GamifiCHI: thematized badges for HCI courses

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ABSTRACT

Schools and universities face the great challenge of keeping students engaged in learning activities, and research communities strive to keep and share their history and culture. Among several methodological approaches, gamification has been used as a resource combined with teaching methodologies to engage and keep students participating. However, gamification strategies have been mainly applied detached from the substantial meaning from the disciplines and activities worked with students. In this paper, we propose to thematize gamification elements, such as badges, with relevant content for HCI classes. We propose a set of 50 badges thematized with distinguished researchers from the HCI community, both in local and global scenarios, and suggest a structure to support using and adapting this set of badges to gamify HCI classes. Exemplifying badges applicability and contribution, we present results from their instantiation to gamify three HCI courses in three different universities. The set of thematized badges is openly available for download and reuse.

CCS CONCEPTS

• **Human-centered computing → Empirical studies in HCI**.

KEYWORDS

Gamification, HCI Education, Badges, HCI Professionals.

1 INTRODUCTION

Students often see the school and teaching as boring [7, 8] and as something that often fails to arouse their interest and motivation. For Lee and Hammer [10], although teachers strive for novel instructional approaches, today's schools and universities face major problems around student motivation and engagement. With the current scenario of virtual classes due to the social distance caused

by COVID-19, the challenge has become even greater, requiring adaptations for and from all the interested parties.

Among different methodological approaches, such as using games, adopting inverted classroom, peer instruction, problem and project-based learning, gamification arises as an alternative to promote students' engagement [7]. To Deterding et al. [6], gamification is "the use of game design elements in non-game contexts". In gamification, the emphasis is on using game design elements, such as points, badges, leaderboards, levels, for instance, to promote a target behavior. The authors highlight the relevance of using gamification to "motivate and increase user activity and retention". For Dicheva et al. [8], using educational games as learning tools is a promising approach due to games' abilities to teach, reinforcing not only knowledge but also important skills such as collaboration and communication.

However, only adopting games or game elements is not enough to produce significant changes in education. In 1998, Papert [13] warned of a common problem when combining entertainment and education: maintaining the bad characteristics of both while losing the good ones, therefore resulting in poor educational technologies that both fail to entertain and educate. This problem can affect gamification effectiveness as well if gamification strategies are not meaningful for students. When using badges, for instance, beyond leaderboards and beyond using gamification strategies to increase students' engagement, fun and motivation [4, 5], we can use them associated with the substantial meaning from the courses and activities worked with students – i.e., we can *thematize gamification*. In education, thematized gamification has the potential to make both gamification and teaching more interesting, favoring a gamification that informs and adds to students experiences and knowledge, and promoting classes that are more interesting, engaging and dynamic.

Thematizing gamification is all about giving substance to gamification, making it not only engaging and motivating but also informative, situated and relevant for the context it is being applied. In our research, on the one hand, we are gamifying HCI classes by using badges for specific tasks and challenges; and on the other hand, we are thematizing gamification by creating badges informed by the content to be taught and the experiences to be shared. This thematized gamification combines the engagement and motivational power of gamification with interesting and relevant information from the course and related issues.

In this paper, we present a proposal of thematized badges to be used in HCI courses. In our proposal, a set of 50 thematized badges representing local (Brazilian) and global HCI researchers was created to gamify activities in HCI courses. We applied the 5W2H Framework [9] which offers 7 dimensions to support gamification design, exemplifying them in our context. Beyond the structure using the 5W2H dimensions, we also provide a set of steps for other colleagues to follow and instantiate the thematized badges in

their contexts. Our work was iterative and incremental, improving both the produced material and our understanding about it and its application.

Beyond trying to engage users in classroom activities, we also aim to arouse curiosity and increase their knowledge about the HCI research community. Scientific communities need not only to maintain the memory of their researchers but make it more notorious. In this sense, Sarmadi et al. [14] informs that "academic culture is an implicit pattern of meanings which is expressed as symbols such as actions, tokens, artifacts and other meaningful categories by which scholars communicate and share their common experiences, perceptions and beliefs". Making explicit – through the badges – noted HCI researchers from our communities, our proposal can be used to provide academic knowledge about them, as well as to highlight their importance and contributions.

This paper is organized as follows: we talk about gamification in education in Section 2; about our set of thematized badges and the method we applied to produce and evaluate them in Section 3; then we present an ongoing Case Study, in Section 4, where we have applied and evaluated our set of badges and collected exploratory feedback from 63 students from three universities – in this section we also present five steps and tips to support other teachers when applying badges to gamify their classes. Finally, Section 5 presents our final remarks and directions for future research and practice.

2 GAMIFICATION IN EDUCATION

The 5W2H Framework understands that Gamification uses several elements of games to obtain a significant response from users in relation to a specific objective [9, 18]. The framework adopts Werbach and Hunter's [17] hierarchy to classify gamification elements into Components, Mechanics, and Dynamics. The *Components* are the game design elements, as cited before; the *Mechanics* encompass processes as competitions and cooperation, challenges, feedback, and rewards, for instance; and the *Dynamics* represents aspects controlled by the gamification but achieved by the other elements, such as emotions, progress, rules and relationships. The 5W2H Framework offers 7 dimensions to support gamification design: Who? What? Why? When? Where? How? and How much? – exemplifying them in the context of educational systems. These dimensions help designers or teachers to think of their target audiences, goals and expected results when designing gamification strategies [9].

The design, evaluation and use of gamification elements have been also investigated in the HCI field. Seaborn and Fels [15] present a systematic survey on gamification from a human–computer studies perspective. The authors highlight that "*little empirical work has sought to validate gamification as a meaningful concept and provide evidence of its effectiveness as a tool for motivating and engaging users in non-entertainment contexts*", claiming for studies that can be replicated, compared, and conducted in a longitudinal style.

Considering badges, the game design element used in our research, Dicheva et al. [8] define them as rewards for special achievements and as a basis for ranking the users on leaderboards "*that reflect their performance in comparison to other users*". Badges have been explored in both HCI and Education literature with promising results. In [11], badges were used to incentive specific student behaviors (e.g., completing a task before the deadline or providing

a helpful feedback) in an online course management. Possible positive effects from their use were identified. Denny [5], in turn, report on a large-scale randomized and controlled experiment designed to measure the impact of using badges in an online learning tool. The author found out that badges had a significant positive effect on the quantity of contributions produced by students without reducing their quality; results also demonstrated a positive effect on the time students engaged with the tool, and revealed a positive feeling from students towards the possibility of receiving badges.

In HCI teaching, Silveira [16] proposes a set of 15 physical badges (stickers) to gamify HCI classes. Badges were related to different kinds of activities, such as creating scenarios, evaluating a system, participating in games, achieving a specific goal, etc., conducted in different forms (individual, in groups, at home, in class). Based on data from students' participation in classes and from their feedback via survey, results suggested that badges had a positive impact on students' satisfaction, as well as on the class attendance. Although conducted in traditional classes (not online), we consider this study as the most relevant one for our research, as it shows positive impact of using badges to gamify an HCI course and offer examples to support other teachers to replicate the initiative.

The 5W2H presupposes that Gamification can improve the user experience by promoting motivation, fun and engagement, and all the previous cited research were focused on offering different types of badges to create leaderboards, motivate students, and make them more engaged to different educational activities. However, badges were usually generic representations for the behavior they were supposed to promote – e.g., a badge for achieving a top ranking position is a trophy representing that position; a badge for recognizing a high quality work shows a star with a "Great Job" label; or a badge for concluding reading activities is presented as a book icon only. Badges representing something directly related to the activity they are intended to gamify or the knowledge students were expected to develop are not usually explored, and this is what we propose to explore with thematized gamification.

3 BADGES FOR HCI CLASSES

Teaching and researching in HCI, we (the three authors) have experienced gamification in education, both in face to face classes and via Learning Management Systems. Knowing the interests and experiences of each other, we decided to apply badges as a gamification strategy for the disciplines we teach at our universities, creating a set of badges that could be (re)used and customized for HCI disciplines with different topics and activities. Moreover, we were not interested in using badges only, but in investigating their potential as another teaching strategy, presenting students to relevant names and themes for both the global and the local (Brazilian) HCI communities. We wanted to create and experience a set of Thematized Badges for HCI Classes – the GamifiCHI Project.

For this study, we draw on Oulasvirta Hornbæk's notion of HCI constructive research problems [12] – grounded in Laudan's theory of scientific progress in Philosophy of Science. In constructive problems, research and its results both help us to better understand the problem and advance our knowledge on how to solve it. In constructive research, researchers have an active role, developing

prospective solutions and analyzing their outcomes. Therefore, research happens in a situated context and both influences and is influenced by it.

The main reasons why the research was conceived and conducted by 3 researchers, PhD in Computer Science who research and teach in HCI, working in 3 different universities, is to reinforce rigor in the study design, to reduce bias from the research situated context, to improve the quality of discussions, and to ensure the replicability of the study.

In this section, we present the method followed to create our set of thematized badges, the list of 50 badges, and two detailed examples of badges. The complete information for each badge is available for download and reuse under the Creative Commons Attribution 4.0 International (CC BY 4.0) license[1].

3.1 Method

Conducting a Design Thinking-inspired [1, 2] method to produce our set of badges, during 13 weeks, from March to May 2021, we conducted individual work and met online once a week to socialize results and discuss our progress. Each weekly meeting lasted about 1 hour. Figure 1 represents the main stages and their principal activities.
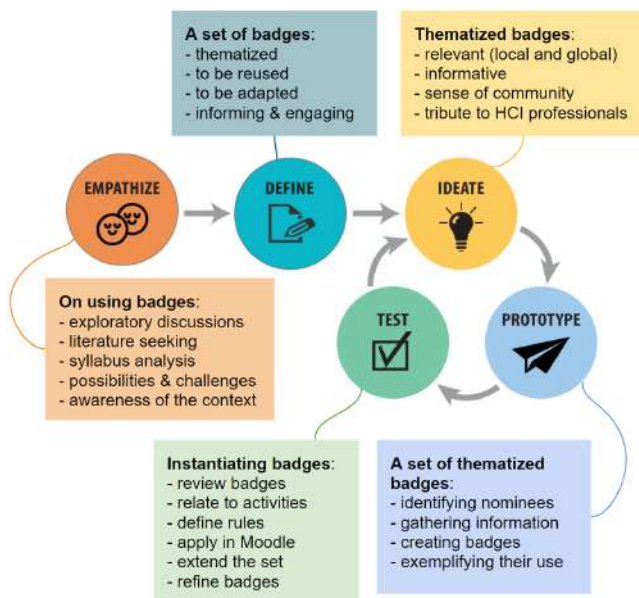

Figure 1: Design Thinking-inspired method.

I. Empathy and Immersion: for the two first meetings, we read and discussed Silveira's paper about badges for gamifying HCI classes [16] as it is the very first paper on the subject published in the Brazilian HCI Conference. We also considered the dimensions from the 5W2H Framework to raise ideas as this framework is intended to inform the design and evaluation of user-centered gamification [9]. Based on this discussion, we analyzed the syllabus and activities of three HCI courses we offer in our universities (one

from each author), and considered possibilities and challenges for using badges to gamify our classes. We also socialized our lessons learned from previous experience with gamification and badges in HCI classes.

II. Definition: in the following meeting, in a brainstorming session we defined our goal: to create a set of badges that could be applied to different courses, and that could be (re)used and adapted according to the courses' characteristics and according to teachers' needs and interests. From this stage, we also defined that badges should offer something valuable for students, extending the engagement purpose to the educational one: badges should be thematized, serving to both engage and inform on relevant subjects for HCI.

III. Ideation: in another brainstorming session, we raised ideas for thematized badges. Existing badges that the first and the third authors had already used for HCI classes were analyzed, and different styles of badges were proposed, such as badges related to HCI concepts and theories. From the different ideas produced, we decided to thematize badges with HCI professionals who have contributed to the global or local (Brazil) research communities.

The main motivation for this decision was the importance of presenting people and their scientific, educational and technical work to students, also sharing information regarding the HCI field and knowledge about the HCI community in Brazil and abroad. This kind of knowledge is not easy to disseminate in classroom activities as it is usually lived, experienced and shared by the members of a community. Knowledge about the history of the field and distinguished researchers, and of our Brazilian HCI community, would hardly be discussed as a topic in our disciplines. Therefore, the thematized badges could help to disseminate a little bit of the history of HCI and our local community by introducing to students the researchers and their contribution to the field. The thematized badges would also represent a tribute to researchers we respect and who have inspired us during our career.

IV. Prototyping: for prototyping our preliminary set of badges, we conducted the following activities:

1 *Identifying nominees for the set of badges:* individually, we created a list with the names of researchers each of us would nominate for our set of badges. A justification for the nomination should be included, preferably explaining the nominee's relation to a research topic (e.g., Accessibility), a task or activity for students (e.g., Usability Evaluation), or because of a personal attribute (e.g., Great communication skills, Creative mind). Nominees should be authors of books or scientific papers relevant for HCI and to be active in the HCI community, in Brazil or abroad;

2 *Building a preliminary set:* in a synchronous meeting, each nominee was presented and analyzed by the 3 authors. The names appearing in all the 3 individual lists were selected directly to our preliminary set of badges. Names appearing in one or two lists only were discussed and selected for the set when at least two researchers agreed. A total of 34 names, 18 from the Brazilian community and 16 from the global HCI community, were initially included in our preliminary set;

3 *Creating badges:* using an online spreadsheet, we worked collaboratively to create badges for each one of the 34 names.

Each badge had the following information: i. Researcher's Name; ii. Image: a photo publicly available on the web (e.g., personal website, social networks); iii. A short biography and information about the person's contribution to the HCI fieldcommunity; iv. A link to the person's publication list (e.g., Google Scholar profile, personal website); v. Examples for awarding the badge: its meaning, tasks related to it, and the conditions or possibilities for earning it.

V. Testing/Evaluating: we conducted two activities to refine our preliminary set of badges: we revised the set of badges in a collaborative way (1), and then we applied the set to gamify our classes (2).

1. *Collaborative revision:* individually, each of us reviewed the information and made the necessary adjustments, taking notes of doubts and problems. After the individual revision, all notes were discussed and fixed in a synchronous meeting;

2. *Instantiate the set of badges for our classes:* using the Moodle Learning Management System available in our different universities, we instantiated the set of badges to gamify our classes, registering our individual process, observations, and usage decisions. Using the agenda for our disciplines, we mapped the activities that could be gamified with badges and, individually, for each activity, we:

   A. Selected a badge to be granted when finishing the activity – badges were selected based on their suitability for the task (e.g., research topic, experience, personal attribute);
   B. Adjusted the description of the selected badge, improving it or adding contextualized information (e.g., a curiosity, a reading suggestion);
   C. Defined the rules for assigning the selected badge, indicating the necessary criteria for receiving it (e.g., finishing the activity before the deadline or receiving a specific grade for it);
   D. Customized the message to be sent to students when receiving the badge (e.g., Congratulations! You received the badge *<name of the person>* because of *<reason>*);
   E. Created, configured and enabled the badge in our disciplines according to the defined in the previous steps.

Each of us used a subset of our badges for a different range of activities. We registered our actions and adjustments, and socialized our experiences with each other in an online meeting. During the application of our initial set, we: i) created new badges for specific activities, ii) used different badges for a similar activity, and iii) used a same badge for different activities according to our teaching contexts.

Based on our notes and discussions, we improved the badges' descriptions and extended our set from 34 to 50 names: 25 from the Brazilian HCI community (see Table 1) and 25 from the global HCI community (see Table 2) – the first and the third authors are present in the list because they were included by the other authors. The resulting set is, naturally, influenced by our courses, the topics we were approaching, as well as our knowledge and experience: therefore, this set is by no means complete or definite, but a starting point from which other teachers can (re)use, extend and adapt.

Going through the five main stages inspired by Design Thinking and alternating individual and collaborative work in both synchronous and asynchronous mode, we produced a set of 50 thematized badges that can be (re)used and adapted to gamify HCI classes. Although described in a straight form in the cited stages, our work was iterative and incremental, improving both the produced material and our understanding about it and its application.

Table 1: Thematized Badges: Brazilian HCI Community.

Amanda M. Melo	Carla Leitão	Clarisse S. de Souza	Cristiano Maciel	Ecivaldo Mattos
Frederick V. Amstel	Isabela Gasparini	Junia C. Anacleto	Lara S. G. Piccolo	Laura García
Lucia V. L. Filgueiras	Luciana A. M. Zaina	Luciana C. Salgado	Marcelo Pimenta	M. Cecilia C. Baranauskas
M.Elizabeth Furtado	Milene S. Silveira	Raquel O. Prates	Roberto Pereira	Silvia A. Bim
Simone D. J. Barbosa	Simone Bacellar	Sérgio R. P. da Silva	Tayana Conte	Vania P. A. Neris

3.2 Thematized Badges

Drawing on the 5W2H Framework's dimensions [9], we refined our proposal and characterized it according to the framework's elements and dimensions. Mapping our initiative into a structured scheme is useful to characterize it in the gamification literature, as well as to enable its (re)use and extension.

According to the 5W2H Framework classification, our proposal is a gamification strategy using Badges as a gamification component. This component will be related to different mechanics, such as Challenges, Reward, Feedback and Cooperation which, in turn,

Table 2: Thematized Badges: Global HCI Community.

Alan Cooper	Alan Dix	Abigail Sellen	Batya Friedman	Ben Shneiderman
Brian Burke	David Benyon	Donald A. Norman	Elizabeth Churchill	H. Rex Hartson
Helen Sharp	Helen Petrie	Jenny Preece	Jakob Nielsen	John M. Carroll
Jonathan Lazar	Liam Bannon	Lucy Suchman	Paul Dourish	Steve Krug
Susanne Bodker	Terry Winograd	Tim Brown	Tom Moran	Yvonne Rogers

Table 3: Thematized badges on the 5W2H Framework [9].

Dimensions	
Who?	HCI teachers using badges for their classes HCI students receiving badges for achieving goals HCI professionals being represented in badges.
What?	badges representing HCI professionals who made important contributions to the HCI field or have played important roles in the global and local communities.
Why?	engage students, provoke their curiosity, introduce them to the HCI community, share knowledge about people and their work; promote interest to know more about HCI literature and people, etc.
When?	during HCI classes when students complete activities or achieve predefined goals; badges can be granted for different kind of activities: administrative or *controlling* ones when students must organize themselves (e.g., registering in a learning system; forming groups for collaborative work); *communication* ones when students must engage or interact in classes or with each other (e.g., helping colleagues, debating, asking questions); and *substantive* ones when students must reach or show distinguished results (e.g., excellent reports; rigorous planning; creative presentation).
Where?	in online or physical classes, badges can be attributed both in digital (e.g., in a Learning Management System) or printed formats (stickers); badges can also be used for activities and challenges in workshops, conferences, quiz, among other possibilities.
How?	for each activity proposed to students, teachers can specify conditions (deadline, task requirements, minimum quality) that, if met, grant students one or more specific badges; teachers may vary the difficulty level or effort necessary to obtain different badges.
How much?	we suggest to use at least one different badge for each activity assigned to students; teachers must ensure students will be introduced to a quite diverse set of badges (e.g., gender, topics, nationality/region, etc.), and can relate more than one for a specific activity.

will promote different dynamics, mainly related to Emotions (motivation, engagement) and Progress (activities, challenges). For our work, we identified the framework as useful to help us to characterize our set, using its dimensions when conceiving our set of thematized badges as a gamification element. Table 3 presents an overview of our thematized badges proposal according to the 5W2H's dimensions.

Table 4 presents two thematized badges from our set. Teachers can (re)use these badges when gamifying their HCI classes or use them as an inspiration and starting point for creating their own badges. Valuing the teaching situated context, we strongly recommend new badges to be included and badges to be customized according to the themes and topics being taught, the activities being planned, as well as according to relevant events and facts related to HCI professionals from local communities.

4 EXPLORATORY CASE STUDY

As part of the *Test stage* in our Design Thinking-inspired method (Section 3), we applied our set of badges to gamify three HCI courses.

This activity both helped to refine our set of badges, extending and improving it, and allowed us to identify steps that can help other researchers/teachers when gamifying their courses. Moreover, this experience gave us a real environment to use our badges and to ask feedback for our students, investigating students' perceptions regarding thematized badges.

4.1 Thematized Badges in Action

Each of us, the three authors, selected one HCI course we offer in different universities in Brazil for Computer Science undergraduate and graduate students: 1. Federal University of Paraná (UFPR), 2. University of São Paulo (USP), and 3. Pontifical Catholic University

Table 4: Examples of Badges.

Badge	Details
Donald A. Norman	Donald A.Norman holds a Doctorate in Psychology from the University of Pennsylvania and an Honorary Doctorate from the University of Padua, Italy. He was a Computer Science professor at Northwestern University and of Psychology and Cognitive Science at the University of California. Norman served at Apple Inc. as vice president of Apple's Advanced Technology group and for Hewlett-Packard. Co-founder of the Nielsen Norman Group, a usability consulting group that also includes Jakob Nielsen, Norman today works to help technology companies structure their product and business lines. His main emphasis is on design strategy: how designers and design thinking can help drive incremental and radical innovation within the company. Norman has hundreds of publications and several extremely popular books. The book "The Design of Everyday Things" is one of the great classics in the HCI area. In 2006, Norman received the Benjamin Franklin Medal in Cognitive and Computer Science. Norman is one of the most cited researchers in the world, with more than 120 thousand citations by 2021. Norman's publication list.
Clarisse S. de Souza	Clarisse Sieckenius de Souza is a Computer Scientist, writer and emeritus professor in the Department of Informatics at PUC-Rio, where she researches in HCI and has developed her Semiotic Engineering Theory. She is the founder of SERG (Semiotic Engineering Research Group) and has received several national and international awards for her career contributions to education, science and technology. In 2010, Clarisse was awarded the ACM Rigo Award for her contributions to Communication Design; In 2013, she was the first Brazilian to join the CHI Academy, and in 2014 for the IFIP TC13 Pioneers of HCI Award. In 2017, Clarisse received the Outstanding HCI Career Award, awarded by the Special HCI Commission of the Brazilian Computer Society. In 2015, Clarisse became the first Brazilian to be honored in the Notable Women in Computing, a project maintained by Duke University which values women participation in Computer Science: her face became part of a thematic deck where each card is an honored scientist (Clarisse is the 10 of spades card). A pioneer in HCI research and teaching in Brazil, Clarisse continues to work, supporting and inspiring generations of researchers. De Souza's publication list.

of Rio Grande do Sul (PUCRS). Lasting 60 hours, the three courses cover different topics, ranging from more theoretical foundation to design and evaluation techniques. HCI basic concepts, evaluation methods and design processes are present in the three courses, usually involving both theoretical and practical activities.

Due to the pandemics caused by the COVID-19, we are offering online classes supported by different technologies and by the Moodle Learning Management System. Moodle offers a module that allows to create and assign badges to students according to predefined criteria. Individually, each of us instantiated the set of badges to gamify our classes regarding activities and tasks students were required to develop. Courses from UFPR, USP nad PUCRS were gamified with 17, 19 and 12 badges, respectively. See Table 5 for an overview.

Table 5: Courses' characteristics.

#	UFPR	USP	PUCRS
Course	Human-Computer Interaction	User-Computer Interaction	Fundamentals of HCI
Level	Undergraduate and Graduate	Undergraduate (U) + Graduate (G)	Undergraduate
Classes	Once a week	Twice a week	Twice a week
Workload	60 hours	60 hours	60 hours
Students	67	58 (U) + 19 (G)	39
Badges	17	19	12

Results also provided evidence of our badges capacity to be (re)used and adapted according to our needs and the characteristics of our different courses. Existing badges were selected from our preliminary set, and new badges were created from the scratch or by combining existing ones for specific activities.

Exclusive and adapted badges: *BR-CHI* is a badge created specially to recognize and disseminate the initiative and work of the SIGCHI Brazilian Chapter, which is offering biweekly online and open seminars with Brazilian HCI researchers. This badge was assigned to students who watched a seminar about accessibility as an activity proposed in PUCRS. *The Sisters* badge, in turn, was created by combining the badges of two Brazilian researchers, *Isabela Gasparini* and *Luciana Zaina*, who are used to work together in several research and teaching initiatives and are very often mistaken (or purposely taken) as sisters. Because these researchers are known by their collaboration and support to other researchers and students in the Brazilian HCI community, this badge was assigned at UFPR to students who helped other students in their tasks, doubts and homework. More than a ready-to-use set, these examples show that our set of thematized badges support the creation of new badges relevant to specific topics or objectives from the different courses.

Our badges can be used to gamify any activity where students must do something, from finishing a task to helping other students; from participating in classes to achieving 100% attendance; from developing a high quality work to demonstrating persistence during the proposed activities. The two most important points for teachers when deciding to gamify their classes are: 1. knowing what behavior they want to promote or value, and 2. selecting an appropriate badge to the expected behavior.

The same badge, three different activities: for our courses, we used a same badge to gamify different activities, adding contextualized information to it. Considering how we instantiated the badge *Simone D. J. Barbosa*:

- UFPR: to earn this badge, students must finish a wiki article about an HCI evaluation method respecting the proposed deadline;
- USP: to earn this badge, students must show a great performance when completing an specific activity related to eliciting requirements;
- PUCRS: to earn this badge, students must offer good or bad examples of HCI important concepts, such as communicability, accessibility, and UX.

For UFPR, the badge's description highlights that Simone Barbosa will be the Program Chair of ACM CHI 2022. For both USP and PUCRS, badges' descriptions highlight that Simone Barbosa is coauthor of the main HCI textbook in Brazil. This example show that a same badge can be (re)used for different activities, granted with different criteria, and adapted with different details and information relevant to its usage context.

The same topic, three different badges: our courses cover a set of common topics, mainly the ones related to HCI basic concepts. For our three courses, we decided to gamify activities related to the Accessibility topic and selected different badges for that. Considering how we instantiated three different badges for activities related to Accessibility:

- UFPR: the activity related to Accessibility was to select an accessibility evaluation method and apply it to evaluate a specific digital game produced in Brazil; *Amanda Melo*, the selected badge, is a researcher known by her pioneer work on inclusive accessibility, a topic of critical importance for digital games as well;
- USP: the activity was to apply the Simplified Accessibility Evaluation Method[2] to evaluate an e-commerce system prototype; *Simone Bacellar*, the selected badge, is known for her work on accessibility in eGov systems and for coordinating a respected Usability and Accessibility Center;
- PUCRS: the activity related to Accessibility was to watch a specific seminar available at the Brazilian SIGCHI's YouTube channel[3]; *BR-CHI*, the selected badge, was specially created for this activity as cited earlier.

This example shows that different activities are usually proposed to work a specific topic in HCI courses, and that badges must be selected according to their meaning and relevance for the respective activities in their situated context. This example also shows that our set of thematized badges is quite diverse, supporting teachers to gamify activities while keeping their flexibility in customizing or creating their badges.

4.2 Exploratory Feedback from Students

The three HCI courses in which the thematized badges were applied were still ongoing by the writting of this paper. In order to understand its applicability, we collected students' first impressions

through an online questionnaire[4]. When the questionnaire was applied, the courses were in different stages considering the semester: UFPR was in its second week of classes, USP in the seventh, and PUCRS in the twelfth week. For the analysis, we observe the answers of 65 students: 23 (35,4%) students from UFPR, 27 (41,5%) students from USP, and 15 (23,1%) students from PUCRS. Forty six (70,8%) students were from undergraduate courses, and 19 (29,2%) from graduate courses.

Considering the badges received, from the 65 students, only 1 did not remember to have received any badge. About what the students think the badges are useful for, 48 students (73,8%) selected the option "to know more about people that work in the HCI area", 44 (67,7%) "sense of progressing in the course", 36 (55,4%) "make the course more interesting or funny", 35 (53,8%) "comply with the proposed tasks", 25 (38,5%) "complete the badges collection", 24 (36,9%) "find out more about HCI topics", 12 (18,5%) "accessing Moodle more often", and 3 (4,6%) do not think that badges can contribute to anything (the students could choose more than one option).

When asked whether they enjoyed receiving a new badge, in a scale from 1 (*I don't like it*) to 10 (*I love it*), from the 65 students, 54 (83%) informed a value 6 or higher – 37 students (52,3%), more than the half, informed 10 or 9 suggesting a very positive feeling. Only 10 students (15,4%) informed 5 and only 1 student informed 4, and no student informed the lowest values in the scale. This result corroborates the literature [5] that suggests a positive feeling from students towards the possibility of receiving badges.

Considering the opportunities to deepen their knowledge about HCI topics and professionals, when we asked if the thematized badges motivated them to find out more about the related professionals, 50,8% of the students (32) answered that they wanted to know more about the professionals (and 12,7% (8) had even looked for more information). The professionals students cited the most were Jakob Nielsen, with 27 answers (44,3%) ("*Jakob Nielsen and his heuristics*", "*his intense research and contribution regarding the usability of digital systems*") and Simone Barbosa with 24 (38,3%) ("*Simone Barbosa's book, along with other authors, is one of the main references of the course*", "*Simone is an author of the book about Human-Computer Interaction*").

Students' open comments also revealed their perceptions about our thematized badges, such as related to progression ("*The sense of progress in the course*"), fun ("*They are fun and instigate the student*", "*It's fun to receive badges*"), tasks compliance ("*Knowing that we are being rewarded and noticed for completed activities*", "*Knowing that I have accomplished the tasks*", "*The feeling of having accomplished an objective as if you were in a game.*"), badges collection ("*collecting purposes*") and access to the Moodle ("*The badges served as an incentive to further explore Moodle. This ends up also serving as a "control" over the files that have been accessed and which ones are new.*") could be easily related to the students' engagement in the classroom. But, the most selected option, related to the knowledge about HCI professionals ("*The bio of each person representing the*

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[2]https://leanpub.com/warau?q=node/1
[3]https://www.youtube.com/c/BRCHI/videos Last Access: August 2021

[4]Participation was voluntary and was not part of the courses activities. Before answering, students must read the free and informed consent term, and explicitly agree to participate. No personal data was registered, but students could leave their email address if they were interested to receive the results from the research and updates from the GamifiCHI Project.

badge", "*Know a little more about the national research scenario*", "*I like to find out about the professionals of each emblem*"), and the one related to deepening HCI topics ("*not to mention that they bring valuable information about the area*", "*For me it brings more proximity to the content of the discipline*","*Creative method of encouraging us to research extra information about the discipline.*") support our claim of **extending the educational purpose of gamification** to beyond **engagement**. And even more, one associated (and not explicitly discussed) result was related to **representativeness**, so important when we deal with question to women participation in the Computer Science field ("*It motivates me to complete tasks faster and also because there is a large female representative, which is difficult in the area of computing in general*").

4.3 Lessons Learned: 5 steps to gamifiCHI

Based on our records and discussions from using our thematized badges in three different HCI courses, we identified 5 common steps and other useful tips to inform other researchers and teachers when gamifying classes with badges – see Figure 2. Some tips may sound obvious and simple but, in our experience, they are especially relevant for the first-time gamification design experience. Tips and recommendations are intentionally presented in a straightforward format.

Let's GamifiCHI: Before any step towards gamifying your classes, be sure you have all the necessary material in hand. Gamification strategies must be applied consistently throughout the course instead of focused on single or isolated activities. Therefore, you will need:

- *Agenda* for your classes, so you can see the topics and activities and their schedule – otherwise you may end up concentrating badges in a few activities and period instead of distributing them across the course;
- *List of activities (or tasks)* you intend to assign to your students, so you can observe all the activities and identify the ones you want to gamify – otherwise you may let aside activities suitable for gamification, miss the opportunity to use the most significant badge for each activity, and have unnecessary rework when configuring the badges;
- *Configured computer Supporting tools*, when it is the case, so you know in anticipation their features and limitations for supporting badges – otherwise you can plan using badges in ways that you will not be able to, or you may miss useful features that can support badges usages, such as notifying your students when they receive a new badge;
- *The set of badges* you want to assign, so you have ready-to-use badges or ideas to create your own badges – otherwise you may end up forgetting relevant badges or choosing badges without a consistent style, theme or meaning.

Once you have prepared your material and have defined the basics for your course, the following five steps can support you to enrich your classes with badges – bold words refer to the 5W2H Framework's dimensions [9]:

1. Select an activity: when you define **what** you want to gamify, the first thing you must ask yourself is: **why?** You may want to engage students by offering them a reward; promote a specific behavior, such as developing high quality works or completing

Figure 2: Steps and tips to use thematized badges.

tasks before the deadline; make your classes more interesting by offering additional features; or give students additional material and information in a different way, such as introducing them to important names of our community that have been working in a subject related to the task. Having your goal in mind is necessary to configure a proper gamification strategy.

2. Choose the badge: knowing the activity you want to gamify and the behavior you want to promote is necessary to choose a badge representing a person **who** is meaningful for both the activity and

your students, therefore influencing **how** you will design the gamification. For example, when teaching Heuristic Evaluation you may identify several activities (e.g., conducting the individual evaluation; building the consolidated list of problems and their severity; identifying the higher number of catastrophic problems) you want to promote specific behaviors (e.g., finishing the individual evaluation in time; writing a high quality evaluation report; inciting competition for identifying the most critical problems). According to the topic or activity, a specific badge will be more suitable than others (e.g., for usability, a Nielsen badge would be undoubtedly the most relevant one).

3. Define the conditions: when relating a badge to an activity you must define clearly the conditions that determine **when** that badge is granted to students, i.e., the conditions they must met to receive the badge. For example, finishing the individual evaluation three days before the deadline; receiving maximum score for the evaluation report; identifying more than 5 catastrophic problems. Some tools and Learning management systems, such as Moodle, support manually and automatically assigning a badge: you can assign the badge whenever you want, or configure the conditions and the system grants the badge automatically to students when they satisfy the necessary conditions.

4. Add relevant content: give meaning to your badge by situating it to relevant facts, curiosities, achievements and **how much** additional information you think can reinforce its relation to the topic/activity and to your classes. For instance, when configuring the badge *Milene Silveira* to be granted to students who achieved a 100% attendance rate, the first and second authors informed that she is the only researcher who has participated in all the 20 editions of the Brazilian HCI conference, since its first edition; when configuring the badge *Cecilia Baranauskas* to be granted to students who paid attention to social issues in their usability evaluation, we informed that she was the first Brazilian researcher to receive the SIGCHI Social Impact Award; and when configuring the badge *Cristiano Maciel* to be granted to students who formed their evaluation team and defined their responsibilities, we informed that he is well-known in the Brazilian community and respected by his capacity to put people together and work for common goals, promoting a sense of community and belonging.

5. Make the badge explicit: students must be aware of badges and the conditions for receiving them; expose badges in a place **where** students can easily see and find (in the system home, in a dashboard). You can print badges as stickers like Silveira [16], or use them in virtual environments only like Denny [5]. In McDaniel et al. [11], the authors received negative feedback from students when they were unable to know whether a badge was available to be earned and what they should do to earn it.

The steps summarized in Figure 2 can characterize the examples presented in Subsection 4.1: in Table 6, the steps characterize the example where the same badge (*Simone Barbosa*) was used to gamify different topics/activities; and in Table 7, the steps characterize the example where the same topic/activity (*Accessibility)* was gamified with different badges.

From our experience instantiating the set of badges in our three courses and from the results obtained in the exploratory survey with our students, we were also able to identify some useful tips for keeping in mind when using thematized badges:

Table 6: Example 1: The same badge, different activities.

	UFPR	USP	PUCRS
1	Evaluation methods	Requirements elicitation	HCI Introduction
2	**Simone Barbosa**		
3	Wiki page development about the topic	Well done activity	Present (bad or good) examples for accessibility, communicability, usability, and UX
4	Next CHI Conference chair	Highlights to the HCI textbook (main national reference)	
5	The students can see the badges achieved, as well as all badges available		The students can see the badges achieved only

Table 7: Example 2: The same topic, different badges.

	UFPR	USP	PUCRS
1	**Accessibility – study and practice**		
2	Amanda Melo	Simone Bacellar	BR-CHI (*)
3	Conduct an Accessibility Evaluation	Apply the Simplified Accessibility Evaluation	Watch the 2021 BR-CHI webinar about accessibility
4	Highlight her pioneer work on inclusive accessibility	Highlight for her coordination of the NAU (Usability and Accessibility Center)	Highlight for Webinars available in YouTube
5	The students can see the badges achieved, as well as all badges available		The students can see the badges achieved

- *Use a good variety of badges*: students must be able to earn a quite diverse set of badges in different activities conducted throughout the course. Our communities are diverse and diversity should be promoted (e.g., gender, topics, nationality, etc.).
- *Value collaboration*: when deciding what behavior you want to promote, do not forget promoting collaboration between students – students can receive badges for helping each other or for developing great team work. Competition may be good, but collaboration is always the best!
- *Vary the difficult level*: make it easier for students to get the first badges (e.g., registering and configuring their account, reading the course agenda) and then raise the necessary effort to achieve them (e.g., answering questions five days in a roll). Easy to earn badges serve to introduce students to the possibility of earning them, and harder to earn badges serve to challenge students.
- *Define rare badges*: create at least two or three badges very rare to be achieved so that students can do their best to earn them. A rare badge can be granted, for instance, when students complete all the proposed activities or when they

show an extraordinary performance for specific challenging activities.

- *Celebrate achievements*: notify students when badges are granted (some systems send emails and notifications automatically) and value the importance of earning them. Take advantage of this moment to talk about the professionals represented in the granted badges, their contribution to the HCI field and community.
- *Prioritize quality*: when defining criteria for granting badges try to value quality over quantity – e.g., encouraging students to answer questions can be positive, but encouraging them to create great answers may be better.

The examples from the application of our set of thematized badges in three different HCI courses show that our set of thematized badges can be "*be applied to different disciplines, and can be (re)used and adapted according to their characteristics and according to teachers' needs and interests*", as stated in the Definition stage of our process. The results from our exploratory questionnaire with 65 students, in turn, indicate our thematized badges "*served to both engage and inform on relevant subjects for HCI*", supporting our claim for the need of extending the gamification engagement purpose to the educational one.

5   FINAL REMARKS

In this paper, we claimed that gamification can be thematized, extending the engagement purpose to the educational one by offering something valuable for students.

Applying a Design Thinking-inspired method, we proposed a set of 50 badges thematized with HCI researchers who made important contributions to the local (Brazilian) or global HCI communities. These badges were applied to gamify activities in three HCI courses offered in three Brazilian universities, which offered examples from their application and evidence that our set of badges can be (re)used and adapted to different contexts.

Based on exploratory feedback from 65 students, we identified our thematized badges were able to raise students' interest to know more about HCI researchers and their contributions, besides promoting their sense of progress and making the course more interesting or funny. Therefore, exploratory results from our target audience suggest that our thematized badges were successful in giving substance to gamification without losing its playfulness, making gamification both engaging and informative, presenting students to relevant knowledge for our context (in this case, knowledge about our HCI community).

Based on our own experience on applying the presented proposal, we believe there are many possibilities for use and, better, of extension or even resignification about the idea of getting to know our scientific community: new badges can be created, new approaches based on the personalities can be designed (as basis to a card sorting or a card game, or quizzes using the acquired knowledge, for instance). The general idea behind our proposal could be used in different courses, fostering the knowing about different scientific communities.

Currently, we are working in the design of a website for the GamifiCHI Project to make available our set of badges to the community[5]. The website includes the entire badges collection, their descriptions, guidelines helping to use them in classroom, examples of use, and even instructions to use it in virtual learning environments as Moodle. This website may be a starting point to, as described by Churchill et al. [3], a "content-centric social network focused on resource-sharing and co-creation", dubbed by these authors as a "living curriculum".

6   ACKNOWLEDGMENTS

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