

# Designing for Affectibility: Principles and Guidelines

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**Abstract.** In analogy to the concept of usability, learnability and playability, the concept of Affectibility was conceived to inform the design process – in this case with affective aspects of interaction. In this paper we present a revised set of the Principles for the Design for Affectibility, together with practical examples of use and application. The objective is to support designers in the process of creating educational systems for children, considering aspects of affect.

**Keywords:** Affectibility · Affect · Emotions · Design · Children interaction · Education

## 1 Introduction

Researches in varied areas of knowledge have been investigating the role that emotions and affect play in our lives. It has been suggested that “positive affect facilitates creative problem solving” [10]. In the field of biological sciences, studies investigated the relationship between negative affective style and weaker immune responses in an individual [21]. In the area of education, affect has been known for long to have significant importance in children’s development. A crescent interest in affect is noted in the field of Human Computer Interaction, as well. However, little is known about the practical design of learning technology aiming at improved affective responses from users in their interaction with that technology.

In order to make clear what we mean by ‘affect’, we adopted the definition from Ortony et al. [19], who see affect as “a superordinate concept that subsumes particular valenced conditions such as emotions, moods, feelings, and preferences”. Furthermore, we use the term Affectibility [9] to express the set of characteristics of a digital artifact that have the potential to elicit rather positive affective responses in the user.

Affective responses can be seen as a product from the interaction of the users with the technology, considering users’ surroundings, as well as users’ culture and society [5]. Note that ‘interaction’ implies in actions, meaning that users are active in the learning processes supported by that technology [20].

In order to better understand the learning environment, we had been working within a school community for over two years, participating in its daily activities, including classes, informal social events (e.g., gatherings during lunch breaks) and formal meetings (e.g., teachers meetings, parents meetings). This empirical knowledge was combined with theoretical studies to inform the Design Principles for Affectibility.

## 1.1 Research Process

We derived the design principles both from empirical and theoretical data. The field notes taken during a 6 months period of immersion as participant observers at an elementary school were transcribed into digital blocks of texts. We then coded [16] the blocks of texts and categorized the resulting codes. In parallel, we studied some of the major lines of thought in education and educational psychology, filtering and focusing on information related to the role of affect in education and children's development. The data obtained from the process of coding were in line with the information retrieved from the analysis of the literature on education and psychology. The combination of both empirical and theoretical data resulted in the Design Principles for Affectibility. The principles were tested [9] and now revised. The revised set of principles is presented in the next section.

This paper is organized as follows: in Sect. 2 we present our revised set of Design Principles for Affectibility; and in Sect. 3 we discuss and conclude this paper.

## 2 Design Principles for Affectibility

### 2.1 P Af.1 Free Interpretation and Communication of Affect

Users should be able to communicate their feelings and emotions. Designers could make features available to allow users to express that. Rather than making systems that automatically recognize emotions, designers concerned with affective responses should leave to users the immensity of possible interpretations that the expression of emotional and affective responses may suggest. Boehner et al. [5] explain that affect and emotion are interpreted and produced culturally: the experience of a feeling (e.g., anger, lust) is grounded in a cultural context that makes that feeling (of anger, lust, etc.) meaningful. Socio-cultural aspects will determine the type of emotional responses that feelings might evoke (e.g. something to be proud of, ashamed of, etc. [5]). Sengers and Gaver [23] argue that multiple interpretations can be fruitful and design solutions should not promote only one single interpretation. We suggest that designers provide users with opportunities for open expression and interpretation through the system or application.

**Guidelines:** Avoid predetermining meanings (of signs, words, images, etc.) and let affect be freely expressed and interpreted; avoid automatic identification of affect; make available features to allow communication among users.

**Examples:** With the application proposed in [25] for the development of social skills in children, the player can choose the responses of the character of this adventure game. The choices for response include affective expressions. Another example of affective expression through art in learning technology is found in [12].

### 2.2 P Af.2 Pride in Social Values and Local Culture

Designers should consider users' social context, including their values and culture. Elements from users' culture and values should be taken into consideration and their

presence should be made clear in the designed application. This can include associated values that are of interest to the learners or that are specific for their context. In order to understand what would be of interest to users, socio-technical and participatory approaches can be used by designers.

**Guidelines:** Be aware of what users are familiar with, what is important to them, what is part of their culture.

**Examples:** The digital storytelling proposed in [14] considers the Chinese cultural heritage. Kam et al. [11] were explicitly interested in the values and context from their target users. The authors first analyze village games that are traditional in the rural areas of India. Another famous and successful example of use of values and culture in design is Google Doodles<sup>1</sup>, which often depicts people, holidays and other elements specific from certain countries.

### 2.3 Paf.3 Feeling of Identification and Appropriation with Personal Adjustments

Users should be able to tailor the application. An application that complies with this principle would be one that allows users to adjust the interface so that they feel emotionally more comfortable. Users should be able to add their own personal media or educational content, according to their needs or preferences. Material from learners' specific contexts composes more meaningful learning opportunities.

**Guidelines:** Allow users to set personal adjustments on interaction elements; provide different options for configuration and personalization; allow users to incorporate their own material to the system.

**Examples:** The Ely doll is a learning tool proposed in [1]. Its camera *“allows children to explore real-world phenomena by creating digital content to be brought into the play”* (p. 858). Other examples of tailoring in the design of educational technology include the customizable avatars proposed in [8]; a personalized search interface [4]; and personalized modules, which are based on the learners' previous achievements or based on their explicit choices [3].

### 2.4 Paf.4 Connectedness in Collaborative Educational Construction

The application should support users to work in collaboration in the construction of group learning. Notice that the participation of adults (teachers, parents, other relatives or professionals) can also be valuable in this process.

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<sup>1</sup> <https://www.google.com/doodles/about> (Accessed March, 2015).

**Guidelines:** Provide mechanisms for group collaboration; allow communication and sharing.

**Examples:** ‘Mobile Stories’ is a mobile technology that empowers children to collaboratively read and create stories. Another example involves peer support, for example in the form of virtual guidance. This could be achieved via (online or offline) participation of more experienced peers, or help systems. Such guidance is also present in the system proposed in [15]. At Livemocha<sup>2</sup> – an online community where people support each other in the task of learning a foreign language – native speakers of a language can help other participants who are now learning that language by correcting their exercises and giving advices on their pronunciation. Participants can rate each other’s contribution to the community, both as learners and “teachers”.

## 2.5 Paf.5 Virtual Closeness and Social Awareness

Social awareness is related to the perception of the social context, e.g., perceiving the presence of others. This might provide a sense of proximity among users or promote collective activities. One of its purposes is to make it easier for people to express themselves and engage in collective interactions. Wallon [6] supports that affective exchanges are dependent on the presence of others, because emotions has a social basis. In this sense, applications should make the presence of others noted, providing feedback to the users. This feedback can also serve users to understand his/her own role within the activity, application or community.

**Guidelines:** Provide feedback on users’ activity, presence, or feelings.

**Examples:** In a tabletop game for sustainability [24], trees change color and facial expression to show the levels of environmental damage during the game. The game also allows each player to know what his/her individual contribution to the game is. At Livemocha (See Footnote 2). users are aware of the online presence of other users who might help them in their language practices. They also know with how many friends they are connected. Knowing the online or offline status of other people is a common and popular element in diverse applications and it constitutes an example of the Design Principle of promoting virtual closeness with social awareness.

## 2.6 Paf.6 Setting the Mood with Varied Media and Modes of Interaction

According to Norman [18], “Emotions are contagious”. In the game design field, it is already known how moods can be created by means of appropriate use of images and sounds. Like in movies, the narrative – coupled with camera zooms and increasing rhythm in the background music – can create strong emotional states in the viewer [22]. The design of learning technology should also profit from such resources. While the

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<sup>2</sup> <http://livemocha.com/> (Accessed March, 2015).

majority of applications already make use of media, such resources are not always used with the explicit purpose of obtaining determined affective responses from users.

**Guidelines:** Explore use of sounds, images (colors, shapes, contrasts, etc.), videos, tactile feedback, etc., to create varied emotional responses; explore the use of multiple modes of interaction (multimodal interaction: kinectic, tangible, voice response, etc.).

**Examples:** As an example of use of different media (images, videos, text compositions, sounds, etc.) in learning technology we can mention the interface for digital textbook proposed in [13]. Different media can also be explored during the design process with children. An example is reported in Tikkanen and Iivari [26].

### 3 Discussion and Conclusion

While some of the principles might not seem new, the new challenge lies in: (1) making affect and emotions explicit in the interaction design with (for and by) children; and (2) creating design processes and products that combine the Design Principles for Affectibility together with other recommendations (i.e., for usability, accessibility, etc.) with harmony, simplicity and beauty.

As Norman [17] discusses: “The new design challenge is to create true participatory designs coupled with true multi-media immersion that reveal new insights and create true novel experiences. We all participate, we all experience. We all design, we all partake. But much of this is meaningless: how do we provide richness and depth, enhanced through the active engagement of all, whether they be the originators or the recipients of the experience?” (p. 15). The combined use of the proposed design principles has the potential to contribute in this direction.

The Design Principles for Affectibility should direct educational applications towards more interactive systems, where learning activities can not only reflect real life (more meaningful), but actively be part of it, ubiquitously. Designers should not be limited by the examples from this article. Other uses may be further explored according to the available technology and creativity. For example, the expression of emotions can be manifested not only via textual formats; it might be interacted in body movements (e.g., strength or speed of movement) and in a collaborative and cultural rich way (e.g., traditional/typical group dances). In this paper we presented design principles aiming at improved affective responses from children, as a result of their interaction with learning technology. We derived the Design Principles for Affectibility from both empirical and theoretical research. We expect to have contributed with practical recommendations to explicitly account for affect in design processes. Future work includes deeper investigation of the principles usage, especially by other designers in their contexts, and assessing users’ feedback.

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