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Characterization of End-users' Engagement and Interaction Experience with Social Media Technologies

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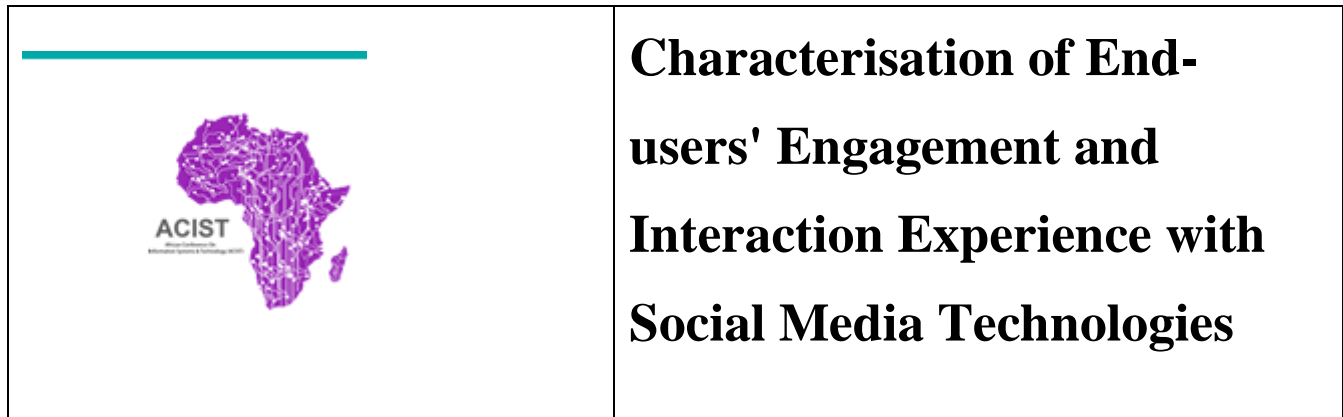


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ABSTRACT

People, particularly digital citizens, gain more technological experiences from their frequent usage of social media technologies. Their experience as end-users occurs before, during, and after their engagement and interaction with the technologies and is popularly described using behaviour-related definitions. However, an end-user's experience with technologies goes beyond the 'click-and-type' definition. This prompts the question, "what are the user experience elements that define and characterise end-users' engagement and interaction with social media technologies?". Using a case study-based approach, end-users' engagement and interaction with social media technologies were identified. The study's findings indicated that several user experience elements were characterised by emotions, cognitive, and behavioural dimensions. Combining the characteristics of the dimensions resulted in a more holistic view of the engagement and interaction that end-users have with social media technologies.

Keywords

User experience, end-user engagement, social media technologies

INTRODUCTION

In society, the daily usage of online and interactive Information Communication Technologies (ICTs), such as social media technologies, have increased, especially remote and social interactions in the fourth industrial revolution era. With over four billion digital citizens using social media worldwide, online socialisation has become part of everyday life, and the adoption of social media keeps increasing globally (We are social & Hootsuite, 2021a). In South Africa, over 25 million members of the population actively use social media technologies (We are social &

Hootsuite, 2021b). Facebook, YouTube, WhatsApp, Instagram, Twitter, TikTok, and Telegram are some globally used social platforms (We are social & Hootsuite, 2021a).

Moreover, the built-in analytical services in social media technologies are used to monitor and report how digital citizens (also referred to as end-users) have engaged or interacted and the status of their actions and inactions on the social media technologies. Typical findings include the number of views, likes, thumbs up/down and claps, and post engagements such as reactions, comments, and shares (Ornico & World wide worx, 2021; We are social & Hootsuite, 2021a). Such a view of the end-users' engaging experience in the social media technology environment relates to the behavioural interaction with technology. However, engagement with interactive technologies goes beyond clicks and typing. Understanding a person's true engagement and experience with social media technology could guide institutions and software developers to know which elements to look out for when adopting and integrating the technology in their respective environments.

This paper adopts the User Experience (UX) lens from the Human-Computer Interaction (HCI) domain. UX is a term used to describe people's encounters with an ICT before, during, and after an interaction (Roto et al., 2011). People's experience with social media technologies goes beyond the 'clicking and typing' aspects of interactions, hence the need to identify the key UX elements of the end-user's engagement and interaction within the social media technology context. The research questions are (i) "what are the user experience elements that define and characterise end-user's engagement and interaction with social media technologies?" and (ii) "What is the relationship between the overall UX engagement and interaction elements for social media technologies?". Through the UX lens, this paper explores elements that make up the engagement and interaction end-users have within the social media technology context. It further stresses the importance of understanding the UX-related aspects and the end-users' perspectives of engagement and interaction.

USER EXPERIENCE AND SOCIAL MEDIA TECHNOLOGIES

The term "user experience" or "UX" in the HCI domain has been proposed as a wider view of a person's engagement with an ICT (Botha et al., 2010). This section outlines the different types of engagement that an end-user may experience when interacting with an ICT, such as social media technology. The engagement and experience end-users have before, during, and after interacting with an ICT, are intertwined. It involves complex elements from the end-users, the ICT, and the context in which the interaction took place. The end-users' experience is subjective as it is based on their personal feelings and perceptions when interacting and when not interacting with the ICT. Consequently, the end-users' feelings affect their judgment of the ICT as it is influenced by their emotional and cognitive aspects of the experience. As the engagement process continues, behavioural aspects such as intention and interactivity emerge.

Emotional Engagement

The interactive experience with an ICT and the post-interaction period evokes emotional responses or reactions in end-users. For instance, the attraction for an ICT and a person's sense of beauty, perceived usability, and interest in the emotional engagement level evoke end-users' motivation to perform a task (D. A. Norman, 2004; O'Brien & Toms, 2008). Affect (or affective experience) is another aspect, and it refers to the human's biological response to external stimulus, which is interpreted as emotions, moods, and temperament, and can either be positive or negative (Dix et al., 2004; Hassenzahl et al., 2010; Lottridge et al., 2011). Additionally, factors such as reliability, satisfaction, delight, and adjustability indicate the extent of emotional engagement in an end-user's experience. Essentially, the emotional engagement concerns the feelings or affective responses of end-users and maps the emotional thread of their experience of the ICT. According to Norman (2004), the end-user emotions have an influential effect on their thoughts and responses and connect to the cognition process during the period of experience.

Cognitive Engagement

The model of cognitive processing and end-user judgment, as well as the sensual and spatio-temporal threads of experience, show that there are manifestations of thoughts, perceptions, emotions, and actions that constitute the cognitive engagement end-users have with ICTs (D. Norman, 2013). End-users subconsciously and consciously devote available perceptual resources during their experiences with ICTs. At the visceral level, end-users form instinctive thoughts along with thoughts of the workload involved in completing a task at the behavioural level. These are followed by reflective thoughts about the period of experience with the ICT. Furthermore, some emotional responses are evoked in the end-user during the cognitive processing or judging levels, thus influencing their experience with the ICT. The emotions can occur during the first impressions end-users have of the ICT, the interactive period while engaging with it, or the reflective stage after engaging with it. During the latter stage, end-users mentally have thoughts and form opinions about their encounters with the ICT, which influence their decision to have further interactions with it or not. End-users could feel some level of attraction, fun and curiosity towards the ICT, along with a cognitive effort to perform tasks with it (O'Brien & Toms, 2008; Oh & Sundar, 2016). Also, the arousal of the imagination, curiosity, boredom, enjoyment, evoked interest, and challenge are some attributes of end-user cognitive engagement (Oh & Sundar, 2016).

Behavioural Engagement

There are many views of the behavioural involvement that end-users have with ICTs. Interactivity is a component of the sensual thread of experience that end-users have with ICTs and is associated with the behavioural aspect of their engagement with the product. Within the HCI domain, interactivity concerns the physical connection and cognition processes that take place during the usage period, which is when the end-users interact with the interface of an ICT. Clicking, touching, body language or human motion and sound are ways end-users interact with an ICT

interface, whether for a short session or longer (multiple) sessions. In addition to interactivity, a period of zero interaction is a manifestation of end-user behavioural engagement with an ICT. This period of zero interaction occurs when end-users temporarily pause the physical or peripheral interaction with the product. The pause could be either intentional, such as abandoning the ICT for another, doing activities with it, or completing a task. Also, the pause could be accidental because of the device crashing and network disconnecting.

End-User Experience Engagement And Interaction

Understanding the nature of end-user engagement requires viewing the interactions through the UX aspects of the ICT. The focus area is on the end-user's subjective feelings of engagement from the perspective of the emotional, cognitive, and behavioural dimensions. A concept was formulated by Oyedele, van Greunen and Veldsman (2018) to capture this focus area of the end-user engagement during an experience with an ICT. The concept termed UX engagement and interaction holistically refers to the emotional, cognitive, and behavioural engagement that end-users have with ICTs (Oyedele et al., 2018). UX engagement and interaction is within a vast but emerging area within the HCI domain and UX field. It could benefit researchers, software designers and developers to understand the engaging experience and interaction that end-users have with ICTs. UX engagement and interaction dimensions are also intertwined during the experience period (Oyedele et al., 2018). This implies that approaches to measuring a specific dimension might also extend to parts or manifestations of other dimensions. Moreover, measuring UX engagement and interaction for end-users requires consideration of all its three dimensions. Therefore, the elements of end-user engagement and interaction with an ICT are intertwined and occur in the forms of expressed or captured emotions, cognition, and behaviour.

Social Media Technologies

Several studies have attempted to define social media in terms of mobile technologies, web-based technologies, or affordances of technologies. (Kaplan & Haenlein, 2010; Tess, 2013). (Kietzmann et al., 2011). (Mao, 2014) (Aichner et al., 2021). In the recent past, mobile Internet-based instant messaging applications such as WhatsApp, TikTok, Snapchat and Telegram, and content management systems such as Moodle and Picasa are regarded as instances of social media (Elletson & MacKinnon, 2014; Mao, 2014; Munyoka et al., 2014; We are social & Hootsuite, 2021a). Further, each end-user can connect with other end-users. The circle of social media end-users' contacts is referred to as their social network. In the fourth industrial revolution era, social media technologies are used with existing ICT products, services, processes, and activities. Examples include the integration of social media with customer/client relationship management systems, adoption of social media as a customer/client relationship management system, social media integration for login processes, and social media for marketing, engagement, and management activities (Ornico & World wide worx, 2021; We are social & Hootsuite, 2021a). The terms "social media" and "social media technologies" have been used interchangeably in literature and everyday conversation. However, they can be differentiated to some extent and still conflict with each other. In this paper, social media

technologies refer to social media applications, websites, and messaging applications, as well as the aspects of social media that can be integrated with other ICTs.

User Experience And Social Media Technology

The developers and end-users control social media technology's content and user interface design aspects. The developer controls the ecosystem while the end-user controls and influences the generation and sharing of content, from the onboarding stage to retrospective usage. End-user activities contribute to the changes in the user interface of social media technology, and other end-users in the universe of the same social media technology see the result of the changes contributed. For instance, the generation and sharing of content are displayed on the feeds, timelines, and profiles of the social media technology and eventually and instantaneously change their user interfaces. Also, the visibility of a social media technology's user interface depends on the privacy settings the end-users have set on their respective profiles and content. Currently limited in literature is a UX approach that can be aimed at promoting social media technology end-user behaviour, where interaction meets the needs for user participation. Several UX-based approaches, used as frameworks, guide the design of interactive products to attract more end-user interactions with the product (Baird & Fisher, 2005; Estes et al., 2009; Garrett, 2011). However, end-users still need to decide whether to participate in the engagement. Also, in developing countries, particularly those in Africa, the research on using social media technology in a context that caters for diverse social media technology end-users is still emerging. A form of artefact for online social application designers and developers is needed on how to understand and design for the online end-user participation using a UX approach for user engagement.

MATERIALS AND METHODS

Procedure And Materials

For this case study, an online-based unmoderated remote usability testing approach and an online-based structured interview approach were used to explore the UX elements that constitute the engagement and interaction end-users have with social media technologies. QuestionPro was used to create a single questionnaire consisting of the general background and Internet experience sections, the unmoderated remote usability testing questionnaire, and the interview questionnaire. For the data collection, the logic and branching feature of QuestionPro was applied to allow end-users to exercise a choice of participation in the respective questionnaires. Upon receiving ethical clearance, the principles of research ethics were adhered to, and the data collection was done over a period of four weeks. Four social media technology credentials were created, randomly assigned to the participants only after the questionnaire was activated and were deactivated after the data collection period.

Participants

A total of 14 participants in this study were conveniently selected from followers of the University's Facebook page after an invitation to participate in the study was posted on the Facebook page. The selection was done during the four-week data collection period between July and August 2018. It is important to note that the sample size for qualitative data collection needs a minimum of 12 participants (Guest et al., 2006). In qualitative research generally, what matters is data saturation rather than the sample size (Creswell, 2013). Participants were encouraged to identify and use the social media technology they had not used before, e.g., Facebook, Instagram, WhatsApp, and YouTube, with a list of basic tasks such as logging in, checking posts, sending posts to assigned users/message groups, and changing profile images/themes and logging out to be completed on the identified social media technology. The unmoderated remote usability testing questionnaire focused on the participants who identified and used a social media technology they had not used before, during the study. The structured interview questionnaire focused on the social media technology experience of the participants as social media technology end-users and as administrators/owners of social network groups or channels. Figure 1 shows the breakdown of the participants in the study.

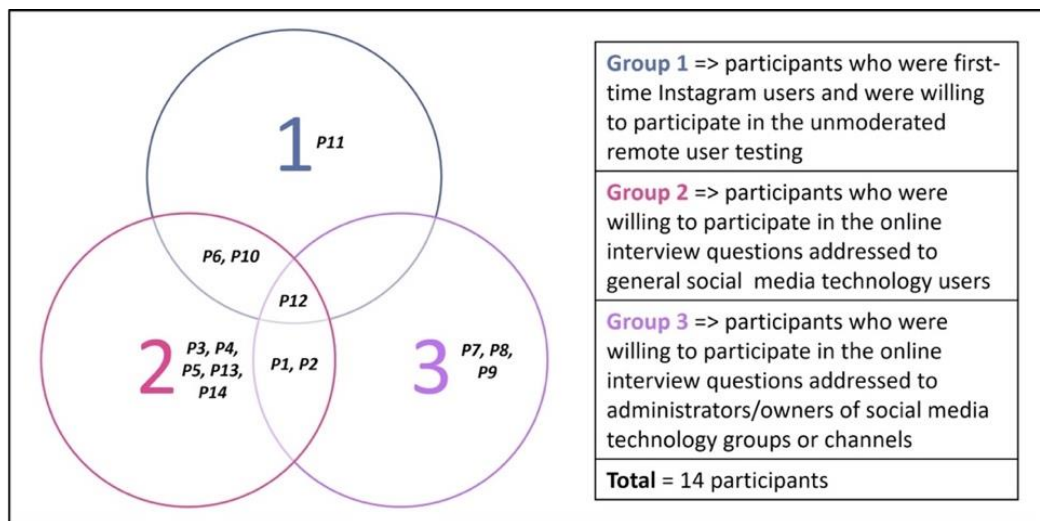


Figure 1: Summary of participants' role in the study

Analysis

Upon completing the online questionnaires, the QuestionPro data was collected and exported to Microsoft Excel for analysis. Descriptive statistics were used to summarise the findings from the data to categorise the emotional, cognitive, and behavioural social media technology engagements of the Group 1 participants. Thematic analysis was applied to Groups 2 and 3's online interview responses. Relevant statements from the online interview responses were tagged into specific codes and grouped into themes aligned with the core dimensions of user experience engagement and interaction.

RESULTS

Onboarding Stage In The Unmoderated Remote Usability Testing

Four participants indicated that they had not used Instagram before while the remaining participants indicated that they were frequent users of Facebook, Instagram, WhatsApp, and YouTube. Thus, Instagram was used during the unmoderated remote user testing with the four new users. Their responses to the questions on their emotional, cognitive, and behavioural engagements with this social media technology are summarised in this section.

From the findings from the case study's unmoderated remote user testing section, the user experience engagement and interaction elements for the first-time end-users of a social media technology can be either positive, negative, or mixed. In this study, the elements found can be categorised into three dimensions as illustrated in Table 1.

Emotional dimension	Cognitive dimension	Behavioural dimension
<ul style="list-style-type: none"> • Felt uninvolved • Fun • Frustration • Annoyance • Discouragement • Felt control • Felt interested 	<ul style="list-style-type: none"> • Not Drawn in • Confusing to use • Mentally taxing • Demanding experience • Task incompleteness • Curiosity • Attractiveness • Visual appeal • Perception of time (none, loss of self, time, and space) • Worthwhileness • Success 	<ul style="list-style-type: none"> • Activity completion • Intentional interaction • Accidental interaction • Dismissal of activities • No content creation • Unlikeliness of continued interaction

<ul style="list-style-type: none">• Nonrewarding• Recommendation

Table 1: UX engagement and interaction dimensions and attributes in unmoderated remote usability testing

The emotional engagement attributes to look out for among new users were both the negative and positive emotions. Three of the four new Instagram users felt that they were not involved, not having fun, not in control, and not interested in the experience of using it when performing the given study tasks to complete on this social media technology. The interest and involvement of the new users' emotions were less than satisfactory, while their negative emotions suggested that their experience with the social media technology was not always positive, especially as they were using it for the first time in research-based or non-social conditions.

The cognitive engagement attributes to look out for among new users were both negative and positive perceptions. The new Instagram users liked the graphics and images used in it and found that using it was not so mentally demanding. All four new users were not drawn into or absorbed in the experience of using Instagram or continued to use it out of curiosity because they found the experience of using it unrewarding. There is a concern that the tasks in the cognitive engagement with the social media technology environment could be limiting and might require improvement.

The behavioural engagement attributes were intentions with actions and non-actions. The four new users were intentional in starting, ignoring, and skipping some activities when engaging with the social media technology in the study. Also, all users were distracted when interacting with the social media technology and were less likely to do a few more activities on it at a later stage.

Interview Findings For Retrospective Stage (End-Users)

Out of the 14 participants in this study (as illustrated in Figure 1), ten participants (P01, P02, P03, P04, P05, P06, P10, P12, P13, P14) who were social media technology end-users were interviewed and responded to questions

related to their emotional, cognitive, and behavioural involvement with the social media technology they mostly engage with. The most used social media technology by these end-users were Facebook (P04, P05, P06, P12, P13, P14), Instagram (P01, P02, P03), and YouTube (P10).

Emotional dimension	Cognitive dimension	Behavioural dimension
<ul style="list-style-type: none"> • Expectations of new relevant content • Mainly excited • Mainly prompts of personal interest • Checks for new items of interest • Loss of interest 	<ul style="list-style-type: none"> • Mainly momentary periods • Mainly attentive to visual content • Mainly attentive to visual or content of interest • Checks for items with direct relevance 	<ul style="list-style-type: none"> • Activities of leisure • Dismissal of request/content that has no relevance • Mainly a response to request/content that is relevant • Mainly a response to content of no interest • Content generated based on own experience

Table 2: UX engagement and interaction themes from social network end-user interviews

The participants' responses to the emotional engagement questions referred to the expectations of new relevant content, feeling excited, prompts of personal interest, checking for new items of interest, and having a loss of interest, as illustrated in Table 2. The felt emotions identified by the participants were fear, inspiration, interest, anticipation, satisfaction, excitement/motivation, attention, and loss of interest. Furthermore, the social media technology characteristics identified by the participants regarding their emotional engagement were content of relevance, friends, Sites/Pages, notification updates, and posts.

The responses of the interviewed participants to the cognitive engagement questions touched on their experiences of momentary periods, attention to visual content and content of interest, and checking of items with direct relevance, as illustrated in Table 2. The cognitive elements identified by the participants were the momentary period,

lingering period, attention, visual appeal, interest, and the feeling of being drawn in, while the identified cognitive emotions were fun, good, and a feeling of comfort. Additionally, the social media technology characteristics identified by the participants regarding their cognitive engagement were pictures, visuals, news, newsfeeds, videos, mini videos, viewed content, friends, friends' activities and profile page, status updates, and content of interest (i.e., fashion, clothing, travel, entertainment, motivational quotes, and memes).

The participants' responses to the behavioural engagement questions referred to their leisure activities, dismissal of irrelevant requests or content, accidental responses to the content of no interest, and content generation based on their experience, as illustrated in Table 2. The behavioural elements identified by the interviewed participants' responses were intentional leisure period (i.e., time breaks, cooking, and work), intentional modality (i.e., joining, reading, updating, finding, and looking), ignoring and skipping, responding (i.e., like, accept and view), posting and capturing. The behavioural emotions expressed were disinterest, annoyance, and discomfort. Moreover, the social media technology characteristics identified by the participants regarding their behavioural engagement were pictures, groups, adverts, videos, status, messages, newsfeeds, friends, posts, requests, pages, content, unknown people, photos of friends, friend requests, music sites, image capturing, video recording, and privacy.

Interview Findings For Retrospective Stage (Social Network Administrative End-Users)

Out of the 14 participants in this study (as illustrated in Figure 1), six participants (P01, P02, P07, P08, P09, P12) who were social network group administrators were interviewed and responded to questions about their emotional, cognitive, and behavioural involvement with social media technology, as social media technology administrators. These social network group administrators were administrators/owners of a Facebook group (P07, P08, P12), Facebook page (P02) and WhatsApp group (P01, P09).

Emotional dimension	Cognitive dimension	Behavioural dimension
<ul style="list-style-type: none"> • Prompts of group activities 	<ul style="list-style-type: none"> • Period of momentary group activities 	<ul style="list-style-type: none"> • Proactive decisions to interact with a group
<ul style="list-style-type: none"> • Engagement observation via system notification 	<ul style="list-style-type: none"> • Mainly attentive to the activities of relevant people 	<ul style="list-style-type: none"> • Activities of leisure or relaxation
<ul style="list-style-type: none"> • Mainly reasons of unsatisfactory events 	<ul style="list-style-type: none"> • Mainly acceptable visuals and content 	<ul style="list-style-type: none"> • Dismissal of mainly irrelevant content

<ul style="list-style-type: none"> • Mainly checks for interactions from group members 	<ul style="list-style-type: none"> • Response to requests/content that are relevant • Mainly intentional responses • Content generated based on personal experience
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Table 3: UX engagement and interaction themes from social network administrative end-user interviews

The participants' responses to questions about their emotional engagement that social media technology administrative end-users have with their group or channel were based on their prompts for group activities, engagement observation with system notification, and reasons related to unsatisfactory events, as shown in Table 3. The felt emotions identified were personal interest, curiosity, motivation, attraction, dissatisfaction, and disinterest, while the behavioural elements were ghosting, responding and dismissals. Moreover, the social media technology characteristics identified from the participants' responses to questions regarding their emotional engagement were personal groups, personal adverts, notification systems, group notifications, new member requests, comments, windows, and social media technology features.

The participants' responses to questions about their cognitive engagement revealed that interest and attention were related to the period of momentary group activities, attention to activities of relevant people, acceptable visuals, content, and checks for interactions from group members, as shown in Table 3. The cognitive elements identified by the participants were the perception of time, attention, visual appeal, and interest. The social media technology characteristics were family/personal group chat, notification pop-ups, frequency of posters, member/group content, videos, pictures, audio files, categorised features, text boxes, emojis, and content.

The participants' responses to questions about their behavioural engagement were based on their proactive decisions to interact with the group, activities of leisure or relaxation, dismissal of irrelevant content, response to requests or content that is relevant, the content generated based on personal experience, and intentional responses, as shown in Table 3. The behavioural elements identified by the interviewed participants' responses were deleting, read, respond/comment, ask, leave (exit), checking, ignoring, skipping, moving, joining, chatting, posting, outsourcing, typing, and researching. The social media technology characteristics identified were our member, group exit, comments, group post, meme, analytic/reporting feature, new friend request, advertisement, new page join request, video, new member request, pages, chat, pictures, and updates.

DISCUSSION

The UX engagement and interaction attributes were explored in the current case study's unmoderated remote user testing session. The responses from the participants who used social media technology for the first time in this study in an unmoderated remote testing approach were both positive and negative, with the negative responses mostly due to the technical challenges faced by the participants during their attempted use of the social media technology that they had not used before. Therefore, UX engagement and interaction can be defined as follows:

Definition 1: UX engagement and interaction in the social media technology context consists of a person's positive and negative subjective feelings that occur during and after using a requested social media technology.

The themes from the interview sessions were extracted from the analysis of the interview responses of the case study conducted in this study. UX engagement and interaction is positive when all the emotional, cognitive, and behavioural engagement is positive. Findings from the interview section of the case study revealed themes that suggested a mixed engagement. Another finding was that the elements, from an end-user perspective as a universal social network member, were like that of their perspective as a social network group administrator. For this reason, Definition 2 for UX engagement and interaction can be as follows:

Definition 2: UX engagement and interaction in the social media technology context consists of a person's positive emotions, thoughts, and self-driven activities that occur before, during, and after using a social media technology at both the personalised/individualised interaction level and the group interaction level.

Together, the attributes from the unmoderated remote use of the social media technology and the themes from the interviews conducted are viewable as follows:

1. User experience engagement and interaction can be either subjectively positive or negative
2. User experience engagement and interaction is a subjective response of the end-user
3. User experience engagement and interaction is influenced by the circumstances of the interaction
4. User experience engagement and interaction occurs at both the universal end-user and the social network administrator end-user levels

Thus, Definition 3 for UX engagement and interaction can be as follows:

Definition 3: UX engagement and interaction in the social media technology context refers to an end-user's subjective perspective of their emotional, cognitive,

and behavioural involvement with technology at the individualistic and social levels.

Furthermore, UX engagement and interaction elements for social media technology involve both the end-users' states of mind and actions, as well as behavioural characteristics. Figure 2 illustrates the connection between the overall user experience engagement and interaction elements for social media technology.

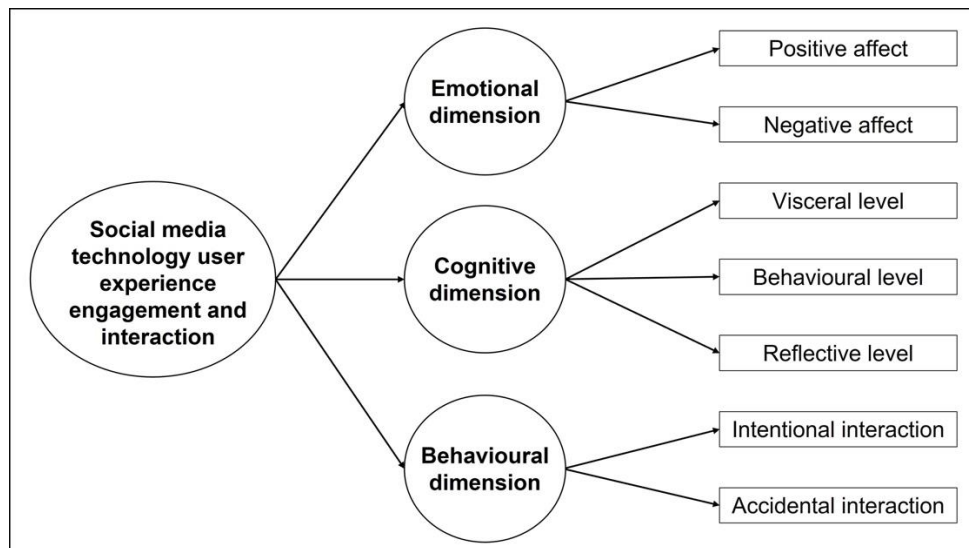


Figure 2: Characterisation of UX engagement and interaction attributes for social media technology end-users

As shown in Figure 2, the perceptions from the emotional engagement of the end-user can be associated with their positive and negative emotions toward ICT products. The perceptions from the cognitive engagement can be associated with the visceral, behavioural, and reflective aspects of human interaction with ICT products, as per Norman (2004) and Andreas (2020). On the other hand, behavioural engagement constitutes the intentions, actions, and non-actions. Hence, these user experience engagement and interaction elements revolve around social media technology characteristics such as content, prompts and search/check options.

CONCLUSIONS

Knowledge about the engaging experience that people have with interactive technologies, such as social media technology, plays a vital role in the success of such technologies. Such knowledge is particularly helpful for technology adopters, designers, and developers. This paper presented the findings from a case study designed to determine the UX elements that made up the engagement and interaction end-users have in the social media technology contexts. Collectively, the UX elements formed a more holistic view of the engagement and interaction that end-users have with social media technology. At the onboarding and retrospective stages, the three dimensions

were visible in the end-user's engagement and interaction with the social media technology. A limitation in the case study of this paper is that the data collection done before the COVID-19 pandemic era and the discussions presented are based on those findings. The COVID-19 pandemic irreversibly changed how people interact and engage with one another, consequently changing how people use online social applications. Further research work could explore the UX engagement and interaction elements of these technologies for the post-COVID era.

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