

# HCI Education in Brazil: Challenges and Opportunities

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**Abstract.** HCI Education in Brazil has come a long way. Since 1999, the Brazilian Computer Society (SBC) included HCI in its reference curriculum for its Computing courses. Since then, the community has discussed the perspective of the area in our country. From 2010 to this day, we have held a series of workshops on HCI Education, called WEIHC, as a permanent discussion forum within the Brazilian HCI conference, IHC. We report here the results of the WEIHC discussions and of two surveys, conducted in 2009 and in 2012, to help us assess the status of HCI Education in Brazil. Despite the advances of the Brazilian HCI community, our surveys show that we still face some important challenges. We should curate existing teaching material to further enhance collaboration among professors, to increase the quality of our courses, and to broaden HCI awareness across all related departments.

**Keywords:** HCI Education, Brazilian HCI community.

## 1 Introduction

HCI Education in Brazil has come a long way. In 1999, the Brazilian Computer Society (SBC)<sup>1</sup> included HCI as a recommended course in its reference curricula for three of its Computing courses: Information Systems, Computer Science and Computer Engineering. This inclusion brought the necessity to deepen the discussion about what was being taught in the related courses. Thus, in 2002, a first discussion on the topic was organized in a workshop during the Brazilian Symposium on Human Factors in Computing Systems (IHC) in which professors exchanged their experiences in teaching HCI. In IHC 2006, a working group on HCI Education in Brazil was organized. In 2010, the working group became a permanent workshop to take

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<sup>1</sup> <http://www.sbc.org.br/en/>

place annually during IHC, entitled Workshop on HCI Education (WEIHC). Besides the discussions fostered by the workshop, the community felt the need to have a better understanding of how HCI was being taught in Brazil, that is, which universities offered the course, was it a mandatory or optional course, was it offered at the undergraduate or graduate level, among other questions. In order to generate this view, two surveys were independently applied – one in 2009 and another in 2012. In the article, we present a summary of the discussions and the results of the surveys.

## 2 HCI Education Discussions in Brazil

The inclusion by SBC of HCI as a recommended course in the reference curricula for Information Systems, Computer Science and Computer Engineering degrees was a huge advance for the HCI area in Brazil. Courses all around the country began to include HCI as a course or as part of other courses, and the absence of a reference syllabus for teaching HCI was a great challenge to these courses' professors, who had to define which contents were essential and how they would be better taught.

In this context, in 2002, we organized a workshop on HCI education in Brazil, and professors exchanged their experiences. However, the discussions were not recorded. As the inclusion of HCI courses increased in universities, in 2006 we decided to hold, a working group on HCI Education alongside IHC. The main goal of the working group was to discuss an HCI syllabus that could be used as basis to the various HCI courses available in our universities, from undergraduate to graduate courses.

Through a process that included the submission of the syllabus of their HCI courses and direct invitation to Brazilian professors with recognized experience in the area, 15 participants were selected to participate in the working group. They represented three of our five regions in Brazil (3 from the Northeast, 3 from the South, and 9 from the Southeast) and had diverse experience in teaching HCI in undergraduate and graduate courses. From these 15 participants, 10 participated in the discussion during the conference, and the other 5 sent their contributions before then, so that everyone involved in the workshop could analyze them. The participants were divided into 2 groups to discuss the topics considered most important to be taught in the courses: one group responsible for undergraduate and other for graduate syllabus.

Considering the syllabus available for analysis and the experience of the participants, each group developed an initial recommended syllabus. The group responsible for the undergraduate course elaborated a syllabus for an introductory (and mandatory, if possible) HCI course and its related literature. As the graduate programs in the country have HCI courses with distinct focus and depth, instead of a syllabus, the participants proposed the goals of an HCI course in this context and their main topics of discussion. For graduate courses, there was no recommendation of related literature. Instead, the participants recommended a set of materials and practices to be held during the course.

From the two recommendations that resulted from the workshop [7], several refereed papers at the next HCI Education workshop held during IHC have presented studies on HCI Education in Brazil, which explored ways to implement the proposals

suggested by the 2006 working group and going even beyond what was first recommended. In the following IHC, in 2008, we did not have a specific education working group, but this topic emerged naturally during the panel “HCI in Brazil – Lessons Learned and New Perspectives” [5]. In this panel, the participants highlighted the contribution of the consolidation of the Brazilian HCI community to education, explicitly mentioning the aforementioned recommended HCI syllabus and the large number of universities offering mandatory or optional HCI courses. The participants also depicted some challenges for the future, and education was mentioned again, highlighting the need for more HCI educational material in Portuguese; for discussing the main theories and research areas of HCI with the undergraduate students; and, mainly, for discussing with them the importance of multidisciplinary dialogs. Our goal should be to prepare students to take into consideration the broad diversity of users we have in Brazil and to understand the social responsibility we have as producers of technology giving all citizens equal opportunity and access to information and services [5].

In 2010, as an answer to the HCI community’s yearnings expressed in the 2008 panel, the I WEIHC – Workshop about HCI Education was organized [1]. And, since 2010, we have held this workshop as a permanent discussion forum within our IHC conference. Every year WEIHC brings together 20 to 30 participants, representing several of the Brazilian states. In 2011 and 2012, the workshop crossed the Brazilian borders and brought professors from other Latin American countries (mostly from Chile and Colombia) to share lessons learned and to discuss common challenges and opportunities. The success of the WEIHC workshop series led the Executive Committee of the SBC Special Commission in HCI (CEIHC) at SBC to include in its executive committee an advisory position responsible for advancing HCI Education.

The main objective of WEIHC is to discuss HCI Education under two perspectives. The first one regards the syllabus being taught, and tries to identify the need for different HCI courses and their syllabi, which could be taught according to the resources and goals of the courses’ curricula. The second one is about the pedagogical practices, and aims at investigating how the contents are presented, how the students’ knowledge is evaluated and what the difficulties that students and teachers have in the Education process are. In the last three editions of WEIHC, the target audience was professors of HCI courses or of courses that included an HCI module, both in undergraduate and graduate programs, and master and doctoral HCI students who intend to become professors in this area.

Each workshop edition lasted eight hours with different activities scheduled. In 2010 the workshop started with a round table for the presentation of all participants. Then the organizers made a brief introduction on the Brazilian and international scenario on teaching IHC. Next, the eight papers selected were presented and the authors had the opportunity to answer questions from other participants on topics such as: (i) teaching strategies, (ii) the relationship of HCI and other disciplines, and (iii) HCI in the industry. The workshop continued with discussions focused on issues selected by the participants, such as: HCI in the classroom, education support, dissemination, and evolution of the area in the country. These discussions generated a list of actions and suggestions for solving the problems identified [2].

In the following year, 2011, the eight selected articles were grouped into three thematic sessions: HCI integration with other disciplines, HCI integration with extension projects, and experiences and discussions about teaching HCI. After the paper presentations, two representatives of the Usability Professionals' Association (UPA) in São Paulo were invited to share with the participants the results of a survey on the User Experience professional profile in Brazil. Once the presentations were finished, there was a discussion to define the topics of interest to be discussed by the participants, who were divided into groups. Each group had half an hour to discuss the issues and then presented their main suggestions which, in turn, were discussed by all participants as a single, larger group [3].

In the third edition, in 2012, the event schedule featured three invited lectures on the experience in teaching HCI and the relationship between industry and academia, discussing opportunities and prospects. In addition, six papers were selected, all of them presented reports of teaching experience or research of new teaching methods. Of the six papers, one reported a Chilean experience, whereas the other five were from Brazilian authors. The selected papers were about the adherence of the HCI courses to the reference syllabus elaborated by SBC, the teaching similarities across universities located in different states, and the process of teaching and learning, discussing how students appropriate the theoretical concepts of HCI when building software artifacts [4].

We observed that HCI has been taught in different semesters in Brazilian universities. In general, we can say that, in courses taught in the early semesters, the goal is to teach the students about the main interface concepts, making them aware of the importance of the interaction layer between the user and the computer system and its impacts in people's lives, and providing them with notions of best practices in user interface design and evaluation. Conversely, courses offered in the final semesters also encourage or require students to develop practical projects applying the learned HCI concepts.

The 2012 event ended with three working groups, with members of different profiles discussing the challenges of the area and, mainly, what the community could do to improve the teaching and the dissemination of the HCI area in Brazilian computing (and related) courses.

### **3 HCI Education Surveys**

We report in this section the results of two surveys that aimed at assessing the status of HCI Education in Brazil. The first one was conducted in 2009 and its goal was to collect data about how HCI courses were being taught in the country [6]. The second one was conducted in 2012 and intended to identify the opportunities and challenges in teaching HCI as perceived by the HCI community, including professors, students and professionals. It used a questionnaire produced by SIGCHI that would allow for a comparison of how HCI education was perceived in different countries.

### 3.1 2009 Survey on HCI Teaching in Brazil

The recommendation to include HCI in computing courses caused many universities to include an HCI course in their curricula. Informally, we noticed that many new courses were being offered in many different universities. In order to collect data regarding HCI teaching in Brazil we prepared a survey. To the best of our knowledge this was the first survey regarding HCI education applied in Brazil [6].

The survey collected data about the University and the department in which the course was being taught, the professors' background, the course level (undergraduate or graduate) and the syllabi of the courses being taught. The survey was conducted through the distribution of an electronic questionnaire made available for about 3 weeks, from end of November to mid December 2009. Professors who taught HCI were invited to participate through an electronic message sent to SBC's and CEIHC's electronic discussion lists. Additionally, HCI researchers from other areas (i.e., Design and Communication) were individually contacted and invited to participate, as well as to forward the invitation to other potential participants and interest lists. The majority of the participants of the survey had a computing-based background. However, this is most probably a result of the survey's distribution strategy than of how HCI courses are distributed throughout different fields. In order to have indicators in that direction, in January 2010 we analyzed the top 100 CVs in the Brazilian Lattes System<sup>2</sup> that came up in a search for the word "usability". Although the data in the CVs about the courses is usually not complete and the analysis cannot be considered conclusive, it indicated that besides the computer degrees, courses in production engineering and design also included many HCI courses.

The survey was completed by 89 professors from sixty-three 63 different universities (some were from different campi or institutes within a same university). Most of the participants (89%) were affiliated to a Computing-related department (such as Computer Science or Informatics). The universities were spread among 18 different states (out of 27) and all 5 regions of Brazil – 56% from the Southeast of Brazil; 21% from the South; 10% from the Northeast, 9% from the Middlewest and 4% from the North.

Regarding their background, 83% of the participants had their background in a computing-based course, whereas the other 17% were scattered throughout a number of different areas ranging from Communication to Engineering, including areas such as Graphic Design, Architecture and even Oceanography. Participants' degree levels also varied: 55% were PhDs, whereas 38% had a master's course, around one third of them were PhD students, and 7% were master students or had completed some other graduate course. When asked about their research fields, 67.4% listed HCI as one of their main research areas, 40% listed Software Engineering, 38.2% listed computers and education and 18% listed collaborative systems. Other fields of research scattered in many areas, varying from Information Science, to Cognitive Neuropsycholinguistics and Computer Networks.

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<sup>2</sup> The Brazilian Lattes System (<http://lattes.cnpq.br/>) is a system in which widely used by data repository for CV system funding agencies and universities in Brazil, and most professors and graduate students in the country have their CV registered in the system.

Participants were asked to list all the courses they taught and to inform for each one of them whether it was an undergraduate or graduate course and its syllabus. In total 141 courses were described. Most professors (59%) entered one course into the survey, but a few (7%) listed four different courses. Of the 141 courses, 57% were for undergraduate degrees, 23% for graduate degrees, 18% were offered both to undergraduate and graduate programs and 2% did not answer.

The professors entered the syllabus in different levels of detail. In order to analyze them we classified them in three distinct levels, according to the topics they covered. Each course was classified as:

- HCI module: Includes an HCI module in a course in a related area;
- Introductory: Introduces basic HCI concepts and gives a general overview of HCI field;
- Advanced: Focuses in a specific HCI topic;

Most courses (81 out of 141 or 57%) were classified as introductory courses. Most of the courses partially covered the syllabus proposed by the HCI community, and only a few (around 5) covered the whole syllabus. Some of them directed the course to a focus, such as usability, ergonomics or a specific technology. Finally, a few adopted the first syllabus proposed in the SBC reference curriculum. Out of the 141 courses, 39 (or 28%) were considered Advanced. They covered a varied range of HCI topics, such as 3D interaction, Interfaces for Games or Semiotic Engineering Theory of HCI, among others. The remaining courses (21 out of 141 or 15%) were HCI modules and were taught mainly in Software Engineering, Computer Graphics or Distance Education courses.

The survey provided a good initial view of HCI teaching in Brazil, at least in computer-based degrees. However, the results are not meant to be statistically representative, since we did not have a known universe of the HCI professors in Brazil.

### **3.2 2012 Survey on HCI Education: Challenges and Opportunities**

The SIGCHI/ACM HCI Education working group conducted an exploratory investigation on HCI Education [8], which led them to prepare an online survey. This survey was lent to us from the Brazilian HCI community to translate and apply to our HCI students, researchers, and professionals.

In addition to demographic data, the survey contained five sections: disciplines related to HCI, exploring the multidisciplinary nature of the area; topics and application areas, both traditional and emerging; design and empirical research methods; challenges to HCI education; and resources for HCI education, in the form of books, conference (and their proceedings), and journals.

Participants were invited via mailing lists and social networks, and they were also asked to propagate the invitation to anyone who might be interested. The survey was completed by 109 people, mostly with a Computer Science background

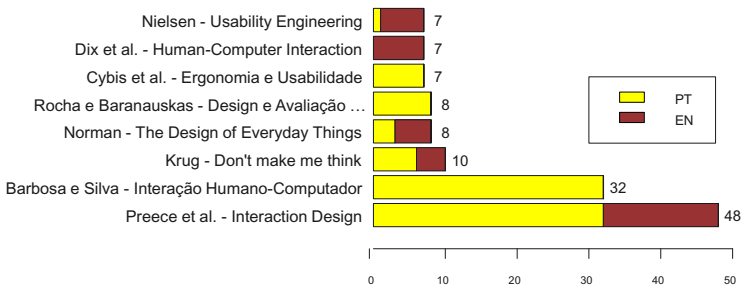
(see Table 1): 49 professors and researchers, 45 students, and 10 practitioners, from a wide range of age groups and from the five geographic regions in the country, with a few respondents from abroad.<sup>3</sup>

**Table 1.** Respondents' ages and geographic regions

background	respondents	age	respondents	region	respondents
Computing	57 (52.3%)	20 or less	3 (3%)	CO	3 (3%)
HCI	29 (26.6%)	21 a 30	40 (37%)	N	3 (3%)
Design	9 (8.3%)	31 a 40	40 (37%)	NE	14 (13%)
Psychology	3 (2.8%)	41 a 50	20 (19%)	S	18 (17%)
Other	10 (9.2%)	51 a 60	4 (4%)	SE	68 (62%)
		61 or more	1 (1%)	abroad	3 (3%)

Because the HCI area has first matured in the Southeast (SE), we had more respondents from that region, followed by the South (S) and the Northeast (NE).

**Teaching Resources.** The survey included a few open questions regarding teaching resources. Most of the books with a high mention count (7 or higher) were either written by Brazilian authors or had a Portuguese translation (Figure 1). This result is in line with discussions held during our HCI Education workshops, regarding the need for high-quality teaching material in Portuguese.



**Fig. 1.** Recommended books that received three or more mentions. PT = in Portuguese, EN = in English.

**Challenges Related to HCI Education.** The survey contained four questions related to HCI education, with answers ranging from 1 (very easy to address) to 5 (very significant challenge), in addition to 0 (I don't agree this is a challenge). Table 2 presents a summary the results, together with an indication of the significant differences (resulting from a Wilcoxon test) between respondents with different profiles.

<sup>3</sup> As with the previous survey, the population of HCI professors, researchers, students and practitioners is unknown, and as such we cannot claim to have reached a representative sample.

**Table 2.** Differences in opinion regarding HCI education challenges from respondents with different profiles (A = professors and researchers, S = students, and P = practitioners)

	A	S	P	Wilcoxon		
<b>1. Integration of HCI Education and Practice</b>	$\bar{X}$ (SD)	$\bar{X}$ (SD)	$\bar{X}$ (SD)	<b>AxS</b>	<b>AxP</b>	<b>SxP</b>
a. adopting a common curriculum	3.71 (1.72)	4.04 (1.31)	4.30 (1.83)			
b. advocating the importance of HCI to computer scientists	4.18 (0.93)	4.44 (0.84)	4.50 (1.35)			
c. advocating the importance of HCI to the general public	4.00 (1.17)	4.33 (0.85)	<u>5.00</u> (0.67)	*	*	
d. applying practical activities + conceptual approaches	3.78 (1.21)	4.22 (1.13)	<u>5.00</u> (0.82)	*	*	
e. forming a unified theoretical perspective	3.24 (2.03)	4.18 (1.47)	4.40 (1.84)			*
	A	S	P	Wilcoxon		
<b>2. HCI Education as an Interdisciplinary Area</b>	$\bar{X}$ (SD)	$\bar{X}$ (SD)	$\bar{X}$ (SD)	<b>DxE</b>	<b>DxP</b>	<b>ExP</b>
a. how to approach HCI as a complex interdisciplinary field	3.92 (1.26)	4.29 (0.94)	4.60 (0.52)			
b. representing breadth and interdisciplinarity in HCI	<u>3.82</u> (1.17)	4.36 (1.13)	4.80 (0.79)	*	*	
c. representing depth in HCI	3.98 (1.09)	4.56 (0.81)	4.40 (0.97)	*		
d. sufficient practice in HCI	4.18 (0.88)	4.49 (0.89)	4.60 (1.43)			
e. sufficient theory in HCI	3.94 (1.11)	4.29 (1.04)	4.00 (1.56)			
f. building on previous education to reach mastery	3.73 (1.34)	4.24 (1.42)	4.40 (1.58)			
	A	S	P	Wilcoxon		
<b>3. HCI Education with a Range of Perspectives and Goals</b>	$\bar{X}$ (SD)	$\bar{X}$ (SD)	$\bar{X}$ (SD)	<b>DxE</b>	<b>DxP</b>	<b>ExP</b>
a. supporting different or parallel curricula to reflect unique student needs	3.57 (1.83)	3.89 (1.68)	<u>4.90</u> (0.88)	*	*	
b. supporting a flexible curriculum to reflect unique student needs	3.82 (1.42)	4.42 (1.14)	4.30 (1.06)	*		
c. teaching students with a range of perspectives and goals	3.96 (1.21)	4.53 (1.08)	4.20 (1.40)	*		
d. including a common introductory course in HCI curricula	3.51 (1.32)	4.09 (1.26)	3.50 (1.78)	*		
e. offering similar courses targeting different audiences	3.16 (1.75)	4.07 (1.29)	3.30 (1.89)	*		
	A	S	P	Wilcoxon		
<b>4. HCI Education in Academia</b>	$\bar{X}$ (SD)	$\bar{X}$ (SD)	$\bar{X}$ (SD)	<b>DxE</b>	<b>DxP</b>	<b>ExP</b>
a. advocating the importance of HCI in different departments	4.02 (1.20)	4.36 (0.98)	5.00 (0.82)	*		
b. finding a home for HCI in smaller institutions	3.98 (1.49)	4.13 (1.34)	4.70 (1.77)	*		
c. encouraging interdisciplinary collaboration	4.14 (1.06)	4.44 (0.99)	4.90 (1.10)	*		
d. fostering collaboration between different programs	4.27 (1.13)	4.44 (0.81)	4.90 (0.99)	*		
e. respecting different epistemologies	4.12 (1.25)	4.20 (1.06)	<u>5.00</u> (1.05)	*	*	
f. situating HCI within academia	<u>3.65</u> (1.52)	4.42 (0.97)	4.40 (1.96)	*	*	

**Academy–Industry Integration.** Most respondents believe that current HCI education in Brazil targets academia over practice. Ironically, students have a more optimistic view than professors and researchers about the sharing of research results with industry (Table 3).

**Table 3.** How do you see the relation between academia and industry in HCI education?

	A	S	P	Wilcoxon
	$\bar{X}$ (SD)	$\bar{X}$ (SD)	$\bar{X}$ (SD)	<b>AxS</b>
■ HCI education prepares students more to academia than to industry.	3.78 (1.16)	3.78 (1.06)	4.40 (1.35)	
■ HCI education prepares students more to industry than to academia.	2.47 (1.31)	2.53 (1.24)	2.90 (2.08)	
■ Not enough research is shared between academia and industry.	4.51 (0.79)	4.11 (1.05)	4.40 (1.17)	*
■ There are divides between academia and industry.	4.53 (0.94)	4.36 (0.93)	4.60 (1.07)	

These results point to the need to address the challenges the community finds relevant, but also to investigate more deeply the root causes for the differences in



respondents' opinions so we can better satisfy the needs and expectations of all parties interested in HCI.

## 4 Discussion: Challenges and Opportunities

The workshops in HCI education have created a forum for the HCI community to exchange experiences regarding HCI education, discuss the challenges involved and work on plans of actions to deal with them. The 2009 survey collected a first set of data regarding HCI teaching throughout Brazil. In some departments, HCI is a mandatory course, in others it is an elective course or not yet offered. Some departments offer one or two additional elective disciplines, which usually explore HCI evaluation, design methods and techniques in depth.

The analysis indicated that, although many professors used the HCI syllabus proposed by the community in 2006, it may include a broad range of topics that cannot usually be covered in one course. On the one hand, this broad coverage has allowed professors to tailor their courses to their teaching context, on the other it has not been able to create a more structured proposal that could be followed by professors. In the 2012 survey adopting a common curriculum was also perceived as a challenge, mainly by practitioners. These results justify the effort in WEIHC to define specific syllabi more appropriate to different contexts.

Because Brazil is a Portuguese-speaking country, most professors tend to recommend in their courses material written in this language, creating an increasing demand for updated resources. The Brazilian HCI community has faced this demand by producing at least five high-quality HCI textbooks in the past ten years. From the top ten books recommended in our 2012 survey, three were written in Portuguese, five were translated from English to Portuguese, and two were in English.

As the community has matured, ties between academia and industry have also been fostered, so much so that CEIHC has also established an advisory position for an industry representative, who has worked with CEIHC to find ways to increase practitioners' participation in our national event. While industry participation in IHC may still be viewed as timid, once a company has sent one or more representatives to an edition of our conference, it has kept sending them to its next editions. Their participation has had at least three positive effects:

- it has made us increasingly aware of their goals and needs regarding the education of HCI professionals;
- it has clearly demonstrated to students the importance of HCI research and practice; and
- it has resulted in fruitful collaboration projects.

Some efforts have been made to increase students' awareness and interest in HCI. In that direction, in the past three editions of IHC we have held a student evaluation competition, which has attracted submissions from all over the country, often resulting from an articulation of the proposed competition challenge with class projects.

## 5 Conclusions and Future Work

Despite the advances of HCI Education in Brazil, our surveys show that we still face some important challenges. First, we need to further strengthen our ties with industry, to ensure our students will find a good HCI position after they graduate, and with university departments (both CS and otherwise), to form professionals that are comfortable with the interdisciplinary work required of HCI. Second, we should promote continuous education programs to keep our professors up-to-date on the latest developments in HCI Education. Finally, we should curate existing teaching material to further enhance collaboration among professors, to increase the quality of our courses, and to broaden HCI awareness across all related departments. To do so, our first step is to continue collecting data on HCI education. Thus, a new version of the 2009 survey to collect information about courses and how they are being taught is being prepared to provide updated information and insights on how HCI teaching has evolved. Other initiative is to advance HCI in the other regions. In 2012, IHC was held in the Middlewestern (CO) region, and in 2013 it will be held in the Northern (N) region. With this purposeful movement, we intend to have critical mass throughout the country in the near future.

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