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USEFUL APPS: A TEACHING PROCESS - LEARNING APPLIED TO THE DAILY NEEDS

APLICATIVOS ÚTEIS: UM PROCESSO DE ENSINO - APRENDIZAGEM APLICADO ÀS NECESSIDADES DO COTIDIANO

APLICACIONES ÚTILES: UN PROCEDIMIENTO DE ENSEÑANZA - APRENDIZAJE APLICADO A LAS NECESIDADES DEL COTIDIANO

Adriana da Silva Jacinto[1]
Alice Nardoni Marteli[2]
João Gabriel Dias Pires[3]
Jaqueline da Silva Jacinto[4]

ABSTRACT: The outcome of Education should be efficient, effective and meaningful learning. However, in the 21st century, it is well known that there are many difficulties in teaching and learning. New computational technologies are pointed out as a factor that can bring benefits to the teaching and learning process, since they should support new pedagogical strategies. So, the problem lies in how to develop and apply new pedagogical strategies to make student aware about his responsibility for his own teaching-learning process. This article proposes a teaching-learning process that unites the use of smartphones, application programming and critical reasoning about problems that the student sees in his daily life. This process was applied to undergraduate students of the Database Technology course. Among the obtained results, there was the development of a collaborative application to help manage the risks of hydro - meteorological environmental disasters. This app is intended to alert responsible agencies to they can take preventive attitudes to evacuate areas at risk, more quickly than commonly used. This and other results indicate the validity of the proposal.

KEYWORDS: Education. Computation. Reality. Daily needs.

RESUMO: O produto do ensino deveria ser a aprendizagem efetiva, eficaz e significativa. No entanto, em pleno século XXI, é notório que existem as mais variadas dificuldades de ensino e de aprendizagem. As novas tecnologias computacionais têm sido apontadas como um fator que pode trazer benefícios ao processo de ensino e aprendizagem, contudo é preciso que elas sirvam de suporte a novas estratégias pedagógicas. O problema reside, então, em como desenvolver e aplicar novas estratégias pedagógicas, de forma que o aluno se sinta comprometido com o seu processo de ensino-aprendizagem. Este artigo propõe um processo de ensino-aprendizagem que une o uso de *smartphones*, programação de aplicativos e raciocínio crítico sobre os problemas que o aluno vislumbra em seu cotidiano. Tal processo foi aplicado a alunos de graduação do curso de Tecnologia em Banco de Dados. Dentre os resultados obtidos, houve o desenvolvimento de um aplicativo colaborativo para auxiliar o gerenciamento de riscos de desastres ambientais de cunho hidro meteorológico. Esse aplicativo tem por intuito alertar órgãos responsáveis para que possam tomar medidas preventivas para a evacuação de áreas de risco, de modo mais rápido que o comumente usado.

PALAVRAS-CHAVE: Educação. Computação. Realidade. Cotidiano.

RESUMEN: El producto de la enseñanza debería ser el aprendizaje efectivo, eficaz y significativo. Sin embargo, en pleno siglo XXI, es notorio que existen las más variadas dificultades de enseñanza y de aprendizaje. Las

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nuevas tecnologías computacionales se han apuntado como un factor que puede traer beneficios al proceso de enseñanza y aprendizaje, pero es necesario que sirven de soporte a nuevas estrategias pedagógicas. El problema reside entonces en cómo desarrollar y aplicar nuevas estrategias pedagógicas, de forma que el alumno se sienta comprometido con su proceso de enseñanza-aprendizaje. Este artículo propone un proceso de enseñanza-aprendizaje que une el uso de *smartphones*, programación de aplicaciones y raciocinio crítico sobre los problemas que el alumno vislumbra en su cotidiano. Este proceso fue aplicado a alumnos de graduación del curso de Tecnología en base de datos. Entre los resultados obtenidos, hubo el desarrollo de una aplicación colaborativa para auxiliar la gestión de riesgos de desastres ambientales de cuño hidrometeorológico. Esta aplicación tiene por objeto alertar a los órganos responsables de que puedan tomar medidas preventivas para la evacuación de áreas de riesgo, de manera más rápida que la comúnmente utilizada. Este y otros resultados obtenidos indican la validez de la propuesta.

PALABRAS CLAVE: Educación. Computación. Realidad. Diario

INTRODUCTION: THE TEACHING-LEARNING PROCESS IN THE 21ST CENTURY

The product of education should be efficient, effective and meaningful learning. Efficient learning means students learned what someone or some situation has taught. Regarding the effective apprenticeship, students would be able to apply the learned concepts in problem solving. Finally, learning would be meaningful if the student learned the basics of a topic of knowledge, appropriating them permanently. More specifically, the product of undergraduate should be an individual who demonstrates innovative, entrepreneurial, creative, efficient and competitive performance (PENSIN, 2018).

However, in the twenty-first century, it is notorious that there are still a variety of teaching and learning difficulties, a situation illustrated by the high drop-out rate that occurs on undergraduate programs. In Brazil, despite the public politics implemented by the State, to expand and facilitate access to undergraduate programs, which has been occurring, more than half of the incoming students do not complete their course (LIMA; ZAGO, 2018).

There are several articles (JORGE *et al.*, 2016; LIMA; ZAGO, 2018; NETO *et al.*, 2015; SALES; LEAL, 2018; SILVA, 2016), which deal with this issue, i.e., about the teaching and learning difficulties, sometimes investigating their causes, sometimes proposing alternative solutions to the problem. Among studied causes, one of them would be the weakening of the bond or relationship that the student maintains with the educational institution, something that can be aggravated by the non-incorporation of computational technologies in the school curriculum (SALES; LEAL, 2018). This statement is based on the observation that contemporary learners are more likely to be distracted in traditional and expository classes (FRAGELLI, 2017).

In general, the use of computers, smartphones, Internet and other computational technologies are pointed out as a factor that can bring benefits to teaching-learning process (NOGARO;

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
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CERUTTI, 2016; SALES; LEAL, 2018). According to a newspaper, professor Mário Sérgio Cortella, one of highlights in Education, agrees with this idea. Cortella says (REIS, 2014):

> It is necessary to incorporate what they already do. The previous generation, composed by those already have more than thirty years old, only communicated themselves by telephone. Children and teenagers from the current generation have returned to writing - on Facebook, on Twitter, on WhatsApp, on blogs. School must take advantage from this production. (REIS, 2014, p. 1).

Although, teachers are not always ready to use these tools adequately, i.e., to support new pedagogical strategies (FERREIRA; FREITAS; MOREIRA, 2018; MARIM; FREITAS, SANTOS, 2014; NOGARO; CERUTTI, 2016). More incisively, there are also reports from professors who classify computational technologies as threatening because they are bothered by the fact that learners are always watching on their smartphones during classes (SALES; LEAL, 2018). Such discomfort mixes with the question of who holds the knowledge. A teacher is no longer the only source of knowledge and information, as students can access websites during classes and get any information they want.

Taking into consideration the use more intense of computational technologies and the discomfort of several teachers in relation to them, there is a disparity. To address this situation, several modifications in education curricula are necessary, making it composed by analogical and computational practices (SALES; LEAL, 2018).

In other words, it is necessary to change the situation where teachers need to tell learners to "leave out smartphones, because the class are going to start." The ideal scenario would be one in which students feel encouraged to solve issues related to their daily lives. To overcome the proposed challenges, concepts would be learned, and tools would be used, including computational technologies such as smartphones.

To obtain this ideal scenario is not a trivial thing, for it constitutes itself a rupture of paradigm, in which traditional curricular practices are based on silence, maximum concentration, accomplishment of one task at a time (SALES; LEAL, 2018) and on transmission and memorization of information (ARAÚJO; BELIAN, 2018). In addition, it must take care that computational technologies are not used merely to support pedagogical practices conducted and focused on the transmission of knowledge. (FERREIRA; FREITAS; MOREIRA, 2018).

However, although there are contingencies such as lack of time, lack of specific training or resources, most professors and teachers show strong commitment to the teaching-learning process (FERREIRA; FREITAS; MOREIRA, 2018). They want their learners to become main and proactive actors in acquiring the necessary professional skills (ARAÚJO; BELIAN, 2018; FERREIRA; FREITAS; MOREIRA, 2018).

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
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Regarding the described ideal scenario and the difficulty to obtain it, this article describes a proposal of teaching - learning process that contemplates the search for solutions to quotidian problems and the use of computational technologies, applying active methodologies. This proposal was applied to undergraduate students of the Database Technology course and, among the several obtained results and generated apps, a solution called Urban Flooding App was developed. This app is intended to alert society about the environmental catastrophes, as well as being able to assist in the implementation of public policies.

This article contains the described sections as follow. The section entitled Background contains relevant concepts used on the proposal of this article. In the Related Works section there is a comparison between some works and the proposal presented here. The section Proposal: Useful Apps describes details of the proposed teaching - learning process, applied to undergraduate students, from the Database Technology course. The Results section describes the process steps related to elaboration of one of the resulting apps, the Urban Flooding App. Finally, the last section presents the concluding remarks of this work.

BACKGROUND

Active methodologies valorize the effective participation of learners on the construction of knowledge and on the development of competences, with teacher's mediation and use of tools from the digital world (BACICH; MORAN, 2018). Such approach appreciates students' protagonism by challenging them to make decisions. Among the strategies or pedagogical practices that share this same ideal, this work highlights the terms Interdisciplinarity, Problem Based Learning (PBL), Project based Learning and Meaningful Learning, due to the proximity of the concepts, inherent in these approaches, with the proposal described here.

The models, which adopt active methodologies, are more focused on actively learning real problems, relevant challenges, games, activities, readings and projects (MORAN, 2013). To student solve a real problem, he needs to understand and overcome the several concepts that permeate the problem. All these concepts are not contemplated in only one discipline of a course, making it necessary the practice of interdisciplinarity.

There is no consensus on the definition of interdisciplinarity, but it can be considered as a pedagogical practice that unites two or more disciplines, retaking the interdependence and interactivity among events, concepts and ideas (THIESEN, 2008). The use of interdisciplinarity rescues the context view of reality, enabling the student to realize that concepts and theories are connected to each other, i.e., the parts make up the whole of a real problem. The use of interdisciplinarity makes PBL and Project Based Learning possible.

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
Article DOI: 10.20396/riesup.v4i3.8652076

On PBL, real-world problems and hypothetical case studies are used so that the student is challenged to solve them, and to accomplish this goal, the planned content needs to be learned (MELO-SOLARTE; BARANAUSKAS, 2008). The PBL draws on the principles of active school, scientific method, integration of content and involved areas, in which students learn to learn and prepare themselves to solve problems related to their future careers (MORAN, 2013).

Project Based Learning has a broader and multifaceted character, and the project refers to a complex task whose results is a product or presentation (NOGUEIRA; MARTINEZ; OLIVEIRA, 2016). During the process, students engage with interdisciplinary issues, make decisions, and act alone and as a team. In this approach, there is a favorable scenario for the improvement of critical thinking, creativity and the perception that there are several ways to carry out the same task (MORAN, 2013). At each stage of project execution, the student is evaluated.

The purpose of using these approaches is to make the learner acquire meaningful learning, i.e., to establish a selective interaction between new learning topics and preexisting knowledge in their cognitive structure (AUSUBEL, 2003). In other words, the student adds new knowledge to what he already has. Through meaningful learning is that the student permanently retains a knowledge, however it is necessary that this student has a disposition or motivation to learn (SILVA JR., 2017), an conducive environment to apply challenging projects and problems.

RELATED WORKS

Exploring presented theories, some papers present interesting results. In the work of NOGUEIRA; MARTINEZ; OLIVEIRA (2016), , the authors describe the stages of an interdisciplinary project for the development of computational games, for learning English, dedicated to Basic Education. In the final considerations, the authors point out that the professors realized that the students acquired a more meaningful learning, because they dealt with concrete tasks, from the real world, being more intimately connected to their social world (NOGUEIRA; MARTINEZ; OLIVEIRA, 2016).

Analyzing the approach described before and comparing to the proposal presented in this paper, there are some differences: a) in that work, the student received a problem and, in the approach of this article, the student himself must analyze the reality that surrounds him and find a problem that can have computational solution; b) in that work, only two disciplines were enrolled in the project, while in the presented approach, more disciplines are affected; c) the target audience for the games of all the students is restricted to the students of the High

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
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School, whereas in this proposal, the student must choose its target audience; d) in that approach, unlike the presented proposal , only the implementation of games was allowed.

The mentioned differences can provide gains in student learning. For example, from the outset, in the proposal of this work, the student feels responsible for his learning, because the problem dealt with was identified by him and, therefore, the student himself wished to take care of that subject. Also, the skills of analysis, synthesis and argumentation should emerge in the student as he will have to convince the audience that what he wants to address is really a problem, worthy of being treated.

Another paper reports the experience of high school students in an introductory programming course (PERDIKURI, 2014). The article says that students were able to create apps for tablets and smartphones, both those suggested by the teacher, according to a certain specification, and other types of ones on their own initiative. Although this work does not have an interdisciplinary aspect and does not focus on pedagogical practices, this report corroborates the idea, also defended here, that the incorporation of computational technologies can bring benefits to learning, since appropriate pedagogical strategies are applied.

In previous works, the use of interdisciplinarity and problem-based learning are themes investigated by the authors. In several ways, we have proven its usefulness and efficiency. The novelty of this reported work is the addition of this practice to quotidian problems and the programming of apps for mobile devices, such as smartphones and tablets.

PROPOSAL: USEFUL APPS

Once the discipline Laboratory of Learning II (Lab II) has the role of having the student apply concepts seen in other disciplines of a Database Technology course, in an interdisciplinary way, it provides conditions for the application of the proposal called Useful Apps. This proposal is made up of the following steps: a) Problem Analysis, b) Presentation of Alternative Solution Proposal, c) App Modeling, d) App Implementation, e) Article Writing. Each step is detailed next.

a) Problem Analysis

In general, students of the 2nd semester of Database Technology have smartphones and present certain interesting characteristics, such as: communicate themselves through social networks via smartphones; to learn something about a subject, they prefer to watch related videos to reading books or handouts; and they present difficulties of writing, reading, interpretation and logical thinking.

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
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Also, in this semester, those same students study Language of Programming, Software Engineering and Database Modeling. However, there needs to be something that makes them apply the taught concepts, so that learning becomes meaningful.

Considering this scenario and the described characteristics of the students, the Lab II professor proposes to each student to investigate and identify problems or issues of their daily life, asking the question: "What problem could be solved or mitigated if I developed an app for smartphone facing that question? ". The analysis of problems is done in two ways: 1) the professor analyzes difficulties of the students, and 2) the students analyze the problems in their daily life, directing a closer look around them.

b) Presentation of Alternative Solution Proposal

Once a problem is identified and chosen, the student should present its proposed solution to its peers and professor. One of the purposes of this step is to develop in the student it logical thinking and argumentation ability, for he must explain why the issue is a problem, report the consequences of not having a solution to that problem, describe how a app could be useful in that context.

The ideas must be original, for even if there are already apps for that issue, student must present something that improves what already exists, or has features that do not exist in others. In summary, the student's app must present a differential in relation to what already exists or to be unpublished in relation to that addressed problem.

Another intention of this stage is to make the students develop their ability to interact, as students and professor make suggestions about the presented ideas. The exchange of suggestions enriches the initial ideas and prevents excesses.

c) App Modeling

Defining what problem to be addressed in the app, the student must use the concepts acquired on Software Engineering and Database Modeling to do the modeling of his app. In this step, the student makes a kind of planning of his app, defining target audience, data to be stored, requirements, use cases, and drawing of the app screens.

Also, at this stage, students should choose appropriate software tools for use in modeling and implementing of the app. Thus, the student becomes an agent of his learning, since it is he who makes the decisions regarding the app, even if assisted by professors.

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
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d) App Implementation

In the implementation stage, the student faces several difficulties and must use his logical thinking ability to solve the found bugs. The Programming Language provides techniques that the student can employ in the development of the code of his app.

Beyond logical thinking, in this stage, the student develops patience, persistence, concentration, and investigative sense. This step, although considered the most arduous, is usually the one that students feel most involved and engaged in, for they already have the notion that they are developing something of their own. Thus, they continue to face the encountered difficulties to see ready something that they themselves conceived.

e) Article Writing

After finished this stage, students should write an article, in scientific format, reporting their ideas, the developed app, the encountered difficulties, in short, they should describe the lived experiences. The purpose of this stage is to make the student think over the taken path until the app is finished, highlighting the concepts that he had to study, remember or learn. Also, in this reflection, the student realizes that to generate a product, he has united what he has learned in the several disciplines of the course, his own experiences and his attentive look at reality.

In this way, the student realizes that, through his studies, it is possible to generate something useful for society, or even for himself. Moreover, at this stage, students, who never had the opportunity to write something more formal, can develop their writing, through the elaboration of a scientific article.

RESULTS

The process was applied to thirty students of the undergraduate Database Technology, an evening course, in 2nd semester of 2016, in a public college in the state of Sao Paulo. Students are between twenty and forty years old and each of them would have to fulfill the five stages of the teaching-learning process described in this article. Initially, twenty-six ideas of apps emerged, including the Urban Flooding App, whose development steps are used to illustrate the whole process.

a) Problem Analysis

In urban areas, disorderly growth increases the risk levels of natural disasters associated with landslides, floods and inundation. In many Brazilian cities, there has been an inadequate

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
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occupation of areas susceptible to such events, which has caused the growth of areas at risk and the number of accidents involving material losses and, above all, human lives(CARVALHO; MACEDO; OGURA, 2007).

In 2013, in Brazil, 493 natural disasters were reported, of which 4,433 municipalities were affected (MINISTÉRIO DA INTEGRAÇÃO NACIONAL, 2014). Table 1 summarizes the human damage caused only by hydrometeorological events except drought.

Table 1 - Human damage by hydrometeorological events.

	Deaths	Injured people	Sick people	Homeless people	Dislodged people	Disappeared people	Others	Affected people
Flooding	4	279	4306	44330	48260	0	180641	277820
Heavy rain	30	468	3607	25585	103278	5	1604303	1737276
Slipping	41	133	88	6721	8843	0	219530	233356
Flash flood	38	787	2324	17266	118074	92	778694	931608
Erosion	1	86	466	2826	3964	0	343906	351249
Inundation	36	1461	13283	59023	208274	6	1083402	1365485
Total	150	3214	24074	155751	490693	103	4210476	4884461

Source: Adapted from (MINISTÉRIO DA INTEGRAÇÃO NACIONAL, 2014).

According to Table 1, in 2013, in Brazil, there were 4,884,461 people affected by hydrometeorological events, about 30% of the total are victims of all-natural disasters that occurred in that year. Impacts of this type cause an annual loss of more than R $ 762 million on a national scale (ARANTES, 2013).

From the problematic presented by the student, the professor analyzed the pertinence of the subject and concluded that, in fact, the subject has relevance. In addition, the analysis of natural disasters facilitates reflection on environmental problems, i.e., one can think over and investigate the extent to which natural disasters are natural or if they are consequences of environmental problems caused by human action. Such discussion can be used as a means to raise awareness or sensitize people about attitudes that impact their own lives, contributing to the development of critical thinking (SANTOS, 2016).

b) Presentation of Alternative Solution Proposal

Considering the occurrence more and more frequent of events associated with natural disasters and the damages caused, it is analyzed that, if the population and competent agencies had access to risk alerts in advance, preventive actions could be adopted. Thus, it

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
Article DOI: 10.20396/riesup.v4i3.8652076

was proposed the development of a collaborative system to help manage the risks of environmental disasters of a hydrometeorological nature. The intention is that the system allows the responsible agencies, for example, to remove people from the houses located in areas at risk, faster than the way commonly used. Such system, in the form of a app, should present resources for posting, queries and information to users.

Analyzing the presented solution alternative, students and professor said that the suggestion would be plausible, but that a complete risk management system would require resources such as data server interconnected with the responsible agencies and rescue teams, available in full time. After these considerations and analyzing that these items are outside the scope of the useful apps proposal, the student offered to develop just the app.

c) App Modeling

To develop an app that could meet the requirements, use cases and the database were modeled. Use cases refer to a mapping between actors and system, with the purpose of avoiding software specification errors (CARVALHO, 2002). Considering the relevance of such phase, Figure 1 presents the mapped use cases to the Urban Flooding App.

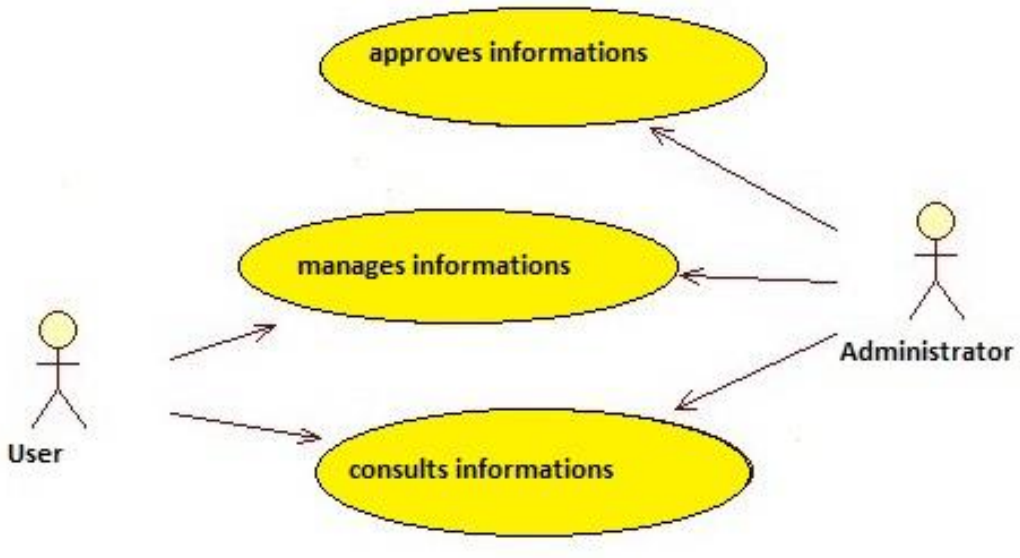

Figure 1 - Use cases of Urban Flooding App.
Source: The authors.

Figure 1 presents two actors, i.e., people who act in the system: a) common user and b) administrator user. An ordinary user, via smartphone, can manage and query information. The application administrator, in addition to accessing it in the same way as an ordinary user, can still approve or not the received information. It is up to the application administrator,

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
Article DOI: 10.20396/riesup.v4i3.8652076

therefore, to verify the veracity and validity of certain information. Thus, a common user may have greater reliability in the information consulted.

Another important item of app modeling refers to the data that must be stored, i.e., how the database should be. One way to make a database prototype is to create an Entity Relationship Model (ERM). This model describes the entities, their attributes and the relationships between them (ALEXANDRUK, 2011). Figure 2 shows the built ERM for the Urban Flooding App.

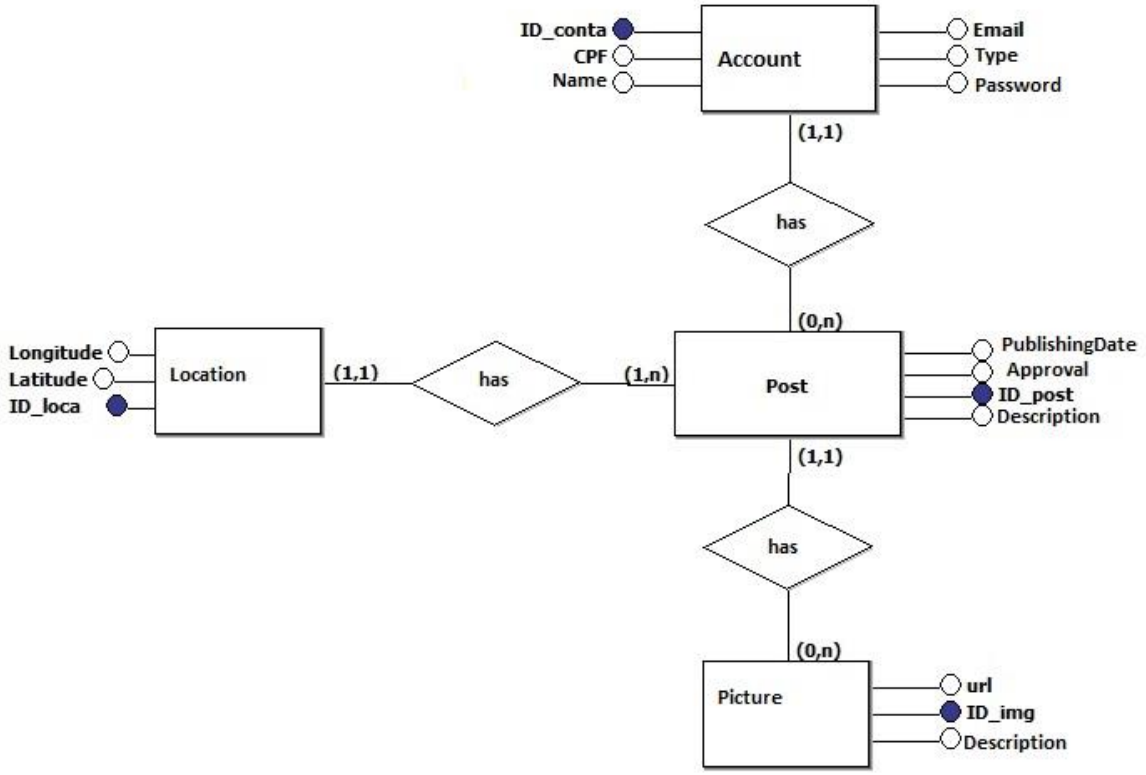

Figure 2 - Entity Relationship Model for Urban Flooding App.
Source: The authors.

In Figure 2, each rectangle symbolizes an entity, i.e., something about which data must be stored. In this case, data about *Account, Post, Location,* and *Picture* shall be stored. Each entity has attributes, which mean characteristics whose values are the data to be stored. For example, considering a *Location*, the values of the *Longitude, Latitude*, and *ID_loca* must be stored. This last attribute accomplishes the mission to assign a unique identification for each location, avoiding duplication of information.

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
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At this stage of development, the Software Engineering and Database Modeling disciplines provided the theoretical inputs for the student to model her app. This situation was in line with what was planned by LabII professor.

d) App Implementation

To develop the Urban Flooding App, the MIT App Inventor tool was used. This tool is a visual programming environment for creating apps for smartphones and tablets, which are based on Android operating system (PERDIKURI, 2014).

MIT App Inventor allows the development of apps that contain databases, interactive maps and other advanced concepts without the app developer having to write the code, simply by using programming logic consistently for what he or she wants to do. Google Labs was the creator of this open source application, which is now maintained by the Massachusetts Institute of Technology (MIT) (WOLBER *et al.*, 2011).

Once the development tools have been defined, the Urban Flooding App has been developed and finalized. Figure 3 shows its initial screen.

Figure 3 - Initial screen
Source: The authors.

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
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According to Figure 3, the initial screen allows the user to register (*Cadastrar)* or access the system through their previously registered login (*Usuário*) and password (*Senha*). In this screen, there is also an icon for the user to call an emergency phone number.

Once connected to the system, a menu called Sections (*Seções*) is displayed to the user. This menu contains the options about registration (*Minha conta*), postings (*Minhas postagens*) and relevant technical information (*Glossário técnico*). Still on the same screen, there is the Forecasts menu (*Previsões*), through which the user can check forecasts of weather conditions. Figure 4 shows this screen.

Figure 4 - Screen of menus
Source: The authors.

Figure 4 shows buttons *Meteorológica*, *Hidrológica* and *Sobre o App*. When clicked, these buttons direct the user to the official pages of meteorological forecast, hydrological forecast and the visualization of information related to the Urban Flooding App, respectively.

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
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Considering Figure 4, there are the buttons *Post, Minhas postagens, Minha conta* and *Glossário técnico*. When the button *Post* is clicked, the "*Criar post*" screen will be presented to the user, which can perform the insertion of information about what situation he wants to report. Figure 5 shows this screen.

Figure 5 - New Posting
Source: The authors.

According to Figure 5, the user, when creating a post, should provide the title and description of the event that occurred. In the example of Figure 5, the post refers to a flood at a tourist spot in the city of Sao Jose dos Campos, state of Sao Paulo.

After saving the information, the user will have access again to the screen shown in Figure 4. Clicking on the *Minhas Postagens* button, the user will be able to inquire about the posts submitted by him. Figure 6 illustrates that the user can view a history of the environmental disasters reported by him.

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
Article DOI: 10.20396/riesup.v4i3.8652076

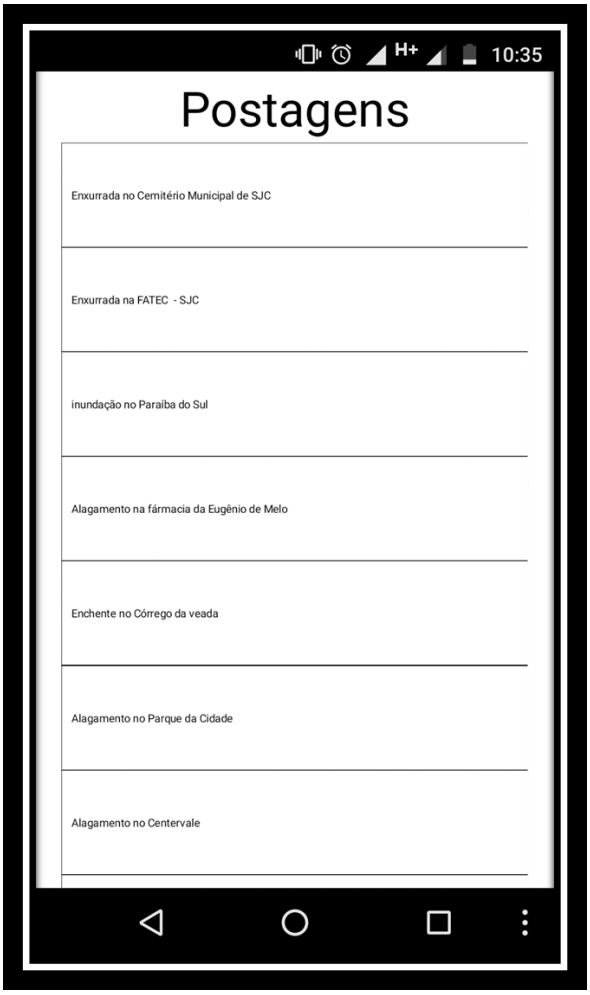

Figure 6 - Postings
Source: The authors.

Figure 6 shows the latest occurred posts. If the user wants to edit any of those posts, he just shall click on the chosen title from the list and an editing screen is displayed. The purpose of this resource is to allow users to update the conditions of certain events in a collaborative manner. For example, user 1 posted the event "Flooding in City Park" and described that this is causing traffic jams on street X. A user 2 can edit the post of this event and add that congestion of vehicles reaches three kilometers in X, Y, and Z. Thus, information is updated more dynamically.

With the end of this stage, the students can reflect overall all studying they have taken during the semester. This analysis is based on evaluating whether there was learning, whether it was pleasant to develop the app, whether the tools chosen were appropriate, if the perception occurred that the several disciplines of the course want to treat separate parts of the same reality.

Revista Internacional de Educação Superior [RIESup] ISSN 2446-9424
Article DOI: 10.20396/riesup.v4i3.8652076

e) Article Writing

After developing and testing the Urban Flooding App, the involved students wrote an article, reporting their learning experience. A piece of the final considerations of the article, referring to the Urban Flooding App, is presented next:

> "The App Inventor platform is still very instable, focused on developing educational apps (...). However, it should be emphasized that the interface is simple and intuitive (...). As for the initial proposal, it demands execution time, research, and a better structured database management system. Therefore, for future work, it is intended to develop this proposal in an independent platform (...).

At this stage, students feel victorious because they have succeeded in tracing and achieving a goal. They gain a new insight into the course subjects, as they come to have a practical meaning. Also, students report their satisfaction in developing something that they themselves have designed, making them more persistent by learning what is needed to finalize the app.

CONCLUDING REMARKS

This article presented a teaching - learning process composed of five stages, in each of which the student improved or learned a set of concepts and topics, related to their daily life and to the disciplines studied.

At each stage, pedagogical strategies were used to promote meaningful learning for student. Student has established a connection between his reality and the knowledge acquired in the undergraduate course. Smartphones are no longer tools of distraction, sometimes a problem for teachers and professors, rather became tools of work and of test for apps.

Both students and professor learned from the process, they have strengthened the bonds of trust and dialogue between themselves. Students figured out that, although they are limited in learning certain topics, with persistence and dedication, they can go beyond what they imagine.

Once again, the LabII professor has proven that students, when they feel themselves challenged and instigated, produce interesting and useful results, such as the Urban Flooding App and others also resulting from this work. Among the twenty implemented apps, Urban Flooding App was selected as an example because the students, called developers, have accomplished all the goals of the proposed teaching-learning process. In addition, this app can help responsible agencies even in the improvement and management of public policies, to combat natural disasters arising from hydrometeorological events.

As future work, there is the proposal of developing apps through more robust environments, such as Android Studio. Students could add new features to their apps.

REFERENCES

ALEXANDRUK, Marcos. **Modelagem de banco de dados.** São José dos Campos, SP. Unilivros, 2011. 54p. Avaliable on: <http://www.unilivros.com.br/pdf/dbmod.pdf>. Access on: 19 janeiro 2018.

ARANTES, José Tadeu. **Prejuízo ao país com enchentes em São Paulo ultrapassa R$ 762 milhões por ano**. mar. 2013. Avaliable on: <http://agencia.fapesp.br/prejuizo_ao_pais_com_enchentes_em_sao_paulo_ultrapassa_r_762_milhoes_por_ano/16968/>. Access on: 19 janeiro 2018.

ARAÚJO, Raul; BELIAN, Rosalie. Concepções de professores universitários sobre inovação pedagógica. **Revista Internacional Educação Superior**,Campinas, SP, v. 4, n. 2, p. 387–400, abr.2018. ISSN 2446-9424. Avaliable on: <https://periodicos.sbu.unicamp.br/ojs/index.php/riesup/article/view/8651698/17838> . Access on: 08 maio 2018. doi: 10.20396/riesup.v4i2.8651698.

AUSUBEL, David P. **Aquisição e retenção de conhecimentos:** uma perspectiva cognitiva. 1. ed. rev Lisboa: Plátano, 2003.243p. ISBN: 972 - 707 - 364 - 6. Avaliable on: <http://files.mestrado-em-ensino-de-ciencias.webnode.com/200000007-610f46208a/ausebel.pdf>. Access on: 08 janeiro 2018.

BACICH, Lilian; MORAN, José. **Metodologias ativas para uma educação inovadora: uma abordagem teórico-prática**. Porto Alegre: Penso, 2018. 260p. ISBN:9788584291168.

CARVALHO, Celso Santos; MACEDO, Eduardo Soares de; OGURA, Agostinho Tadashi. (Org). **Mapeamento de riscos em encostas e margem de rios**. Brasília: Ministério das Cidades e Instituto de Pesquisas Tecnológicas – IPT, 2007. 176p. ISBN 978-85-60133-81-9. Avaliable on: http://www.cidades.gov.br/images/stories/ArquivosSNPU/Biblioteca/PrevencaoErradicacao/Livro_Mapeamento_Enconstas_Margens.pdf>. Access on: 08 janeiro 2018.

CARVALHO, Maria Cristina Ferro. **Um método para elicitação e modelagem de requisitos baseado em objetivos.** 2001**.** Dissertação (Mestrado em Ciência da Computação) - Programa de Pós Graduação em Engenharia de Eletricidade da Universidade Federal do Maranhão, São Luís, 2001. Avaliable on: <https://tedebc.ufma.br/jspui/bitstream/tede/307/1/Marcia Cristina Ferro Carvalho.pdf>. Access on: 08 janeiro 2018.

FERREIRA, Giselle Martins dos Santos; FREITAS, Rejane Cunha; MOREIRA, Laélia Carmelita Portela. Inovação, TIC e docência: práticas e concepções de professores em uma IES privada. **Revista Internacional de Educação Superior**,Campinas, SP, v. 4, n. 1, p. 25–

51, jan. 2018. ISSN 2446-9424. Avaliable on: <https://periodicos.sbu.unicamp.br/ojs/index.php/riesup/article/view/8650880>. Access on: 08 maio 2018. doi: 10.22348/riesup.v4i1.8650880.

FRAGELLI, Thaís Branquinho Oliveira. Gamificação como um processo de mudança no estilo de ensino aprendizagem no ensino superior: um relato de experiência. **Revista Internacional de Educação Superior**, Campinas, SP, v. 4, n. 1, p. 221–233, jan. 2018. ISSN 2446-9424. Avaliable on: <https://periodicos.sbu.unicamp.br/ojs/index.php/riesup/article/view/8650843>. Access on: 08 maio 2018. doi: https://doi.org/10.22348/riesup.v4i1.8650843.

JORGE, Juliana Gomes et al. Influence of passive smoking on learning in elementary school. **Jornal de Pediatria**, Rio de Janeiro, RJ, v. 92, n. 3, p. 260–267, 2016. ISSN 00217557. Avaliable on: <http://dx.doi.org/10.1016/j.jpedp.2016.02.012>. Access on: 08 janeiro 2018. doi: 10.1016/j.jped.2015.08.010.

LIMA, Franciele Santos de; ZAGO, Nadir. Desafios conceituais e tendências da evasão no ensino superior: a realidade de uma universidade comunitária. **Revista Internacional de Educação Superior**,Campinas, SP, v. 4, n. 2, p. 366–386, abr. 2018. ISSN 2446-9424. Avaliable on: <https://periodicos.sbu.unicamp.br/ojs/index.php/riesup/article/view/8651587>. Access on: 15 maio 2018. doi:https://doi.org/10.20396/riesup.v4i2.8651587.

MARIM, Vlademir; FREITAS, Adriano Vargas; SANTOS, Heinrich da Solidade. A formação de professores na era da inclusão digital. **Revista Contexto & Educação**, Editora Unijuí, v. 29, n. 94, p. 153–178, 2014. ISSN 2179-1309. Avaliable on: < https://www.revistas.unijui.edu.br/index.php/contextoeducacao/article/view/3259 >. Access on: 15 janeiro 2018.doi: 10.21527/2179-1309.2014.94.153-178.

MELO-SOLARTE, Diego Samir; BARANAUSKAS, Maria Cecília C. Uma abordagem para EaD baseada em resolução de problemas. In. SIMPÓSIO BRASILEIRO DE INFORMÁTICA NA EDUCAÇÃO, XIX, 2008, Forataleza. **Anais do**... Fortaleza: SBIE, 2008. p. 716–725.

MINISTÉRIO DA INTEGRAÇÃO NACIONAL. **Anuário brasileiro de desastres naturais:** 2013. Secretaria Nacional de Proteção e Defesa Civil. Brasília, DF: Centro Nacional de Gerenciamento de Riscos e Desastres (CENAD), 2014. 106p. Avaliable on: <http://www.mi.gov.br/c/document_library/get_file?uuid=fee4007a-ab0b-403e-bb1a-8aa00385630b&groupId=10157>. Access on: 08 janeiro 2018.

MORAN, José. **Metodologias ativas para uma aprendizagem maios profunda**. [s.l: s.n.]. Avaliable on: <http://www2.eca.usp.br/moran/wp-content/uploads/2013/12/metodologias_moran1.pdf>. Access on: 08 maio 2018. doi:

NETO, Francisco Frederico; CARDOS, Andréa Cristina; KAIHAMI, Harumi Nemoto; OSTERNACk, Kátia; NASCIMENTO, Andreia de Fátima; BARBIERI, Carolina Luísa Alves; PETLIK, Marina Emiko Ivamoto. Dificuldade de aprendizagem no ensino

fundamental e médio: a percepção de professores de sete escolas públicas de São Paulo - SP. **Rev. Psicopedagogia**, São Paulo, SP, v. 32, n. 97, p. 26–37, 2015. ISSN 0103-8486. Avaliable on: < http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S0103-84862015000100004 >. Access on: 15 janeiro 2018.

NOGARO, Arnaldo; CERUTTI, Elisabete. **As TICs nos labirintos da prática educativa**. Curitiba: Editora CRV, 2016. 170 p. ISBN 9788544410226

NOGUEIRA, Teresinha de Fátima; MARTINEZ, Juliana Forin Pasquini; OLIVEIRA, Angélica Gomes de. Jogos para celular: uma experiência interdisciplinar na aprendizagem de língua inglesa. **Revista CBTecLE**. Campinas, SP, v.1, n.1,2017. ISSN 2526-4478 Avaliable on: <https://revista.cbtecle.com.br/index.php/CBTecLE/article/view/21. Access on: 15 janeiro 2018.

PENSIN, Daniela Pederiva. Educação superior e agenciamento: a constituição singular do professor da educação superior no presente. **Revista Internacional de Educação Superior**,Campinas, SP, v. 4, n. 1, p. 74-94, jan. 2018. ISSN 2446-9424. Avaliable on: <https://periodicos.sbu.unicamp.br/ojs/index.php/riesup/article/view/8650674>. Access on: 08 maio 2018. doi: https://doi.org/10.22348/riesup.v4i1.8650674.

PERDIKURI, Katerina. Students' experiences from the use of MIT App Inventor in classroom. In: PROCEEDINGS OF THE 18TH PANHELLENIC CONFERENCE ON INFORMATICS - PCI '14 2014, New York, USA. **Anais**... New York, USA: ACM Press, 2014. ISBN: 978-1-4503-2897-5. p. 1- 6. Avaliable on: <http://dl.acm.org/citation.cfm?doid=2645791.2645835>. Access on: 08 janeiro 2018. doi: 10.1145/2645791.2645835.

REIS, Bia. Cortella: "A escola passou a ser vista como um espaço de salvação". **O Estado de São Paulo**,São Paulo, SP, 2014. Avaliable on: <http://educacao.estadao.com.br/noticias/geral,cortella-a-escola-passou-a-ser-vista-como-um-espaco-de-salvacao,1168058>. Access on: 08 maio 2018.

SALES, Shirlei Rezende; LEAL, Rafaela Esteves Godinho. Práticas pedagógicas inovadoras na formação docente: ciborguização do currículo do curso de pedagogia. **Revista Internacional de Educação Superior**,Campinas, SP, v. 4, n. 1, p. 7–24, jan. 2018. ISSN 2446-9424. Avaliable on: <https://periodicos.sbu.unicamp.br/ojs/index.php/riesup/article/view/8650710>. Access on: 08 maio. 2018. doi: https://doi.org/10.22348/riesup.v4i1.8650710.

SANTOS, Orildo Ribeiro. UM OLHAR DE ALUNOS DA EJA SOBRE IMPACTOS AMBIENTAIS DO TURISMO COSTEIRO EM AJURUTEUA (BRAGANÇA-PA). **Revista Contexto & Educação**,Editora Unijuí, v. 31, n. 100, p. 116–139, 2016. ISSN 2179-1309. Avaliable on: <https://www.revistas.unijui.edu.br/index.php/contextoeducacao/article/view/5736>. Access on: 08 janeiro 2018. doi: 10.21527/2179-1309.2016.100.116-139

SILVA, Simone Vieira da. As principais causas das dificuldades de aprendizagem em alunos

da rede municipal de sinop atendidos pelo instituto criança. **Eventos Pedagógicos**, Sinop, Mato Grosso, v. 7, n. 3 (20.ed.), p. 1321–1332, dez. 2016. ISSN 2236-3165. Avaliable on:< <http://sinop.unemat.br/projetos/revista/index.php/eventos/article/view/2532/1883>. Access on: 08 janeiro 2018.

SILVA JR., Romualdo. Indicadores acerca da importância do papel do professor no processo de formação continuada do aluno: um ensaio a partir da Teoria da Aprendizagem Significativa de David Ausubel. **Revista Thema**,Campinas, SP, v. 14, n. 2, p. 329–335, maio 2017. ISSN 2177-2894. Avaliable on: <http://revistathema.ifsul.edu.br/index.php/thema/article/view/410>. Access on: 08 janeiro 2018. doi: 10.15536/thema.14.2017.329-335.410.

THIESEN, Juares da Silva. A interdisciplinaridade como um movimento articulador no processo ensino-aprendizagem. **Revista Brasileira de Educação**, Rio de Janeiro, RJ, v. 13, n. 39, p. 545–554, dez. 2008. ISSN 1413-2478 Avaliable on: <http://www.scielo.br/pdf/rbedu/v13n39/10.pdf>. Access on: 08 janeiro 2018. doi: http://dx.doi.org/ 10.1590/S1413-24782008000300010

WOLBER, David; ABELSON, Hal; SPERTUS, Ellen; LOONEY, Liz. **App Inventor:** create your own Android Apps. Sebastopol: O'Reilly Media, Inc, 2011. 383p. ISBN. 978-1-4493-9748-7. Avaliable on: <http://cs.usfca.edu/~wolber/appinventor/appinv_0331.pdf>. Access on: 08 janeiro 2018.

About the Authors

[1] ***Adriana da Silva Jacinto***
E-mail: adriana.jacinto@fatec.sp.gov.br
Fatec de São José dos Campos Professor Jessen Vidal – Brasil
PhD in Science by Computer Engineering - ITA.

[2] ***Alice Nardoni Marteli***
E-mail: alicenmart2@gmail.com
Instituição – País Fatec de São José dos Campos Professor Jessen Vidal – Brasil
Master in Engenharia Civil da Universidade Estadual Paulista [UNESP].

[3] ***João Gabriel Dias Pires***
E-mail: joao.pires@fatec.sp.gov.br
Instituto Federal de São Paulo (Araraquara) – Brasil
Student of Analysis and Development of Systems by FATEC (São José dos Campos).

[4] ***Jaqueline da Silva Jacinto***
E-mail: jalumiar2@gmail.com
Secretaria de Educação Municipal de São José dos Campos – Brasil
Postgraduate in Methodology of Portuguese Language Teaching at the Fac. São Luís de Jaboticabal.