# Guidelines on Context Integration: Developing Technological Solutions Communication for Education Professionals

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**Abstract.** This article presents a project that arose from the need to design applications with natural interactions for professionals in the field of education, who have long working days and who mix personal and social activities together with professional activities. The project is based on the Design Process Model for Health Applications: Integrating Contexts and Adding Abilities (ICAH, in Portuguese), developed to guide and support the work of application developers for health professionals who care for patients in need of long-term care [1–3]. Its objective is to validate the guidelines of integration of contexts proposed in the ICAH Model applied to education professionals. To fulfill the proposed objective, the ICAH Model was used for the definition and collection of requirements for an application of communication and dissemination of information in the educational environment. The application was developed from research and observations of professionals who worked in a professional education institution during the year 2018. The application provides the disclosure of information related to extracurricular events and activities and official communications that are part of the Institution. The observations and feedbacks collected by the application gave us indications that the application was effectively adopted by education professionals. The content of the information that had favorable feedback was, in its majority, information that added extracurricular contents and social events of the Institution, evidencing the mix of contexts in the educational environment.

## 1 Introduction

### 1.1 Contextualization

The current situation reflects that the work environment of education professionals, as well as all those professionals who deal with constant and long-term care, is conducive to the construction of a new identity and reference for these professionals, who incorporate their personal and social activities to professional activities and build cooperative relationships with their peers beyond the professional environment. To incorporate technological resources that are naturally inserted in the workflow of these professionals, without being obstacles in their routines, but that support them in the performance of their tasks, a model of design process and a set of guidelines has been


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developed, supporting the development of systems and applications for these professionals. The ICAH Design Process Model was developed during the works [1–5] and was used as a reference in this project.

The development of this project arose from the need to design applications with natural interactions for professionals in the field of education who have long working days and who mix personal and social activities with professional activities. The natural interactions, in this project, are defined as the way in which the user exchanges information with applications and technological resources in an instinctive and transparent way, without worrying about the peculiarities of the application or manipulated technological resource [2, 4].

What is intended is that the development of these applications allows a result that integrates the different contexts in which these professionals are: professional, personal and social, considering their abilities through the experience of using technological resources and the exchange of experiences among them. Knowing the complexity that is expected to be found in a person and their actions in the real environment, the existing typical design models and approaches that are based on the standard user idea (or medium), such as those discussed in [6, 7, 12], aren't specifically indicated for the understanding of human interaction, although they serve the purpose of generating and setting conventions – it's always necessary to refine, search or create new models and approaches [8]. In addition, the use of personal technological resources, such as mobile devices, in the professional environment allows the experience of using these resources to be used to stimulate the abilities of the professional and promote personal, social and professional integration in the work environment, incorporating the concepts of Bring Your Own Device (BYOD) defined and presented in [10, 11, 13] and Bring Your Own Application (BYOA), defined and presented in [9] to that project.

To fulfill the proposed objectives, the ICAH Model was used for the definition and development of an application of communication and dissemination of information in the educational environment. The application was developed from research and observations of professionals who acted in a professional education institution, during the year 2018. The application provides the disclosure of information related to events, extracurricular activities and official communications that are part of the Institution. The information is disseminated by education professionals, through displays installed in areas of coexistence of the Institution, as well as a totem that was strategically positioned so that officials and students can comment on the importance and usefulness of the information disclosed. The opinions collected served as feedback for professionals to analyze the importance and necessity of the information available on the displays and could refine the type of information disclosed.

The observations made, information data and feedbacks collected by the application gave us indications that the application was effectively adopted by education professionals. The content of the information that received favorable feedback was, in its majority, information that added extracurricular contents and social events of the Institution, evidencing the mix of contexts in the educational environment. The suggestions collected with education professionals showed us that in order to improve and expand the application's functionalities, such as future work, it's interesting to promote access to the application also by mobile devices.

### 1.2 Objective

The objective of this project is to validate a set of guidelines applied to ICAH that guides and supports the work of application developers with natural interaction for professionals in the field of education.

It's believed that applying these guidelines during the process of developing applications for the education professional will support the lifestyle of this professional in the constant and long-term care of students, facilitating the management and integration of professional, social and personal contexts for that professional. As the focus of this research is on the process of designing applications with natural interaction, both interaction designers and developers (designers and systems analysts) benefit from the validation of guidelines for the integration of contexts, so they're treated in this job, as designers or application developers.

The specific objectives are:

- Understand how education professionals use their own technological resources for professional activities;
- Know the abilities of education professionals in the use of technological resources;
- Understand how is the dynamics of communication and information exchange between a group of education professionals;
- Apply the ICAH design process model in the creation of evolutionary prototypes for education professionals, following the guidelines of integration of contexts that guide the application of the model;
- Evaluate, with a case study, the use of evolutionary prototypes by education professionals.

## 2 Development

This project was developed in two steps: the lifting of the requirements, according to ICAH Model and the elaboration, execution and analysis of the results of the Case Study, which included the development of the application.

### 2.1 First Step - Requirements Survey

Based on the understanding of the ICAH Model and the guidelines proposed in the model, the requirements for the development of a prototype to aid the communication and dissemination of information in a teaching institution were raised.

The guidelines proposed in the model are divided into two domains: the context integration domain and the skill addition domain. The two areas present common objectives to facilitate the appropriation of the artifact to be developed: to the extent that the integration of contexts occurs, users become aware of the use of technologies and applications in different contexts, in addition to the effective adoption of these technologies and applications; and the extension of the use of these technologies and applications favors the exchange of experiences and expands the abilities of the users involved in the design process. In this project the guidelines of the Domain of Context

Integration were used, which emphasize the actions to be executed during the design process, actions that guide the designers on what aspects, related to the different contexts of the user, should be considered. The actions taken in this project are described below.

**(A1)** Make clear the purpose of the design process. Before initiating the first session of the interaction design process, a conversation with the user group was promoted to explain what and how the design process and its activities would be carried out.
**(A2)** Promote a quick socialization before the design sessions (ice breaking). The design sessions began with a socialization activity and each participant was encouraged to present what they expected to happen at the end of the session.
**(A3)** Identify what electronic communication services are used. Technological resources were identified that were used for communications at work and outside of work, as well as the types of messages, annotations, information and reminders that users share with each other.
**(A4)** Promote short intervals during the design sessions. The small intervals were made during almost all the design sessions and the developers took advantage of these moments to observe the behavior of the users and how the interaction was between them.
**(A5)** Promote design for appropriation. It was important the active participation of the users, which allowed to elaborate a flexible and easy to use design, favoring the appropriation of technological resources.
**(A6)** Observe and promote the integration between users, in the professional context and outside of it.
**(A7)** Identify the lead user. The education professionals who directed the validations during the development of the solution were identified and encouraged the use of the innovations adopted.

The presented guidelines monitor the clearer development model activities and facilitate the work of developers and designers during the application development process.

## 2.2 Case Study

During the studies of the ICAH Model and the collection of requirements - based on the model, we found the need to develop a system for the dissemination of information and news in a public way on the campus of Araraquara, the Municipal Chamber of São Paulo, Brazil.

This observation guided the development of the COMMUNIQUE-SE system, a responsive WEB system. The system, as well as its characteristics and form of use, is presented below.

**COMUNIQUE-SE System**
The system developed aims to manage and organize information transmitted to the community of the Institution in its public displays. Today, the Institution has two displays for the dissemination of information and news and the content disclosed is not managed or controlled in an automated way. In addition, the system has a feedback

functionality: for some selected information and news, community members can leave their opinion about the disclosure, choosing if what is being disclosed is useful or not.

To access the system and make available an information or news, the user, who in that first moment is the director of the institution, needs to make the access validation, through previously registered login and password.

After logging in, the list of registered releases is displayed and can be managed. In a menu you can access all the features of the system. On this system screen, in addition to the list of registered announcements, it's also possible to view, edit or delete a specific communication, with text and image (Fig. 1). It's interesting to note that the announcements are presented on the display screen of the displays during the period in which they're valid - with dates of initial and final display.


**Fig. 1.** Communication inclusion

In the presentation of the statement, the information or the news is shown and, if it's a communication of feedback, a range of evaluation on the usefulness of the information or the news (Fig. 2).


**Fig. 2.** Communication and evaluation range

When the statement presents the range of feedback, the members of the community of the Institution can register their opinion and for each opinion, the images of the evaluation range are filled, showing the number of opinions received, in terms of percentage. The collection of opinions is done on a totem with monitor and keyboard for the election (Fig. 3).

**Fig. 3.** Opinion collection totem

The GALLERY functionality allows to insert a set of images to appear in the displays in the form of an image carousel when there is no active communication, that is, when no information or news is in the viewing period, so the selected images are displayed in the galleries. You can create several image galleries and select which ones will be active and ready to be displayed. You can also remove and change a gallery at any time.

## 3 Discussion and Conclusion

As a final result for this research project, context integration guidelines were validated for the development of applications aimed at education professionals and application developers can use these guidelines as support during the development of applications, facilitating the definition and creation of applications. The validation occurred with the use of the guidelines for the definition and development of the interaction design used in the case study. And the identification of the problems and needs of the users interviewed and participants of the activities proposed in the ICAS Model gave indications of the needs to be addressed in the system developed.

The results obtained, according to the specific objectives were:

– Understanding how education professionals use their own technological resources for professional activities and their abilities in the use of technological resources was achieved through interviews, observations and questionnaires with these professionals. In addition, we analyzed how communication happens between education professionals, between professionals and students and with the management, in general.

- Application of the ICAS Model during all the work, in the surveys and interviews, with observation techniques and following the guidelines defined in the model. Thus, it was also possible to define and understand the needs and problems that these professionals reported.
- Validation of the model, as education professionals approved the iterative and evolutionary prototypes that were developed.
- Preparation of a case study, providing the creation of the COMMUNIQUE-SE system, which may be adopted by the educational institution to disseminate information and news. Also, as the COMUNIQUE-SE system has a feedback functionality, it will allow to analyze and evaluate the usefulness of the information and news disclosed.

Thus, as this project had the development of a system for education professionals, the system can be widely used by the institution's staff to disseminate news and information and obtain a feedback related to the news and information disclosed.

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