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User experience and social influence: a new perspective for UX theory

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Abstract: For a few years now, *User experience* research has been of interest in academia. However, studies are often limited to study the individual nature of a user's technological experience. To extend the UX framework and our understanding of the psychological processes involved, this research proposes the impact of the social surrounding on user experience as defined by the Component of User Experience model developed by Thüring and Mahlke [1] .In order to achieve our goals a survey was carried out in Belgian and French universities to study students' tablet user experience. Results indicate that peer students influence more and differently the appraised experience than the tablet users' professors. Peer students influence instrumental and non-instrumental factors and professors influence only and in a less extend non-instrumental factors. This can be explained by, first, figure similarity, and secondly, by group conformity and the capacity of the university community to be considered as experts and opinion leaders.

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 technology 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, few researches have been undertaken to study the impact from the social surrounding on these subjective feelings and judgments. Theories from social psychology and works stemming from other approaches like the *Technology acceptance* approach have proven the importance of the social surrounding in technology adoption. Therefore, this paper proposes to fulfill this gap in UX literature by investigating the influence of the social surrounding in the case of tablet usage a university.

2 Theoretical background

2.1 User experience

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 characterized as a multidimensional phenomenon that encompasses the judgment of different aspects important to task accomplishment but also important to the user's personal desires, as well as the emotions that arise from technology interaction. In other words, in contrast with the Technology Acceptance Models (ref Davis, Venkatesh…), based on usability, usefulness and ease of use evaluation, , the UX approach integrates more than task related matters by broadening the scope to user personal needs, desires and emotional feelings.

The ISO norm 9241-210 [2] defines UX as "a person's perceptions and responses that result from the use or anticipated use of a product, system or service". While this definition is rather broad, a several number of attempts have tried to define UX more precisely and specify its characteristics [3–8]. Based on the aforementioned authors it is possible to summarize the main characteristics of the UX approach in four notions. 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 in the subjective experience. Fourth, UX nature evolves overtime.

To account for these aspects the Components of User Experience model (CUE-Model; see fig.1) proposed by Thüring & Mahlke in 2007 [1] tries to define and schematize the core elements of UX. It is one of the most thorough models that incorporate the several UX characteristics and has been built from empirical research findings involving several smartphones or audio player designs. In consequence, the CUE-model

is particularly suited for empirical research on innovative technologies and allows to test external effects on the several UX aspects [1, 9].

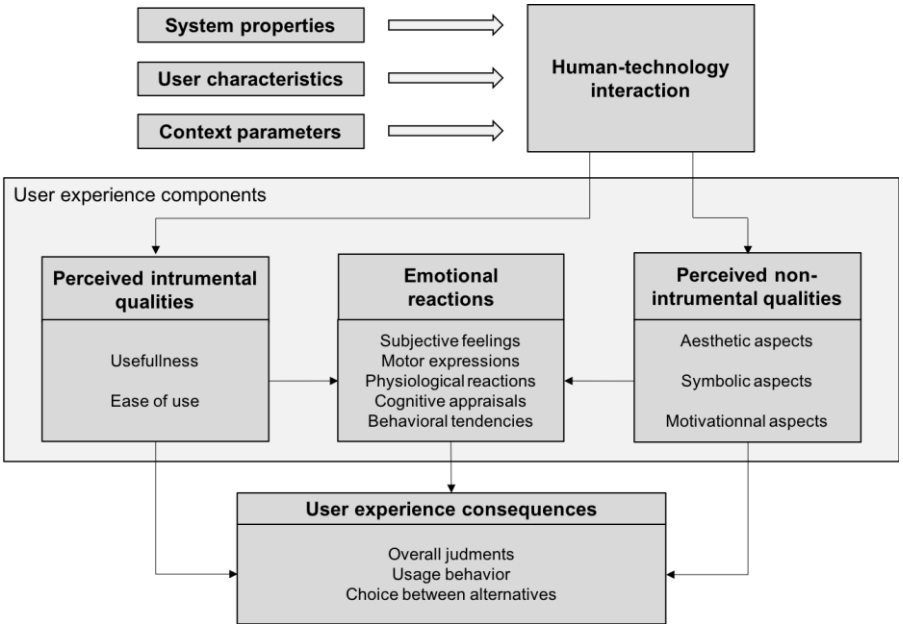

Figure 1: CUE-model

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, concerned with perceived instrumental qualities, is focused on task related judgments and can be linked to another HCI approach, the *technology acceptance* framework (e.g. [10–12]. This component takes up perceived usefulness, and perceived ease of use as the central elements constituting the component. The second component, concerned with non-instrumental qualities, deals with technological aspects that are not important to task performances but to the user own personal desires and needs. It encompasses aesthetics aspects and symbolic aspects judgments, but also motivational aspects which constitute the technology's inherent capacity to motivate it's use. Following, the last component is concerned with emotional reactions. It is theorized as encompassing the emotional consequences stemming from the other two components. Moreover, Thüring and Mahlke specify that the three component of user experience will allow one to form an overall judgment and usage behaviour of the technology usage. Besides, the authors detail the UX antecedents. User characteristics, contextual components and system properties

shape the interaction between a user and a system which is responsible for the UX nature. Interestingly, the only direct antecedent of UX is here the human-technology interaction.

2.2 Social influences

The user's social surrounding is known to be a major factor to comprehend a user subjective appraisal and behavior. Several social psychology theories have proven that a group can affect significantly an individual. For instance, the *Reference group theory* clarifies that each individual looks for guidance from opinion leaders and/or from a group of experts before shaping its own opinion [13, 14]. Also, the *Group influence processes* proposes that, in order to strengthen his relationships with other group members, an individual adopts the behavioral norms of the group [15], and the *Social exchange theory* explains that an individual act in a cost-benefit perspective [16]. Where each decision or action is expected to bring personal benefits.

In the specific case of technology usage, previous theories have also proven the existence of a certain consistency between a user's opinions and behavior towards a given technology and the ones that are stemming from his social surrounding. Indeed, *Innovation diffusion* research suggests that technology adoption decisions are impacted by a user's social system, and this beyond an individual's decision style and IT characteristics [17]. In addition, studies rooted in the *Technology acceptance* approach showed us that norms and social groups play a predominant role in the intention to use a technology. Studies based on the Technology acceptance model (TAM) developed by Davis and colleagues [10] posits that Perceived usefulness and Perceived ease of use are the two key factors explaining a user attitude towards a technology and intention to use. Interestingly, several TAM extensions incorporated social related factors. For example, Hardgrave, Davis and Riemenscneider [18], as well as Venkatesh and Bala [11] included the social norms as explaining factor for Perceived usefulness. Other studies applying the TAM framework have also showed that peer and professor appreciation and uses of a technology had a positive impact on Perceived usefulness [19, 20].

Flowingly, based on aforementioned works, it is possible to assume that a direct social impact on an individual user experience must exists. First, as proven by TAM literature, social influence on the Perceived instrumental qualities exists. Secondly, the Perceived non-instrumental qualities must be impacted as well. The *Reference group theory* suggests that all kind of opinions are shaped by the social surrounding, this must be applicable to the judgment of the non-instrumental qualities, such as a technology aesthetics and symbolic aspects. Also, as more and more daily technology can be used in front of others, *Group influence processes* are implied. Accordingly, a technology motivational aspect must be influenced. Indeed, to get closer to a beloved group, technology usage behaviour can be used as an expression of group norm adoption.

2.3 Tablet usage at university

To study this topic, the usage of tablets has been chosen as subject. Since the first iPad released in 2010, tablets became popular devices. They are used in different context, and especially in the educational context. Indeed, tablets are seen as innovative and user-friendly devices for learning and task management. Some students to replace their notebooks or laptops have quickly adopted them. The ease of transport, the need for only finger gestures to control, and their innovative design make these interesting working tools appropriate for field and laboratory work [21]. Tablets provide the benefits of mobile applications while offering the advantage of a larger screen than smartphone. They are also wieldy for short uses and for fun activities at university [22]. 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 permits universities to save costs in ICT 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 currently entering tertiary education have come to expect that they will make use of their mobile devices as part of the educational process [23]. And indeed, more and more students use their tablet to plan and support learning activities.

However, tablets are not only task completion tools, they also convey the users' more personal needs and desires. In consequence, tablets are the perfect study objects to carry out UX research. Indeed, tablets are not just popular mobile computing devices used for task completion and learning. It can be argued that tablets also carry self-oriented expectations like an enhanced self-image, or a pleasurable experience, but 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) [10], or the Unified Theory of Acceptance and Use of Technology (UTAUT) [12] are used to understand students' acceptance and adoption. However, because of their original research scope they neglect to integrate various factors that affect the process, such as economic, emotional, and self-oriented factors. 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 [24, 25]. They do not offer an overall estimation of the adoption process, and convey a rational image of the user, the focus being mainly on the perceived technology's instrumental features. But the 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 settings.

2.4 Aim of the article

Accordingly, to the above-mentioned literature, a research model has been set up to test the effect of the social surrounding on a university student user experience. It

proposes to investigate the direct influence of peers' and professors' 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 exactly the same questions. Only a few questions have been changed to overcome some small shortcomings.

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 Professors stemming from science, health science and social science were asked to encourage students 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 a course at university. These students were asked to complete the questionnaire at the end of the lesson and to handle it directly back to the teaching Professor.

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 tablet ownership, operating system, types of usage, and frequency of use. In 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 several CUE-model components and subfactors were

added (see Table X). To measure Perceived instrumental qualities, items based on Perceived usefulness and Perceived ease of use scales derived from Venkatesh and Bala (2008) were used. To measure Perceived non-instrumental qualities no items satisfying our methodological needs have been found. In consequences, items relating to Aesthetic aspects, Symbolic aspects and Motivational aspects were created in a back and forth procedure between several scholars. To measure Emotional reactions, it was decided to test only Perceived enjoyment as resulting emotion because it is the most obvious emotion for many users and the easiest to asses with a questionnaire. Items for the Perceived enjoyment scale were also derived from Venkatesh and Bala [11]. Last, items to measure technology satisfaction were based on Wixom and Todd [26] System satisfaction scale. 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 professor influence were used (see Table X.). Both scales are based on Martins and Kellermanns [19] scales and were also 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 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.

Table 1
Quality construct outcomes

Construct	Items	Factor loading	t-Value	AVE (>0.5)	Composite reliability (>0.6)	Cronbach's alpha (>0.7)
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			
	PE2	0.864	68 257	0.726	0.888	0.812
	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			
	PeerInfl2	0.845	42 869	0.714	0.882	0.802
	PeerInfl3	0.869	53 081			
Prof. influence	ProfInfl1	0.784	15 351			
	ProfInfl2	0.807	14 765	0.640	0.842	0.725
	ProfInfl3	0.808	15 950			

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, the biggest part of participating students, 56.5% precisely are female and 43.5% are male. The same is true in France, where 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. Most of Belgian students, 73.7%, are their bachelor years and 26.3% in their master years. As it is in France where 94.9% are in their bachelors and 5.1% in their masters.

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 hours 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)

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

3.5 Data analysis

Statistical analyses were executed through the use of 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 and not on covariance analysis which allows calculations on smaller samples [27–31].

4 Results

Results in table 3 indicate the average scores, standard deviations scores, and minimum and maximum values obtained by each factor. No factor obtains a specifically high or low score. Interestingly all Non-instrumental qualities factors are below the middle point of the scale, which could indicate a smaller interest in Non-instrumental qualities of tablets.

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
Professors support	3,99	1,35	1,00	7,00

4.1 CUE-model

The test of the CUE-model, including the links between the several sub-factors, validate the sound basis of the model. 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.

More precisely, all Perceived instrumental qualities factors influence positively the Emotional reactions. However, a significant influence of all 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 of each component on user Satisfaction, results indicate that Perceived instrumental qualities and Emotional reactions are the highest influencers of Satisfaction. The influence of Perceived non-instrumental qualities is almost nonexistent. Noteworthily, even if the impact of Symbolic aspects turns out to be significant the strength of it is quite negligible. Besides, the effects of the two other Perceived non-instrumental qualities factors are nonexistent. As a matter of fact, it can be established that Perceived non-instrumental qualities has almost no importance in user satisfaction.

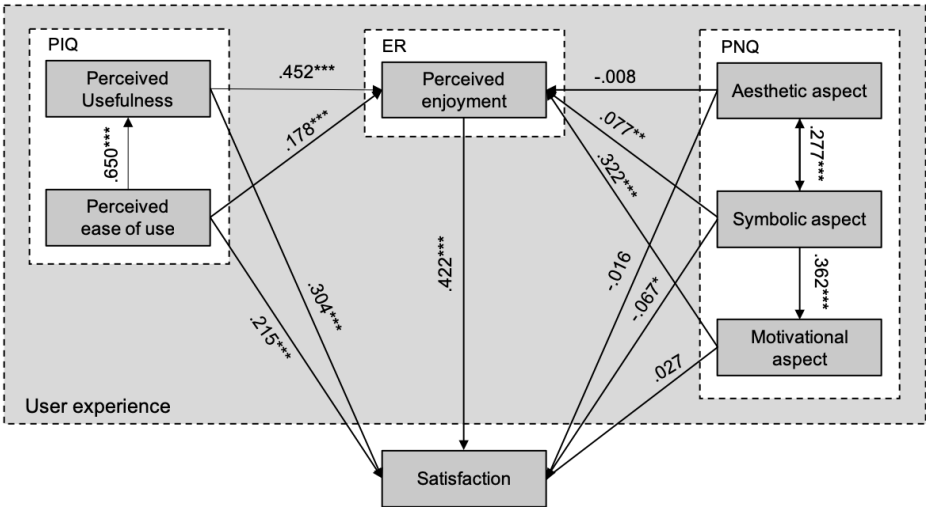

Figure 2: Results of the research model
Note: *p < .05; **p < .01; ***p < .001

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 UX factors are impacted more by Peer influence than by Professor influence.

More precisely, Peer influence impacts 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 Peer influence also influence Perceived usefulness (ß=.182; p-value=.000). To put it simply, only Peer influence impacts the Perceived instrumental qualities and Perceived non-instrumental qualities components. Professor influence results indicate that only two Perceived non-instrumental qualities factors are influenced by Professors opinions. The two impacted factors are Aesthetic aspects (ß=.113; p-value=.019) and Symbolic aspects (ß=.142; p-value=.005).

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
Professor Support		

Perceived instrumental qualities		
ProfInfl → PU	0.007	0.848
ProfInfl → PEOU	0.033	0.574
Perceived non-instrumental qualities		
ProfInfl → AA	0.113	0.019
ProfInfl → SA	0.142	0.005
ProfInfl → MA	-0.034	0.462
Emotional reactions		
ProfInfl → PE	-0.024	0.351

5 Discussion/Conclusion

Répéter objectif de l'étude et ce qui a été mis en place.

Résultats :

Existence influence sociale.

Résultats en accord avec théorie sociale et approche TAM

Cependant, impacte différentié des pairs et profs

Impact plus fort des pairs car plus de proximité. Reference group theory, Group influence processes and Social exchange theory permette d'expliquer cela.

Présence d'impact sur PNQ, Reference group theory, Group influence processes and Social exchange theory permette d'expliquer cela.

Absence d'impact des prof sur PIQ, car n'ont pas les mêmes utilisation, connaissance/ autre génération technologique

Absence d'impact sur RE en accord avec modèle CUE-model

Yet, no impact from peers and Professors has been found on Perceived enjoyment. These results corroborate the soundness 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. 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 professor remains the same along the adoption process. In addition, it would be interesting to extend this research with personality factors and type of users.

In conclusion, this study posits a new perspective for UX research. The theoretical framework should broaden its scope to the social impact in order to get a richer 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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