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מאת

שלי רפ

אינטראקציות כימיות בפייסבוק

Chemical Interactions on Facebook

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Abstract

Social networks online, which are increasingly being used in recent years, allow users to form social connections and are platforms for advanced technological applications. The most prominent social network is Facebook, which is considered leading among teenagers nowadays and hence the importance in its introduction into education. Facebook allows active learning, interaction, shared learning and sharing of knowledge.

Chemistry is one of the most difficult subjects for learning. Chemistry learning usually includes theoretical, abstract terms that form the basis for understanding the science of chemistry represented by chemical symbols. The linking between the different levels of understanding makes learning of chemistry difficult without using advanced visualization tools and may cause it to be perceived by students as disconnected from the real world. The Facebook can be used as a fertile ground for the advancement of science learning because it makes accessible the updated and diverse information, as well as visualization tools, such as advanced simulations and graphics that are available on the platform.

The study presented in this thesis work is a result of combining the two insights described above. The overarching goal of this study was to examine if and when Facebook can be used as a platform for Chemistry teaching. For that purpose, the doctorate thesis focused on three pivotal dimensions necessary for an online community of inquiry. The first dimension focused on characterizing learning and exploring it through participation in the discourse arising through teaching and learning activities in the groups. In this part, the interactions that exists in the Facebook groups were examined and the learning existing in the groups was characterized using the Commognitive approach, as well as examining the three-phased discourse in the groups. The second dimension is the students. This dimension dealt with the issue of teaching in the Facebook platform from the students' point of view and explored their attitudes toward the integration of Facebook in their chemistry learning. As well as examining their needs for complimentary teaching. The third dimension is the teachers. This dimension dealt with their self-efficacy to teach chemistry on Facebook and how they used the technology to promote their teaching. In this context the unique TPACK for chemistry teaching on social networks was examined as well as how this knowledge evolved among the teachers throughout the study.

The study population included 16 chemistry teachers and their students, who were members of the Chemistry Learning Facebook Groups (CLFGs). The research focused on groups of students majoring in chemistry in the tenth to twelve class and included 707 students.

The CLFG was a complimentary platform to the learning in the classroom and participation in the groups was voluntary.

The research combines qualitative and quantitative tools. The quantitative tools were used to explore students' attitudes concerning the CLFGs and teachers' self-efficacy to teach through this platform. The qualitative tools assisted in validating the quantitative findings, as well as to understand the learning processes occurring in the different CLFGs. The quantitative tools in this research included an attitude and requirements questionnaire for the students, and self-efficacy questionnaire for the teachers. The qualitative tools included qualitative analysis of interaction and learning in the CLFGs. In addition, it included case study methodology that included two-years follow up of three teachers in order to learn more about teacher's development in regards to knowledge and self-efficacy in using Facebook for chemistry teaching.

The main findings of the study suggest that:

· The Chemistry Learning Facebook Group (CLFG) allow for diverse interactions among its members. The most common of which deals with Learning Management System (LMS). Also found were the following interactions: learning, links to learning materials, social, enrichment, call for discussion, and links to relevant websites.

· Learning interactions were found on the CLFG. Three main types of discourse were revealed: monolog, triadic dialogue, and commognitive conflict.

· Whenever a commognitive conflict exists it can be transformed into a learning event, i.e., a change to the discourse of the students.

· In most cases, the students are the initiators of learning interactions in the CLFGs.

· Students partaking in groups in which learning takes place perceive the learning interactions as beneficial and re-enforcers of their positive attitudes toward the CLFGs.

· Students in in groups in which learning takes place report more positive attitudes toward the presence of formal learning in the CLFGs.

· Students are interested in the presence of their teacher as long as this is not the sole mean of communication between them. Students are interested in formal activities in their classroom (such as assignments), as well as maintaining of borders, and request that the teacher behave as a teacher (not as a friend) online as well.

· Self efficacy of teachers regarding working with Facebook and learning on CLFGs were measured with a questionnaire developed and validated specifically for this study. The self-efficacy of teachers was assessed also through interviews held with them with similar trends to support the high reliability of the questionnaire.

·   Three case studies presented in this work provide evidences for the professional development process of teachers when using social networks with their students. Teachers preserve their attitudes toward learning and learn through time how to utilize the new media to promote learning (as they perceive it).

·   The teachers developed a TPACK unique for chemistry teachers – learning through social networks and linking to visual explanations of abstract chemistry ideas.

In this study, for the first time, a characterization of learning in social networks, specifically in the CLFGs, was performed. This study highlights the term TPACK from the point of view of chemistry teachers in the context of social networks. It was found that prior to the research, teachers held a certain position about "what is chemistry learning" and what is the ultimate way to achieve it. Throughout the study it was observable that teachers did not change their perception of learning, however they tried exploring how they can promote their students' learning using a technological tool, i.e., the advantages and tools of social media that can help promote chemistry learning. As part of the accessibility to simulations, clips, and apps, it was possible to upload links to these tools in an intuitive manner while providing demonstrational discourse and an explanation to an abstract issue. In addition, it was found that personal experience if the teacher holds great influence over their self-efficacy perception. Only after the teachers new the task, i.e. opened their Facebook groups with their students and performed learning interactions within it, did their self-efficacy reflect a more realistic self-efficacy and influenced their performances. As far as the factor of circumventing experience that influence teacher's self-efficacy, it was found that sharing personal experience with using CLFGs with other teachers contributed to individual self-efficacy. Through virtual meetings, the teachers could learn from successful experience of other teachers and envision themselves react to described situations (vicarious experience).

The learning discourse in the CLFG is different than that taking place in the traditional classroom. It is a testament to the fact that on social networks student sfeel more comfortable to ask questions, they know they will receive response from peers or the teacher. They see themselves as equals in one group and look for their peer help on the social network. Another main aspect, which makes Facebook an attractive tool for learning discourse for students, is the rapid feedback, immediate communication and interaction it provides. In this study, for the first time a transition to application of the theory was done, at least for the chemistry discipline. In chemistry teaching, the understanding of chemistry is linked with the language of chemists. The encounter with the new language and its symbols is accompanied with the creation of

Commognitive conflicts between the student's level of discourse and the scientific discourse. These Commognitive conflicts (Sfard, 2007b) create opportunities for changes in the discourse of the students, which is the transition to the scientific usage of chemists' language – and the transition to the usage of chemists' language constitutes chemistry learning. Recommendations for implementation of the study's insights to the field of teaching are discussed.