

Utilizing Data from Twitter to Explore the UX of “*Madrasati*” as a Saudi e-Learning Platform Compelled by the Pandemic

Asma Abdulsalam Alfaifi^{1*} and Shakir Gayour Khan²

¹College of Computer and Information Sciences, Imam Mohammad Ibn Saud Islamic University (IMSIU),
Riyadh, Saudi Arabia

²College of Computer and Information Sciences, Imam Mohammad Ibn Saud Islamic University (IMSIU),
Riyadh, Saudi Arabia

*E-mail: aaqfaifi@sm.imamu.edu.sa

Abstract

Received: 01/12/2021
Revised: 28/04/2022
Accepted: 16/05/2022

Purpose: When a website or application is designed and deployed rapidly as a response to an urgent need, it may not satisfy users. Therefore, we decided to investigate users' attitudes and (dis)satisfaction towards the UX of the *Madrasati* platform, an e-learning system that was developed by the Saudi Ministry of Education as an alternative to traditional learning during the COVID-19 crisis.

Method: The study utilizes Twitter to collect a large volume of data (177,358 tweets) related to *Madrasati*. Two relevant hashtags #Madrasati (#مدرستي) and #Minaset Madrasati (#منصة مدرستي) were used to collect data within the first two months after the launch of the platform. The two-month period was split into four phases: *Pre-Semester Phase*, *Familiarization Phase*, *Interaction Phase*, and *Use Phase*. The Microsoft Product Reaction Cards (MPRC) tool was implemented to judge user satisfaction/dissatisfaction.

Results: The findings show a sudden dissatisfaction about the platform upon launch, but a gradual increase in positive UX over time. Various categories of negative UX (e.g., errors, user denial, and speed issues) gradually became less and less over the observed two months. More importantly, the results show how big data from Twitter can be used for analyzing the UX of a new product.

Conclusion: UX is not static; it can change positively over time as users gain more experience with the system.

Keywords: *Madrasati*, Twitter Data, User experience, Social Network Sites, e-learning platform

Introduction

Madrasati (The Ministry of Education, 2020) is a Saudi interactive learning management system (LMS) that allows teachers to virtually instruct primary, intermediate, and high school pupils and provide them with educational content (e.g., instructional videos, presentations, and exercises). This system came as an urgent response to an unprecedented crisis, COVID-19, which started affecting the Kingdom of Saudi Arabia in March 2020 (Alfaifi, 2021; Khan, 2021). That is, it was designed, developed, implemented, and delivered in a rapid manner with limited user involvement in the design process. After the launch,



some users (e.g., staff, parents, and pupils) encountered some challenges with this new LMS, reflecting a negative user experience (UX). The success or failure of a product is determined by its UX, and this is especially true for a learning platform aiming to facilitate pupils' learning. Therefore, this study investigates indications about user (dis)satisfaction towards this system, relying on data collected from another virtual platform, Twitter. That is, the current work is an attempt not only to evaluate an existing system over time, but rather to investigate how data from social media, specifically Twitter, can inform us about a product's UX over a certain period of time. If data from Twitter can be informative enough, systems designers can use such platforms to gain a quick, continuous, and large-scale evaluation for developing their systems.

Background

Previous research showed that LMSs have been adapted in different institutions such as universities because of their functionalities for improving and enhancing learning (see e.g., Elgort, 2005, December). However, studies have revealed that an LMS such as Blackboard is likely to have some issues associated with usability and accessibility, which in turn preclude both teachers and students from comfortably utilizing the e-learning systems (Kim & Seo, 2009). For example, Al-Khalafi (2012) evaluated the usability of JUSUR LMS, a system developed locally by the Saudi National Center for E-Learning and Distance Learning, and measured user satisfaction, finding that the LMS had some functionality problems that caused user dissatisfaction. This emphasizes the importance of investigating the UX of new locally produced LMSs such as *Madrasati*.

During the COVID-19 crisis, many existing LMSs such as Blackboard and videoconferencing technologies such as Zoom rapidly became more popular. Other systems emerged as an urgent solution to allow the educational systems to survive and keep running. In other words, during the pandemic, e-learning and innovation in online technologies became no longer just an option but rather a need (see e.g., Schneider & Council, 2020). For example, in Indonesia, a new e-learning application was launched during the early period of switching from face-to-face learning to home/e-learning (see e.g., Khotimah, Zainiyati, Hamid, & Basit, 2020). The Indonesian application is called *Madrasah*, similar in name to the Saudi platform *Madrasati*; the former means "school" while the latter means "my school". Khotimah et al. (2020) assessed the users' (both teachers and students) attitudes towards the application and reported a discrepancy between the teachers' responses and those of the students. Specifically, the surveyed/interviewed teachers appeared more satisfied about the application than the students were. However, part of the dissatisfaction the students reported seems to have been attributed not to the system itself but rather to the network connection and digital divide.

Madrasati does not seem to have received sufficient attention from researchers. The few studies that have examined this LMS were either loosely related to the UX of the system itself or used a small sample of respondents or only one group of stakeholders such as teachers. For instance, Al-Humoud (2021) investigated the reality of teacher online training for using the electronic platform, *Madrasati*. The findings implied that the platform still requires some improvements, and that a user guide is necessary to make it easy for the teachers to use this platform. This study was limited to only one category of users, namely teachers, and was not directly intended to investigate the UX of the system.

Twitter, which is heavily used by Saudis (Statista, 2021), has been used in previous

studies to investigate people's attitudes and reactions towards different social, cultural, and technological issues. One of the recent topics in which data from Twitter were used was the Saudi governmental preventive measures to contain COVID-19 (Alhajji, Al Khalifah, A., Aljubran, & Alkhalifah, 2020). Alhajji and colleagues (2020) performed a sentiment analysis of tweets in Saudi Arabia in order to assess Saudis' attitudes towards COVID-19 preventive measures. Hence, this study used tweets to show whether big data from Twitter can be used for analyzing UX with a newly launched product, as previous studies have also shown that there is some relationship between big data and education (see e.g., Khan and Alqahtani, 2020).

Methodology

Data source

The ideal method of investigation would be empirical in nature; that is, it would be informative to observe users' performance (such as pupils and teachers) while using the system or to give them some tasks to complete while monitoring their reactions. However, due to precautionary measures and the need for social distance as well as the difficulty in finding volunteering participants during the COVID-19 global crisis, it was not possible to run the study in an experimental or pseudo-experimental manner. In addition, the platform being investigated has been substantially developed and no longer represents the initial design it had upon launch. Instead, this study utilizes data from another platform, namely Twitter, to see the extent to which large data from social media can help system designers gain a rough image about user attitudes. Twitter was selected because Saudi Arabia has been well-known for its heavy use of Twitter since 2013 (Business Insider, 2013; Statista, 2021), and because it has been used in a similar way for a similar purpose (i.e., investigating user attitudes) in other studies such as Alhajji et al. (2021).

Data selection

The study selected data from two main Hashtags #Madrasati (مدرستي) and #Minaset Madrasati (منصة مدرستي) over the first two months of launch. This should represent a good diversity of users (students, teachers, parents, administrators, etc.) from different cities and backgrounds in Saudi Arabia. The limited two-month period was chosen in order to show how such a relatively short timeline can reveal a gradually improved UX of the system and how a short period of time with a large amount of data can reveal much about UX.

The tweets were produced in various Saudi and non-Saudi dialects, which made it difficult to extract some key words in an automated manner. For this reason, it was necessary to implement the Microsoft Product Reaction Cards (MPRC) tool (Benedek and Miner, 2002), which has been used and examined previously in many studies (see e.g., Williams, Kelly & Anderson 2004; Rohrer 2009, Barnum & Palmer 2010; Hinkle & Chaparro, 2013). In a pre-analysis phase, the list was translated into Arabic, and then 10 Arabic speakers were asked to evaluate, on a 0-100 scale (with a ten-point interval), the semantic indication of each word (positive vs. negative), and then select ten positive and ten negative words they were likely to use to describe a system. Any item that was perceived as negative or positive by no less than 80% of judges was included in the list of negatives or positives. The entire data set from each phase was searched for each positive or negative item, and each tweet including one of the key words was scrutinized

by the researcher to make sure that it was relevant to the platform under investigation and carried the target semantic meaning. One issue involved negated sentences, as words that carry a positive meaning like “easy” were sometimes embedded in negative sentences. A solution was to treat negated positive expressions (e.g., “not easy”) as positive and vice versa, provided that the key positive vs. negative word was included in the list determined in the pre-analysis phase.

Data organization and analysis

Over two months, Twitter users produced 177,358 tweets. The two-month period was split into four phases. Phase 1 (Pre-Semester Phase): this phase lasts for two weeks after launch and before the first day of the semester. Phase 2 (Familiarization Phase): this phase lasts for another period of two weeks after the beginning of the semester. The Ministry of Education devoted the first week of the semester to registration. The users of the system registered and started familiarizing themselves with the system. Phase 3 (Interaction Phase): this phase lasts for another two weeks after the Exploration Phase. In this phase, the users had already enough time to be familiar with the system, and started interacting with the system better than in the previous phase. Phase 4 (Use Phase): this phase starts after four weeks of use (that is one month after the semester started) and lasts for another period of two weeks. This phase represents the actual period of use, at the beginning of which users had already used the platform for four weeks. Frequency of positive vs. negative items was computed and used as indicative of UX.

Results and discussion

Pre-Semester Phase (1)

During this phase, the two hashtags received over 18,000 tweets ($\approx 10\%$ of the total data). The data show different themes including news items about the new semester and about the new platform, instructions for registration in *Madrasati*, demos about the use of *Madrasati*, and advertisements on assistance services. Hence, unsurprisingly, the data from this phase cannot be used to perform any evaluation about the UX. However, it was important to include this phase for comparison with Phase 2.

Familiarization Phase (2)

As expected, tweets in Phase 2 largely outnumber tweets from Phase 1. The hashtags being searched received over 97,000 tweets, of which nearly 42,000 tweets ($\approx 43\%$) were sent out on Day 1 (Sunday, the first day of the semester) of Week 1 of Phase 2, and nearly 32,000 ($\approx 33\%$) tweets were posted on Day 1 of Week 2 of the same phase. During this phase, the amount of data constituted approximately 55% of the entire data set, and the general trend of users' reaction to the system was negative (85.18%). Figure 1 below depicts this pattern. A Generalized Linear Model (GLZM) was fit to test if there was a statistically significant difference between the frequency of positive and negative items (probability distribution was Poisson loglinear). The results show that there is enough evidence for differences between the two types of items, $\chi^2(1) = 237.037$, $p < 0.001$.

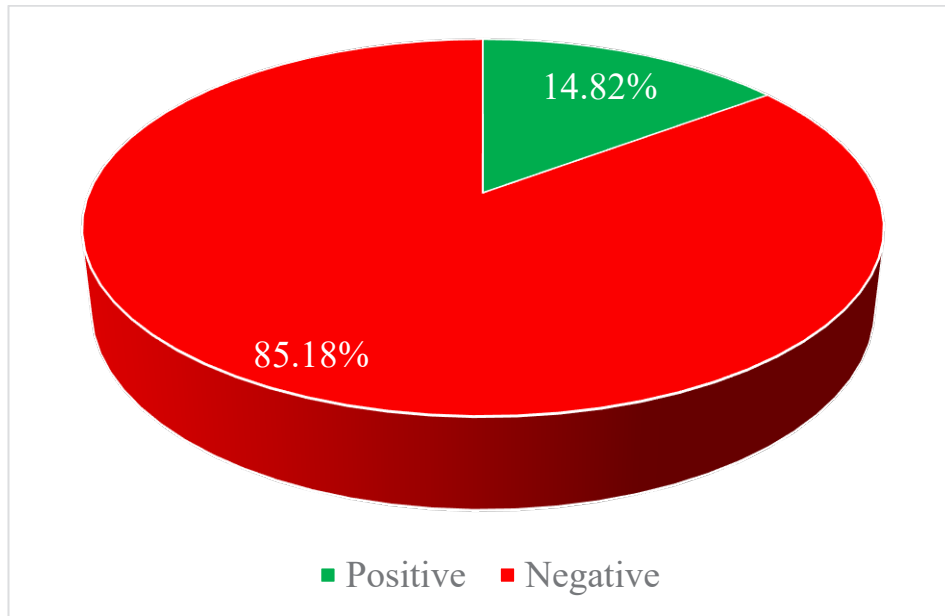


Figure 1. users' positive vs. negative responses to the system during Phase 2

Interaction Phase (3)

The number of tweets in this phase is by far fewer than those in Phase 2. The data show only around 18,000 tweets ($\approx 10\%$ of the total data). As shown in Figure 2, the frequencies of negative and positive items that represent UX are nearly even, negative= 46.56% and positive= 53.44%. Another GLZM was fit to test these frequencies and revealed no statistically significant difference, $\chi^2(1) = 2.06$, $p \leq 0.151$.

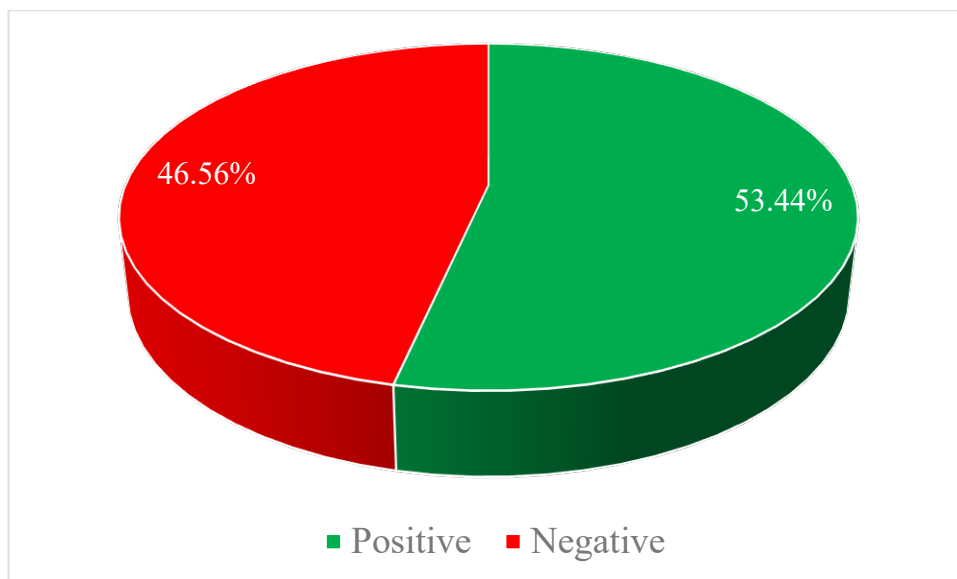


Figure 2. users' positive vs. negative responses to the system during Phase 3

Use Phase (4)

The number of tweets increased in this phase to reach about 45,000 ($\approx 25\%$ of the total data). Tweets that contain positive (70.21%) responses outnumber tweets that contain negative responses (29.79), as depicted in Figure 3. A GLZM shows that there was a statistically significant difference between positives and negatives, $\chi^2(1) = 88.32$, $p \leq 0.001$.

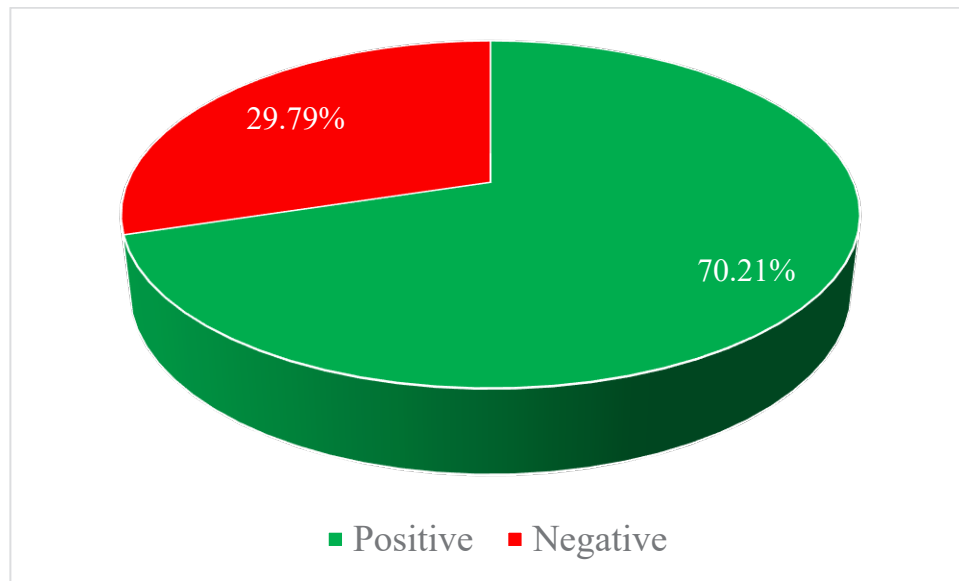


Figure 3. users' positive vs. negative responses to the system during Phase 4

Overall comparison

Figure 4 below shows the overall pattern across the four phases. We can observe the increment of positive responses toward the system and the decrease in negative responses towards the system across the four phases.

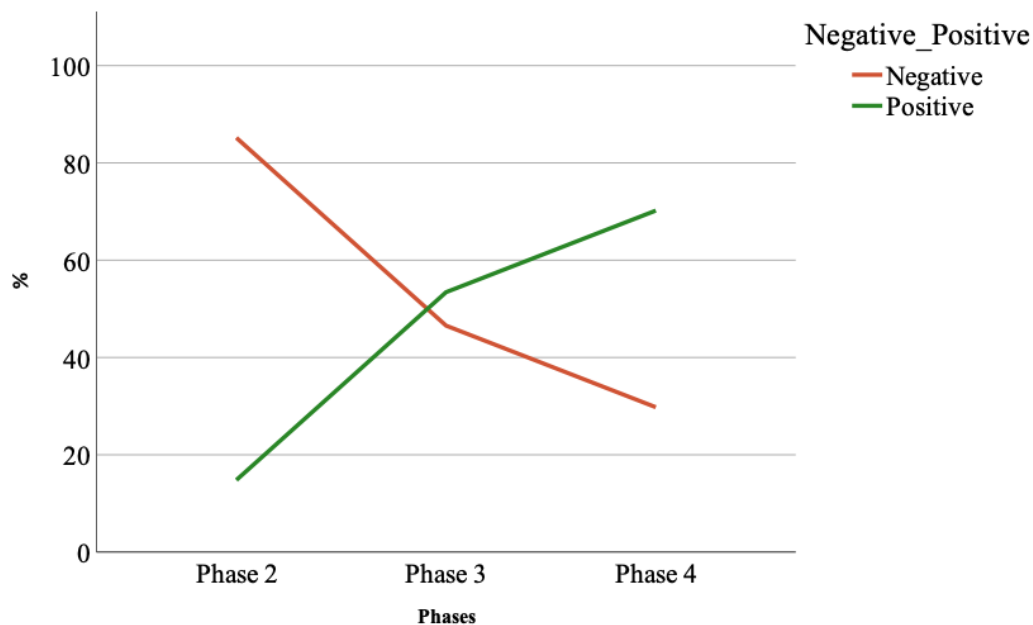


Figure 4. users' positive vs. negative responses to the system across all phases

The change in UX over time has been supported by different findings in the literature. For example, Hassenzahl (2004) found that, after using the product being studied, “perceived usability became a strong determinant of goodness” (p. 319) (note that “goodness” in their study means “satisfaction”). Karapanos, Hassenzahl, and Martens (2008) also showed that there is a difference in UX between initial and prolonged experiences, and that users develop a more comprehensive UX over time (see also Karapanos, 2013). A

more recent study by Kim, Han, Park, and Park (2015) showed that the participants who engaged in a longitudinal experiment by using a social network service (SNS) underwent two phases: an initial phase that was affected by usability and a latter phase that was affected by user value. The current study also supports the idea that UX is dynamic and can change over time. Most responses in Phase 2 were negative while most responses in Phase 4 were positive. Phase 3 functioned as a transitional phase in which UX did not exhibit a clear pattern. The current study also shows that social media networks can be incorporated to study UX, especially over time. Nevertheless, the system underwent some improvements while being used, which may draw our attention to the possibility that the shift from negative to positive UX may be attributed to the improvements that the system gradually received. It is also possible that users started realizing the value of the product after a certain period of use. All these are possible variables, but they are impossible to control for.

Conclusion

User experience (UX) is generally focused on how people feel when interacting with user interface elements created by user interface (UI) designers. A successful UX design considers human needs, and provides people with clear directions on how to access or use a product or website easily, quickly, and directly. Unfortunately, not every site or application is designed properly, especially when designed and deployed rapidly as a response to an urgent need. This study attempted to evaluate UX of the platform that the Saudi Ministry of Education (*Madrasati*) developed as an urgent solution for shifting from traditional learning to e-learning during the COVID-19 crisis. Although studies have used different ways to evaluate new products such as experimentations and online surveys (see e.g., Yang, Liu, Liang, & Tang, 2019), this study attempted to incorporate a social media network (Twitter) to gain insights into the UX of this new LMS. The study led to two major results. First, UX is dynamic and can change over time regardless of the reasons behind the change. Second, the study confirms that a large amount of data obtained from social media can help designers and UX experts to evaluate their new products and make any necessary changes. For future work, we recommend undertaking a new study to examine UX after the system has been used for over two years (at the present time). The study can target and compare different categories of users (e.g., students vs. teachers), and may be conducted in laboratory settings.

References

- Al-Khalifa, H. (2010, February). A first step in evaluating the usability of JUSUR learning management system. In *3rd Annual Forum on e-learning Excellence in the Middle East*.
- Alfaifi, A. (2020). An "Infodemic" with Misinformation and Mistrust among Sampled University Students during the COVID-19 Crisis. *Journal of Arts*, 32(3), 11-20.
- Benedek, J. & Miner, T. (2002). *Measuring Desirability: New Methods for Evaluating Desirability in a Usability Lab Setting*. Proceedings from the Usability's Professionals Association (UPA). Orlando, FL.
- Business Insider (2013), These Are The Most Twitter-Crazy Countries In The World, Starting With Saudi Arabia (!?) retrieved Feb 26th 2021 from <https://www.businessinsider.com.au/the-top-twitter-markets-in-the-world-2013-11>

- Elgort, I. (2005, December). E-learning adoption: Bridging the chasm. In *Ascilite* (pp. 181-185).
- Hassenzahl, M. (2004). The interplay of beauty, goodness, and usability in interactive products. *Human–Computer Interaction*, 19(4), 319-349.
- Hinkle, V., & Chaparro, B. (2013, September). Is User-Validation Necessary for a Spanish Translation of the Microsoft Product Reaction Cards Tool?. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 57, No. 1, pp. 414-418). Sage CA: Los Angeles, CA: SAGE Publications.
- Humoud, M. (2021) the reality of teacher online training for using the electronic platform, *Madrasati: teachers' views and suggestions for improvement. Journal of Faculty of Education Assiut University*, 37(1) 52-97.
- Karapanos, E. (2013). User experience over time. In *Modeling users' experiences with interactive systems* (pp. 57-83). Springer, Berlin, Heidelberg.
- Karapanos, E., Hassenzahl, M., & Martens, J. B. (2008). User experience over time. In *CHI'08 extended abstracts on Human factors in computing systems* (pp. 3561-3566).
- Khan, S. (2021). Visual Data Analysis and Simulation Prediction for COVID-19 in Saudi Arabia Using SEIR Prediction Model. *International Journal of Online & Biomedical Engineering*, 17(8), 154-167.
- Khan, S., & Alqahtani, S. (2020). Bigdata application and its impact on education. *International Journal of Emerging Technologies in Learning (iJET)*, 15(17), 36-46.
- Khotimah, H., Zainiyati, H. S., Hamid, A., & Basit, A. (2020). E-learning application Madrasah online learning solution in the middle of pandemic Covid-19 in Ma Negeri Insan Cendekia, Kendari. *Technium Soc. Sci. J.*, 10, 107.
- Kim, H. K., Han, S. H., Park, J., & Park, W. (2015). How user experience changes over time: A case study of social network services. *Human Factors and Ergonomics in Manufacturing & Service Industries*, 25(6), 659-673.
- Kim, S., & Seo, B. (2009). The development of e-learning platform for gifted children education. Published on *International Journal for Educational Media and Technology*, 3(1), 39-51.
- Schneider, S. L., & Council, M. L. (2020). Distance learning in the era of COVID-19. *Archives of Dermatological Research*, April. <https://doi.org/10.1007/s00403-020-02088-9>
- Statista. (2021). *Leading countries based on number of Twitter users*. Retrieved February 26, 2021, from <https://www.statista.com/statistics/242606/number-of-active-twitter-users-in-selected-countries/>
- The Ministry of Education (2020), *Marasati*, retrieved Feb 26th 2021 from <https://edu.moe.gov.sa/Onaiza/About/Pages/madrasati.aspx>
- Yang, B., Liu, Y., Liang, Y., & Tang, M. (2019). Exploiting user experience from online customer reviews for product design. *International Journal of Information Management*, 46, 173-186.

توظيف بيانات من تويتر لاستكشاف تجربة المستخدم لـ «مدرستي» بوصفها منصة سعودية للتعليم الإلكتروني فرضتها الجائحة

أسماء عبد السلام الفيافي^{1*} وشاكر جايور خان²

¹ كلية علوم الحاسب والمعلومات ، جامعة الإمام محمد بن سعود الإسلامية ، الرياض ، المملكة العربية السعودية.

² كلية علوم الحاسب والمعلومات ، جامعة الإمام محمد بن سعود الإسلامية ، الرياض ، المملكة العربية السعودية.

* البريد الإلكتروني: aaqfaifi@sm.imamu.edu.sa

المُستخلص

غرض الدراسة: عندما نقوم بتصميم أحد المواقع الإلكترونية أو التطبيقات أو نشرها بسرعة خاطفة نظراً لحاجة طارئة وماسة لها، فإنها قد لا تحوز على رضا المستخدمين. ولذا، فقد قررنا أن نتحقق من مواقف المستخدمين ورضاهم من عدمه عن تجربة المستخدم لمنصة «مدرستي»، وهي نظام تعلم إلكتروني طورته وزارة التعليم السعودية ليكون بديلاً عن التعلم التقليدي الحضوري خلال أزمة كوفيد - 19.

منهجية الدراسة: استعملت هذا الدراسة منصة تويتر لجمع كم كبير من البيانات (177358 تغريدة) تتعلق بمنصة «مدرستي»، حيث جمعنا البيانات من هاشتاق #مدرستي وهاشتاق #منصة مدرستي خلال الشهرين الأولين من إطلاق المنصة. وقسمنا مدة الشهرين إلى أربع مراحل هي: مرحلة ما قبل بداية الفصل الدراسي، ومرحلة التعرف على النظام، ومرحلة التفاعل مع النظام، ومرحلة الاستعمال الفعلي للنظام. واعتمدنا على أداة بطاقة ردة الفعل تجاه المنتج والتي تعود لمايكروسوفت من أجل الحكم على رضا المستخدم من عدمه.

نتائج الدراسة: أظهرت النتائج عدم رضا المستخدمين عن المنصة بصورة مفاجئة عند إطلاقها، وازدياداً تدريجياً في تجربة المستخدم الإيجابية بمرور الوقت. وتناقصت بصورة تدريجية مجموعة من مسببات تجربة المستخدم السلبية (كالأخطاء، ورفض النظام للمستخدم، ومشكلات بطء النظام) طيلة الشهرين. والأهم من ذلك أن النتائج أظهرت كيف أن البيانات الضخمة من منصة تويتر يمكن أن تستخدم لتحليل تجربة المستخدم لأي منتج جديد.

الكلمات المفتاحية: مدرستي، بيانات تويتر، تجربة المستخدم، مواقع الشبكات الاجتماعية، منصة التعلم الإلكتروني.

تاريخ استلام البحث: 2021/12/01
تاريخ تعديل البحث: 2022/04/24
تاريخ قبول البحث: 2022/05/16

