User Experience and Social Influence: A New Perspective for UX Theory

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Abstract. Research on *User experience (UX)* is mainly focused on the individual user's technological experience. To extend the UX framework and toobtain a better understanding of the psychological processes involved, thisresearch investigates the influence of the social environment (peer students and teachers)on user experience. This UX study is based on the Component of UserExperience model developed by Thüring and Mahlke [1]. A survey was carriedout in a Belgian and a French university to study students' tablet user experience.Results indicate that peer students influence Perceived usefulness, Perceivedease of use, the Aesthetic aspects and the Motivational aspects whileteachers only influence the Aesthetic aspects and Symbolic aspects. Globally, peer students influence instrumental and non-instrumental factors and teachersinfluence only non-instrumental factors. The results may be explained throughthe *Group influence processes* theory. In conclusion, this study offers a newperspective for research on UX. The theoretical framework should extend itsscope to the social environment impact.

Keywords: User experience · CUE-model · Social support · Tablet · University students

1 Introduction

Over the last few years, technology devices have never been so present in our daily lives. People are confronted with technologies in work, learning and leisure contexts. Consequently, it is not surprising that are more and more research efforts aim a better understanding of human-computer interaction from a user point of view. To investigate this matter, the research framework *User Experience (UX)* is particularly adequate. It proposes to understand the psychological processes at stakes when one is confronted with a technological device. However, even if UX related studies became popular over the last few years, not much research has been undertaken to study the impact from the social environment on this user experience. Theories from social psychology and works stemming from other approaches like the Technology acceptance approach have

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proven the importance of the social surrounding in technology adoption. Therefore, this paper proposes to investigate the influence of peers students and teachers in the context of tablet usage at university.

2 Theoretical Background

2.1 User Experience (UX)

The User Experience approach emerged as a comprehensive framework, which provides a holistic perspective on users' subjective response arising from technology usage. This appraisal can be described as a multidimensional phenomenon that encompasses the judgment of various aspects related to the task accomplishment but also to personal desires, as well as the emotions aroused by technology interaction. In other words, unlike Technology Acceptance Models [2–5] that are based on the assessment of usability, usefulness and ease of use evaluation, the UX approach integrates more than just task-related issues broadening the scope to personal needs, desires and emotional feeling.

The ISO norm 9241-210 defines UX as "a person's perceptions and responses that result from the use or anticipated use of a product, system or service" [6]. Although this definition is rather broad, several attempts have tried to define more precisely the UX concept and to specify its characteristics [7–12]. Based on the aforementioned authors it is possible to summarize the main features of the UX approach in four concepts. First, UX is necessarily subjective and arise from technology usage. Second, UX aims a holistic perspective, including interests in non-utilitarian factors. Third, emotions are fully integrated into the subjective experience. Fourth, the nature of the user experience evolves overtime.

To take these aspects into account, the Components of User Experience model (CUE-Model; see Fig. 1) proposed by Thüring & Mahlke in [1] attempts to define and schematize the core elements of UX. This is one of the most thorough models incorporating several UX features. It has been built from empirical research findings on smartphones and audio players studies. As a result, the CUE-model is particularly suited to empirical research on innovative technologies and allows to test external effects on the several aspects of the user experience [1, 13].

In the CUE-model, the core aspects of the user experience are summarized in three distinct components: the Perceived instrumental qualities, the Perceived non-instrumental qualities and the Emotional reactions. The first component, which concerns Perceived instrumental qualities, focuses on task-related judgments and may be linked to another HCI approach, the technology acceptance framework (e.g. [2–4]). This component takes up Perceived usefulness, and Perceived ease of use as the central elements constituting the component. The second component, which concerns non-instrumental qualities, deals with technological aspects that are not important to task performances but for the user own personal desires and needs. It encompasses the Aesthetics and Symbolic aspects judgments, but also the Motivational aspects that constitute the technology's inherent capacity to motivate its use. The last component concerns Emotional reactions. It is theorized as encompassing the emotional

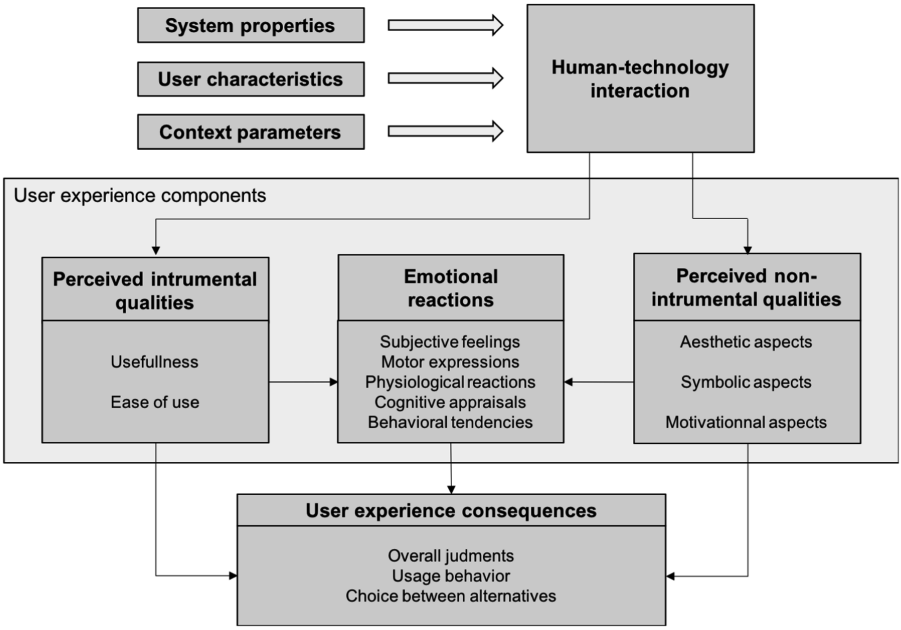

Fig. 1. CUE-model

consequences stemming from the other two components. Moreover, Thüring and Mahlke point out that these three components of user experience will allow one to form an overall judgment and determine technology usage behaviour. Besides, the authors detail the UX antecedents. User characteristics, contextual factors and system properties shape the interaction between a user and a system that is responsible for the user experience's nature. Interestingly, the only direct antecedent of UX is the human-technology interaction.

In conclusion, as Bevan affirms: "user experience focuses on the user's preferences, perceptions, emotions and physical and psychological responses that occur before, during and after use, rather than the observed effectiveness and efficiency. While usability typically deals with goals shared by a user group, user experience is concerned with individual goals, which can include personal motivations including needs to acquire new knowledge and skills, to communicate personal identity and to provoke pleasant memories. User experience also puts emphasis on how the experience changes with repeated use" [14].

2.2 Social Influences

The user's social environment is considered to be a major factor to understand the user's subjective appraisal and behavior. Several psychological theories have proved that a group can significantly affect an individual. For instance, the Reference group theory states that an individual seeks the advice of opinion leaders and/or from a group of experts before shaping his or her own opinion [15, 16]. The Group influence

processes suggests that, in order to strengthen relationships with other group members, an individual adopts the behavioral norms of the group [17]. The Social exchange theory explains that an individual acts in a cost-benefit perspective [18]. Where every decision or action is expected to bring personal benefits.

In the specific case of technology usage, the previous theories have also demonstrated a certain consistency between users' opinions and their behavior towards a given technology and the ones that are stemming from his or her social environment. Indeed, *Innovation diffusion* research suggests that technology adoption decisions are impacted by the user's social system, beyond the individual's decision style and IT characteristics [19]. In addition, studies rooted in the *Technology acceptance* approach have shown that social norms and groups play a predominant role in the intention to use a technology. Interestingly, several TAM extensions incorporated social related factors. For example, Hardgrave, Davis and Riemenscneider [20], as well as Venkatesh and Bala [4] included the social norms as explaining factor for Perceived usefulness. Other studies applying the TAM framework show that the appreciation and use of technology by peers and teachers has a positive impact on Perceived usefulness [21, 22].

Based on aforementioned studies and models, it is possible to assume that a direct social impact on an individual user experience must exists. First, as proven by TAM literature, there is a social influence on the Perceived instrumental qualities. Secondly, the Perceived non-instrumental qualities must also be impacted. The *Reference group theory* suggests that the social environment shapes any type of opinions. This must be applicable to the judgment of the non-instrumental qualities, such as technology aesthetics and symbolic attributes. In addition, as more and more everyday technology can be used in a social environment, group influence processes are involved. Accordingly, technology motivational aspects could be influenced. Indeed, to get closer to his or her social group, technology can be used as an expression of group norms adoption.

2.3 Tablet Usage at University

To study this topic, the use of tablets has been chosen as subject. Since the first iPad released in 2010, tablets have become popular devices. They are used in different context, and especially in the educational context. Tablets are considered innovative and user-friendly devices for learning and task management. Some students in order to replace their notebooks or laptops have quickly adopted them. The ease of transport, the need for only finger gestures to control interaction, the autonomy, and their innovative design make these interesting tools suitable for field and laboratory work [23]. Tablets provide the benefits of mobile applications while providing a larger screen than smartphone devices. They are also useful for short or quick interaction and for fun activities at the university [24]. Furthermore, the addition of accessories like an external keyboard or an electronic pencil broadens the range of possibilities and facilitates notes taking, sketches drawing and the marking of electronic documents. Besides, the Bring Your Own Device (BOYD) strategies can be used to reduce in the ICT infrastructure costs and provide students with enhanced comfort of use and the possibility to avoid overcrowded university computer labs. Nowadays, the situation has changed to the point that many students entering higher education expect to use their mobile devices

as part of the educational process [25]. And indeed, more and more students are using their tablet to plan and support learning activities.

However, tablets are not only task completion tools. They also reflect the more personal needs and desires of users. In consequence, tablets are perfect study objects to carry out UX research. As mentioned, tablets are not just popular mobile computing devices used for task completion and learning. It may be argued that they also includes self-oriented expectations like an enhanced self-image, or a pleasurable experience. However, these aspects have often been overlooked in studies trying to understand technology usage in educational fields. Frequently, when an innovative technology like a tablet is introduced, the Technology Acceptance Model (TAM) [2], or the Unified Theory of Acceptance and Use of Technology (UTAUT) [3] are used to understand students' acceptance and adoption. As a matter of fact, those studies explain partly the use or the non-use of tablets, and a series of limitations of these approaches have been pointed out [26, 27]. They do not provide an overall estimation of the adoption process. They convey a more rational approach of the user's behavior and focus mainly on the perceived technology's instrumental features. Nevertheless, task related aspects are not always sufficient to explain satisfyingly actual technology adoption. Thus, applying other theories encompassing more aspects, such as the user experience framework, can enhance our understanding of tablet adoption in university context.

2.4 Aim of the Article

According to the above-mentioned literature, a research model has been set up to test the effect of the social environment on a university student's user experience. It proposes to investigate the direct influence of peers and teachers technology appreciation and behaviour on the components of user experience as defined by Thüring and Malhke [1].

3 Methodology

3.1 Study Context

The research is part of an international research project called *LEarning with Tablets: Acceptance and COgnitive Processes* (LETACOP) financed by the French National Agency for research (ANR). It aims a better understanding of the psychological factors and underlying cognitive processes taking place when tablets are used in learning contexts. This paper presents the results of two questionnaire surveys that have been undertaken in a French university and a Belgian university. The two questionnaires included the same scales on UX components and social influence. Only a few questions on the tablet usage have been changed.

3.2 Procedure

The research took the form of an online survey for the Belgian students and a paper form for the French students. The online questionnaire was published with the LimeSurvey 2.5 platform. Several teachers were asked to encourage their students from

science, health science and social science to complete the survey. The link to the survey was sent by e-mail or published online on their course learning management system. The paper form questionnaire was given to the French students during courses at university, and students were free to fulfill the questionnaire at the end of the lesson.

3.3 Questionnaire

The used questionnaire comprises four different parts:

- The first part aimed at collecting biographical data such as age, gender, and education
- The second part aimed at collecting information about tablet usage. Students were asked about their tablet ownership, operating system, types of usage, and frequency of use. Belgian students were asked to rate to which extend they use a tablet in hours per day, and French students were asked to rate it on a 5-point frequency scale going from "never" to "very often". It was decided to change the type of question because Belgian students declared that rating the number of hours spent using a tablet was tricky. Besides, to obtain a more detailed picture, a question to assess since when students were tablet owners was also added.
- The third part aimed at collecting data about students' tablet experience and satisfaction. Scales relating to the CUE-model components and subfactors were added (see Table 1). To measure Perceived instrumental qualities based on Perceived usefulness and Perceived ease of use, scales derived from Venkatesh and Bala [4] were used. Examples items are "Using a tablet is usefull for my studies" and "I think that tablets are easy to use for my studies". To measure Perceived non-instrumental qualities, no existent scales satisfying our methodological needs have been found. As a result, items relating to Aesthetic aspects, Symbolic aspects and Motivational aspects were created in a back and forth procedure between scholars. Examples items are "For me, the tablet is an aesthetic device", "Tablet usage is a sign of modernity", and "I feel more motivated to do my activities, because I'm using a tablet". To measure Emotional reactions, it was decided to test the Perceived enjoyment as resulting emotion because it is an easy emotion to assess with a questionnaire. Items for the Perceived enjoyment scale were derived from Venkatesh and Bala [4], an example is "I enjoy using a tablet for my studies". Last, items to measure technology satisfaction were based on Wixom and Todd [28] System satisfaction scale, an item example is "All together, I am satisfied using a tablet". All items were assessed on a 7-point agreement Likert scale going from "I totally not agree" to "I totally agree".
- The fourth part of the questionnaire aimed at collecting data to assess the social influence on user experience. Items about peer and teacher tablet support were used (see Table 1). Example items are: "My friends at university use tablet for during their lessons" and "Professors prompt us to use tablets for our lessons". These scales are based on Martins and Kellermanns [21] scales and were assessed on a 7-point agreement Likert going from "I totally not agree" to "I totally agree".

The figures of Table 1 indicate that quality indicators satisfy all required needs. Each item is highly loaded on its belonging factor, and all factors present an average

Table 1. Quality construct outcomes

Construct	Items	Factor loading	t-Value	AVE	Composite reliability	Cronbach's alpha
Instrumental qualities						
P. usefulness	PU1	0.955	161 766	0.909	0.953	0.900
	PU2	0.952	145 465			
P. ease of use	PEOU1	0.916	112 278	0.818	0.900	0.778
	PEOU2	0.892	63 960			
Non-instrumental qualities						
Aesthetics a.	AA1	0.902	79 014	0.829	0.906	0.794
	AA2	0.919	97 275			
Symbolic a.	SA1	0.863	42 415	0.763	0.866	0.690
	SA2	0.884	48 043			
Motivational a.	MA1	0.888	79 905	0.794	0.885	0.741
	MA2	0.894	74 151			
Emotional reactions						
P. enjoyment	PE1	0.886	70 792	0.726	0.888	0.812
	PE2	0.864	68 257			
	PE3	0.805	34 111			
UX consequences						
Satisfaction	Sat1	0.923	87 528	0.858	0.923	0.834
	Sat2	0.929	108 735			
Support						
Peer influence	PeerInfl1	0.821	31 402	0.714	0.882	0.802
	PeerInfl2	0.845	42 869			
	PeerInfl3	0.869	53 081			
Teach. influence	TeachInfl1	0.784	15 351	0.640	0.842	0.725
	TeachInfl2	0.807	14 765			
	TeachInfl3	0.808	15 950			

variance extracted superior to .5 and a composite reliability superior to .6. Only the Cronbach's Alpha for the Symbolic aspects does not meet the required threshold of .7. Nevertheless, a very close score of .690 has been reached.

3.4 Sample

The characteristics of the respondents are presented in Table 2. A total of 796 students answered completely the questionnaire, 384 students are coming from Belgium and 412 from France.

In Belgium, 56.5% are female and 43.5% are male. In France, 65.3% of students are female and 34.7% are male. The age is respectfully 22.3 years old (s.d. 5.3) in Belgium and 19.6 years old (s.d. 1.8) in France. For Belgian students, 73.7% are bachelor students (first three years at university) and 26.3% are master students (two years after bachelor). In France, 94.9% are bachelor students and 5.1% are master students.

Table 2. Characteristics of the respondents

Characteristics	Belgium	France
Total respondents (n=)	384	412
Gender (%)		
Female	56.5	65.3
Male	43.5	34.7
Age (y.o.)		
Mean	22.3	19.6
s.d.	5.3	1.8
Education (%)		
Bachelor	73.7	94.9
Master	26.3	5.1
Tablet user (%)	49.2	59.2
For leisure	65.1	70.9
For work	30.2	35.7
Operating system (%)		
iOS	47.6	54.3
Android	38.6	32.5
Windows	11.6	11.1
Frequency of use (hours)		
Mean	2.9	
s.d.	2.4	
Frequency of use (%)		
Never		5.0
Rarely		15.9
Sometimes		26.8
Often		32.6
Very often		19.7
Ownership (month)		
Mean		33.6
s.d.		21.8

Concerning technology use, nearly half of students declared possessing a tablet. Indeed, 49.2% of students in Belgium and 59.2% in France. Among those, most of them run an iOS operating system (47.6% in Belgium, 54.3% in France), followed by an Android system (38.6% in Belgium, 32.5% in France), and a bit more than one tenth use a Windows operating system (11.6% in Belgium, 11.1% in France). Frequency of use figures indicate that in average Belgian students use their tablet 2.9 h a day (s.d. 2.4), and that most French students use it often (32.6%), sometimes (26.8%), or very often (19.7%) but several students declared using it never (5%) or rarely (15.9%). In addition, French students also declared that in average they possess a tablet for 33.6 month (s.d. 21.8).

3.5 Data Analysis

Statistical analyses were carried out using SPSS 25 for the descriptive analysis and with SmartPLS 3.2.4 for internal consistency and the calculation of regression scores. Data was processed using the Partial Least Square method because, this method is quite suited to tests complex models with smaller samples. Contrary to the classical structural equation modelling (i.e. Lisrel method, M+), the PLS-method is based on variance analysis [29–33].

4 Results

Results in Table 3 indicate the average scores, standard deviations scores, and minimum and maximum values obtained by each factor. Non-instrumental qualities factors obtain an average that is just below the middle point of the scale, which could show a smaller interest in non-instrumental qualities of tablets. However, all variables present a relatively high standard deviation, which indicate a wide array of responses. Moreover, it is interesting to note that Perceived ease of use obtains a higher average score than Perceived usefulness.

Table 3. Loadings of indicator variables

Construct	Mean	s.d.	min.	max.
Instrumental qualities				
Perceived usefulness	3.92	0.95	1.00	7.00
Perceived ease of use	4.83	1.64	1.00	7.00
Non-instrumental qualities				
Aesthetics aspects	3.76	1.74	1.00	7.00
Symbolic aspects	3.64	1.56	1.00	7.00
Motivational aspects	3.90	1.66	1.00	7.00
Emotional reactions				
Perceived enjoyment	4.16	1.61	1.00	7.00
UX consequences				
Satisfaction	4.54	1.81	1.00	7.00
Support				
Peer support	4.18	1.36	1.00	7.00
Teachers support	3.99	1.35	1.00	7.00

4.1 CUE-Model

The analysis of our variables (Instrumental qualities, Non-instrumental qualities, Emotional reactions, UX consequences), including the links between the sub-factors, validate the CUE Model structure. Globally, the calculation of standardized beta scores of path analysis (see Fig. 2) confirm the effects of Perceived instrumental qualities on Emotional reactions and Satisfaction, as well as the effects of Emotional reactions on Satisfaction, but partially the effects of Perceived non-instrumental qualities on Emotional reactions and Satisfaction.

Fig. 2. Results of the research model. Note: *p < 0.05; **p < 0.01; ***p < 0.001

More precisely, the Perceived instrumental qualities factors influence positively the Emotional reactions. However, a significant influence of all three Perceived non-instrumental qualities factors on Emotional reactions has not been found. Indeed, Motivational aspects influence positively Perceived enjoyment, as well as Symbolic aspects but this last effect happens to be quite small. No significant effect has been found from Aesthetic aspects on Perceived enjoyment. Concerning the influence on user Satisfaction, results indicate that Perceived instrumental qualities and Emotional reactions are the highest contributors. The effects of the three Perceived non-instrumental qualities on satisfaction are very small (Symbolic aspect) or not significant. As a matter of fact, it can be established that Perceived non-instrumental qualities has almost no importance in user satisfaction.

4.2 Social Influences

The outcomes regarding the social impact on the different user experience factors are presented in Table 4. The results indicate that the students' user experience is more influenced by their peers than by their teachers environment.

More precisely, the Peers influence affects mainly the Aesthetic aspects (ß = .387; p-value = .000), the Perceived ease of use (ß = .351; p-value = .000), and the Motivational aspects (ß = .335; p-value = .000). In a less extend, Peers influence also affects Perceived usefulness (ß = .182; p-value = .000). To put it simply, our results indicate that Peers influence impacts the Perceived instrumental qualities and Perceived non-instrumental qualities components, but not the Emotional reaction component.

Teachers influence results indicate that two Perceived non-instrumental qualities factors are influenced by their attitude or behavior. The two factors are Aesthetic aspects (ß = .113; p-value = .019) and Symbolic aspects (ß = .142; p-value = .005). Contrary

Table 4. Model testing results

	ß	p-Value
Peer support		
Perceived instrumental qualities		
PeerInfl → PU	0.182	0.000
PeerInfl → PEOU	0.351	0.000
Perceived non-instrumental qualities		
PeerInfl → AA	0.387	0.000
PeerInfl → SA	0.029	0.588
PeerInfl → MA	0.335	0.000
Emotional reactions		
PeerInfl → PE	0.028	0.301
Teacher support		
Perceived instrumental qualities		
TeachInfl → PU	0.007	0.848
TeachInfl → PEOU	0.033	0.574
Perceived non-instrumental qualities		
TeachInfl → AA	0.113	0.019
TeachInfl → SA	0.142	0.005
TeachInfl → MA	−0.034	0.462
Emotional reactions		
TeachInfl → PE	−0.024	0.351

to peer influence, no significant effect as found on the Motivational aspect, nor on the Perceived instrumental qualities (Perceived usefulness and Perceived ease of use).

In addition, no significant effect was found from peers and teachers on the Emotional reactions component, measured by Perceived pleasure

5 Discussion/Conclusion

The *User Experience (UX)* approach has emerged as a comprehensive framework for Human-Computer Interaction studies. It aims at providing a more holistic perspective on user's technology perception that encompasses the perception of the technology's utilitarian and non-utilitarian characteristics and the emotional aspects. However, there is a lack of studies investigating the impact of the social environment on user experience. This study proposes to examine the impact of the social environment on user experience as defined by Thüring and Mahlke [1]. To attain our objectives, a questionnaire was diffused to investigate the university students' experience with tablets. The focus on tablets as technological device has been chosen because tablets, like other mobile technologies, they carry self-oriented expectations, enhanced self-image, or pleasurable experiences. To take into account the social environment influence, two factors have been retained: peer students influence and teachers influence.

Globally, results demonstrate that peer students and teachers (their social environment at university), influence user experience, and by extension, the interests to include social factors to understand user experience.

Our analyses show that the social influence differ depending on the reference group. The impact from peer students is more important that the one from the teachers. Peer students influence perceived instrumental qualities and perceived non-instrumental qualities, and teachers influence only the perceived non-instrumental qualities.

To explain the Peers influence on the Perceived instrumental qualities, we can refer to the Group influence processes theory. Following this theory, individuals adopt behavioural norms in order to strengthen their relationships with other group members. As university teachers belong to another social group, it may be explained that they have no significant influence on Perceived usefulness and Perceived ease of use.

The peer influence on Perceived instrumental qualities confirm partially the results from the *Technology acceptance* approach, and more specifically the results obtained by Martins and Kellermanns [21]. They demonstrated the influence from peers and from teachers on Perceived usefulness. However, in our study, no effect was found for the teacher social influence. Furthermore, our results show a greater impact from peers on Perceived Ease of Use than on Perceived usefulness. This is somehow contrary to the TAM literature, which theorize an effect on Perceived usefulness but not on Perceived ease of use. This could be related to the manner tablets are promoted. Tablets are known to be easy to-use and portable technological devices [23]. Secondly, the teachers' lack of influence on Perceived instrumental qualities can be explained by the fact that students do not usually observe their teacher using tablets. They could ignore how, and why their teacher use tablets. Moreover, students may consider their teachers as belonging to another technological generation, with other kinds of habits and knowledge.

The results regarding the influence of peers and teachers on Perceived non-instrumental qualities also differ in function of the referred group. First, the peers and teachers influence on the aesthetic aspect means that students attribute more positive aesthetics aspects when they perceive an environmental support to tablets at university. Secondly, in line with former conclusion, the influence of teachers on the symbolic aspects means that students judge their tablet as holding a positive symbolic value when they perceive a teacher support to use tablets at university. The absence of effect stemming from peers on the symbolic aspect can be linked to the fact that in our sample more than half of the students own a tablet. Nowadays, tablets are more economically accessible and widely available for university students. In consequence, tablets may no longer considered reserved for a few students and their symbolic values are probably more limited.

Third, regarding the motivational aspects, the *Group influence processes* theory can also be mobilized to explain the willingness of students to use a tablet. As other peers support the use of tablets, adopting the same behavior will allow everyone to strengthen their relationships with others.

Furthermore, the analyses confirm another point regarding the reliability of the CUE-model. There is no significant influence of peers and teachers on Perceived enjoyment. These results corroborate the model structure of the CUE-model. The

model theorizes that the Emotional reaction are only influenced by the Perceived instrumental and non-instrumental qualities.

This research presents several limitations. A validation process of the scales could have been useful: some scales have been adapted to the use of tablets at the university, others have been developed for our specific needs. Even though the sample size is quite correct, expanding the database could improve the statistical validity. Moreover, the outcomes need to be verified with other samples, technologies and contexts.

This study focuses on UX factors included in the CUE-model, but accordingly to the UX holistic perspective, it would be interesting to extend this research to other UX factors. In addition, it does not take into account the dynamic nature of UX. More in-depth studies should be carried out to verify if the social influence of peer and teacher remains the same along the technological appropriation process. In addition, it would be interesting to extend this research with personality factors.

In conclusion, this study offers a new perspective for research on UX. The theoretical framework should extend its scope to the social environment impact in order to obtain a better picture on the psychological processes involved. A narrow focus on the individual nature of a user's technological experience, could lead to incomplete insights as technologies are more and more used in the vision of other individuals.

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