used to enhance knowledge construction; we adopt seamless learning, situated learning, and rhizomatic learning as basic theories for our study. ***Seamless learning*** refers to activities which engage learners in continuous individual or collaborative learning experiences across different contexts, [11]; i.e., it enables learners to learn wherever and whenever they feel a curiosity for something and seamlessly switch between different contexts. ***Situated learning*** posits that meaningful learning will only take place if it is embedded in the social and localized context within which it will be used [12]. Finally, seen as a model for the knowledge construction, ***rhizomatic learning*** is about the interconnectedness of ideas as well as boundless exploration across many fronts from various starting points, where the learning experience may build on social and conversational processes, as well as tacit and internal knowledge creation linked to many self-personal or external points of view. [13].

Lou and Clifton [8] found that early researchers developed and adopted a social constructivist approach for conceptual models, which served as a guide to examine learner interactions at various stages of knowledge construction. Based on the analysis done in [8], we adopt an extended conceptual model with eleven categories for coding types of learners interaction proposed by [7, 14]:

(1) Self-reflection; learners reflect on and interpret what they have.
(2) Elaboration/clarification; learners build upon an existing comment by adding supporting examples and justification.
(3) Alternative/ complementary proposal; learners offer a complementary or alternative view.
(4) Internalization/appropriation; learners paraphrase the concepts/ideas presented by their peers or acknowledge learning something new.
(5) Conflict/disagreement; show disagreement or conflicting opinions.
(6) Support; learners express their agreement without further explanation, establish rapport, or share feelings.
(7) Off task; irrelevant tweets, not focusing on the course content.
(8) Resources sharing; share information related with the task content.
(9) Seamless learning; students learn across different contexts.
(10) Situated learning; learning take place in a specific geo-referenced context.
(11) Rhizomatic Learning; interconnectedness of ideas as well as boundless exploration.

Categories 7 and 8 were extended by [8], and also adopted by us, because we consider the coding of tweets and their relevance of high importance for our study. Categories 9 to 11 are related to learner interactions that support the learning types already explained in this section.

IV. METHOD

A. Participants

We used a case study research design with twelve (8 females) students aged 22 to 25 from a core course at Information Technology program in a Chilean University. Nearly 75% of them self-identified as an intermediate or advanced technology user, and only 61% considered themselves regular Twitter users.

B. Instructional Context

The course activity started with an in-class task consisting of two face-to-face 80-minutes sessions in the first week allowing students to gain experience using Twitter and the *FeedbackApp*. We asked them to use *FeedbackApp* for the next two weeks in order to perform two activities. One was to explore tweets associated with hashtags related with technology, created in any place of the world (in Twitter, hashtag is a word used to join tweets on related topics, preceded by a pound sign "#"). The second one was to use the in-built chat to carry on discussions (synchronous or asynchronous) about the relevance of the hashtags found.

C. Data Collection and Analysis.

We collected and analyzed 109 contributions to discussions about technological hashtags found by the students published on the chat. Similar to what authors did in [8], we considered two coding schemes: one for an in-depth view of the interaction (utilizing Gao's coding scheme for types of interaction, [7]), and the second as a limited scope of the elements of knowledge construction which included utilizing dimensions, elements, and indicators of the Integrated Framework of [14]. To examine the process of knowledge construction produced by learner interaction, we coded students' messages comparing them with the modified Gao's [7] coding scheme, as shown in Table 1.

D. Description of FeedbackApp for exploring hashtags

Figure 1 shows the main interface of the *FeedbackApp* application where a user is working in a session called *Technology* shared with other 11 students. The exploration of the hashtags related to the topic *Technology* starts when the student selects the option of retrieving from Twitter messages associated with a certain hashtag after marking a geo-reference in any part of the world. The application retrieves from Twitter messages sending a request using Twitter services, which returns at most 100 messages, associated with a hashtag. Figure 1 shows three geo-referenced

points: one in the USA, one in Latin-America and one in Europe. The system shows the retrieved messages in a list displayed at the left hand side of the map. The hashtags are also shown as a conceptual map at the bottom of the screen. They appear linked to their messages with an arc. By traversing the conceptual map (rhizomatic learning), students can find and explore other messages related to other hashtags which may or may not be associated to the starting one (*Technology* in this case). Students explore the conceptual map collaboratively in a synchronous or asynchronous mode. They can also retrieve hashtags when being physically in the place they have geo-referenced (situated learning). At the right hand side the interface displays a chat tool for this session, where students can reference the tweets they found with the hashtags they are interested in.

FIGURE 1. Main interface of *FeedbackApp*.

V. Results and Conclusions

We develop a specific web-based application, called *FeedbackApp*, for exploring hashtags as a pedagogical activity in an undergraduate course of Information Technology. We also proposed a conceptual model of learner interaction for knowledge construction, that was extended from [8], with categories of messages for identify instances related to seamless, situated and rhizomatic learning.

We tested this application for three weeks in an undergraduate university course after which we got 109 useful microblogging-type messages from twelve students in the chat session option of the application. The distribution of the messages according to the eleven categories of learner interaction messages proposed in our conceptual model (see section III) is shown in Table 1. In this table, **A#** represents the number of messages to categories **C** numbered from 1 to 11, and **A%** their respective percentages for activity **A**. The same table shows also the results obtained and reported in [8], in which twenty-four students worked for 8 weeks. These are listed under the label **B.** We can see that results are comparable in numbers, however for the activity A the number of people was only 12 and the period of time they worked generating messages was also 4 weeks only. These numbers suggest that *FeedbackApp* might be an effective tool to support knowledge construction based on the Exchange of geo-referenced messages among students, using conceptual maps.

This initial research will be extended in order to use the same learning methodology with a higher number of students in order to get more conclusive information about the influence of using geo-referencing and conceptual maps in mobile scenarios as provided by the *FeedbackApp* application.

TABLE 1. Number of messages corresponding to the 11 categories of interaction among students.

A#	21	10	7	9	6	5	9	11	9	10	8
A%	20	9,5	6,7	8,6	5,7	4,8	8,6	10,4	8,6	9,5	7,6
B#	39	13	-	10	2	4	13	16	-	-	-
B%	36,1	12	-	9,1	1,8	3,7	12	14,8	-	-	-
C	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**

A# is the number of messages for the chat application in *FeedbackApp,* **A%** its percentage over a total of 109 generated messages. **B#** is the same number obtained by the sub-activity of learning by exploring hashtags reported by [8], and **B%** its percentage over a total of 105 messages. **C** are the categories.

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