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## Research article

## Investigating users' experience on social media ads: perceptions of young users

Dana A. Al Qudah<sup>a,\*</sup>, Bashar Al-Shboul<sup>a</sup>, Ala' Al-Zoubi<sup>a</sup>, Rizik Al-Sayyed<sup>a</sup>, Alexandra I. Cristea<sup>b</sup><sup>a</sup> Department of Information Technology, The University of Jordan, Jordan<sup>b</sup> Department of Computer Science, Durham University, United Kingdom

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## ABSTRACT

Social media platforms changed from being socialization platforms to serve businesses through advertisements. This research aims at investigating active young users' experience with social media ads by studying the personalization and the usefulness of the ads, and the role of the host architecture of the used platform. The results prove that users' experience was affected by the designated variables: personalization, perceived usefulness, and the host architecture. Specifically, It was found that social media users find social media ads useful, and personalized, and that the perceived usefulness and personalization significantly affect the usage of host architecture which significantly affects users' experience. Additionally, a significant difference is found between clusters of student answers in terms of personalization and perceived usefulness effect on user experience.

## 1. Introduction

Social media content has an effect on understanding the personalized preferences and user behaviors. Social media as a concept has been around for more than a decade now (Edosomwan, 2011) It has evolved radically through the years and changed the way it affects users' data and information (Cachia, 2008). As the web has evolved and advanced from web 2.0 to web 3.0 then web 4.0 also did social media providers (Ruhberg, 2017). The data provided by the users allows the online social media providers to personalize their content. By personalization they aim at more relevant ads-content on one side and make more profit for advertisers on the other side, by making advertisements more effective and targeted (O'Donnell, 2015). Although online service providers try to suggest, contain, and/or reveal personalized information content, it cannot be determined if it is useful and contributes to their experience. This research suggest a theoretical framework to examine user experience on social media ads by studying the personalization and the usefulness of the ads, and the role of the host architecture of the used platform.

Personalization is defined as "means customization of the presented data content to the needs of users, restricting the available functionality to the goals and preferences of users, and tailoring the web presentation according to used devices and style options" this will enhance his or her performance" (Dillon, 2001). The usage of host architecture was studied

by examining the type of operating (Schewe, 2007). While perceived usefulness is defined as "the degree to which a user believes that using the system used, social network, and hardware.

This idea has been examined with the help of 1,015 undergraduate students from 19 different faculties, to generalize the contribution of this research to examine users' experience in terms of the usage of host architecture, personalization and perceived usefulness of the social media ads and the correlation between these variables to reflect on the overall experience. The major research questions of this work can be identified as follows:

- Is there a correlation between social media users' perceived usefulness of ads and personalized ads?
- Do social media users find ads useful?
- Do social media users find ads personalized?
- Does the perceived usefulness have an effect on the usage of the host architecture?
- Does personalization have an effect on the usage of the host architecture?
- Does the usage of host architecture have an effect on the user experience?
- Is there a significant difference between clusters of student answers in terms of personalization and perceived usefulness effect on user experience?

\* Corresponding author.

E-mail address: [d.qudah@ju.edu.jo](mailto:d.qudah@ju.edu.jo) (D.A. Al Qudah).<https://doi.org/10.1016/j.heliyon.2020.e04378>

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This paper is divided into six main sections as follows. First, the related works are summarized. Then, the theoretical framework and hypotheses are presented. In section 4, the methodological approach is clarified. Results and discussions are presented in section 5. Final conclusions are summarized in section 6.

## 2. Related work

Personalized advertising (PA), sometimes known as one-to-one advertising or interest-based advertising, is a powerful strategy that allow providers utilizing the collected data from internet users (Dodoo, 2019). This schema has shown a lot of revenue and attention in recent years. For example (Restuccia, 2018), suggested that the mass advertising strategies are no longer effective compared to the PA methods. Another work stated that this type of advertising is better for users in which it suits their needs more than ever (Montgomery, 2009). This shows how important and essential the PA has become. In this research, user experience on PA is examined by addressing a set of parameters including: perceived usefulness, personalization, and host architecture. Part of the user experience is to examine a number of issues that may arise alongside. Although personalization does provide interesting experience, there is a dark side as well. The dark side of the PA is how the providers act with the data and information for which exploits the privacy of users without their permission, which eventually harms them directly or indirectly. Liu et al. explain that there are many cyber-attacks on the information privacy in previous years (Liu, 2018). In 2015 only, two security breaches transpired on the US government services caused massive attention from the public to privacy issues. Another breach also happened in 2016, where the e-government systems suffer from a data breach of their users (Liu, 2018). Thus, more procedures have taken place to reduce the PA without users' permission on several platforms such as websites, blogs, and applications. However, with the raising of social media platforms, the capability to utilize users' public information becomes more tangible (Ala' M, 2017) (Walrave, 2016).

Online social networks or social media have attracted huge attention in the last decade. This online community considers, in the present time, the first platform with registered users on the Internet, with nearly 3.48 billion users according to Global Digital 2019 reports (Digital, 2019: Global Internet use Accelerates, 2019). In addition, users share numerous information about themselves voluntarily, including social relationships, personal interests, demographics, emotions, real-time locations and so on. Further, analyzing data such as comments, posts, shares, likes could help retailers to generate a deep understanding of the customers' behaviors in order to send them the right personalized content. This collected information from the users induces that different online social networks seek to employ the PA (Aguirre, 2016). However, it cannot be determined if the personalized content is useful, relevant and personalized or not for the users. Therefore, many researchers have tried to study PA content relevance in the literature. The authors in (Dodoo, 2019) for example, explained that some retailers benefit from users' information on social media to provide relevant ads to individuals. Contrarily, the study in (Kelly, 2010), discovered that one of the main reasons to avoid advertisements in social media is the lack of relevance. Thus, users' perceptions of PA in social media can positively impact their perceived (relevance) ads. Other researchers have some extensive studies to design an adaptive online advertisement system to explore how users interact with ads such as in (Al Qudah D. A., 2015). They found that users find personalized ads can increase user acceptance of such ads. The same researchers explore more in depth different personalization methods like the ease of use, personalization and diversity in a non-intrusive way and the results on users' acceptance of targeted ads (Al Qudah D. A. & S. S., 2015).

The relevance of advertisements on social media can be a state of conflict, as shown in prior studies. However, most research stood in the line of the existence of relevance on social media advertisements. For instance, Dodoo and Wu (Dodoo, 2019), investigates how relevance

advertising influences users to affect their impulse buying, which is the way of buying without planning in advance. They also study the antecedent association between perceptions and impulse buying tendency. The results showed that the perceived personalization advertisements on social media are positively influenced by the relevance of advertising. This suggests that there was a significant impact between the PA and the online impulse buying behavior of the users. Like the previous work, the authors of (Zhu, 2015) also investigated the relevance and the need satisfaction of advertising on social media. The article addressed several points regarding the precise insight of the content delivery to the right users. The points are collaboration, relationship, creative outlet, and self-media. Some authors have also suggested that there is a relationship between privacy concern and ad relevance (Jung, 2017). Their work classified into two folds, first, how the avoidance of ads decreased if they were relevant, while the second fold how a group of users afraid of the privacy issues concerning infringement of relevant advertising which lead to avoid them eventually. This group usually does not publicly provide their information online, yet they are targeted because of their friends' data under the assumption of sharing the same interest (Curran, 2011). A poll performed by the Digital Advertising Alliance demonstrates the prior suggestion, where 70 percent of 1000 people showed a positive attitude toward PA, while only 4% of them had worried about the tracking behavior (Bachman, 2019).

Studying the relevance with mentioning the usefulness and benefit from the perceived content on social media has not been discussed significantly in the literature so far. In other words, the advertising value, which is a market-oriented index provides an insight of the customer expectations about the advertising and eventually about the products (Ducoffe R., 1995). Haghirian et al. also defined advertising value as a "measure of advertising effectiveness" (Haghirian, 2005). Ducoffe described it as a "subjective evaluation of the relative worth or utility of advertising to consumers" (Ducoffe R., 1995). Thus, such value can reflect the element worth and the experience regarding the transaction process (Houston, 1987). Values are the judgments, attitudes, and basis of actions in advertising as well as in different parts of social life (Beatty, 1985). Hence, all of this indicates that the advertising value is a beneficial measurement for evaluating advertising impact generally, and especially on the web. Few works attempted to study the concept of advertising value on the social network, such as (Shareef, 2019), where their work focused only on the Facebook social network. Many researchers have focused on the intentions of these users'. Some of this work is presented in Alalwan (2018), where a theoretical framework to examine the purchase intention of users using many parameters (e.g. interactivity, relevance, among others) was developed. Further, Tran (2017) studied the behavioral intentions of the users using a theoretical framework in which personalization is one of the decisive factors in his research. Furthermore (Fue et al., 2009), also examined behavioral intentions of users via Social Network Sites (SNS) ads by measuring the user acceptance, relevance, and value of ads. Additionally, as mentioned earlier, the immature investigation in the literature about user experience not the behavioral intention within social media ads led us to explore users' experience more in our work. Therefore, in this study users' experience perception is studied extensively based on three main parameters: personalization, usage of host architecture, and the perceived usefulness.

## 3. Hypotheses and theoretical model

One of the main reasons for conducting this research is to examine users' perceptions and experience using SNS ads. This has been derived from the concern of users' reactions and perspectives and the necessity of predicting their opinion of such ads (Alalwan, 2018).

In this research, the proposed theoretical model aims at investigating the correlations between independent and dependent factors, including the effect of social media ads personalization on users' experience, how useful social media users find social media ads, and how much social

media users find social media ads personalized. During this section, the correlation between the factors will be investigated as well. Generally, our model suggests that user experience is dependent on the perceived usefulness, personalization and the host architecture. The model is illustrated in Figure 1.

The development of the theoretical framework has been done to bridge the gap found in the state-of-the-art where many researchers have developed different frameworks to evaluate SNS advertisements. The work proposed by (Johnston et al., 2018) compares between the traditional ads against the ads found on SNS. Their ultimate goal is to examine the social interaction behavior and the attitude towards SNS ads. They have tested their framework using two sets of factors (i.e. SNS ads infotainment and credibility, and the value of SNS ads) by examining the beliefs of consumers from attitude and personal utility perspectives. Many researchers investigated the intention of the users, whether to click on the ads or actually buy the content provided in the ads. The work of (Fue et al., 2009) discusses the behavioral intentions of consumers. These intentions are examined by their acceptance, relevance, and value of ads. However, the factors mentioned above are quite wide so the researchers break it down to discuss them from the parameters of social identity and group benefit norms. Then the researchers have done several intersect experiments to examine the relationship between acceptance and relevance and how it could reflect on the intention of consumers. The work of (Tran, 2017) also discussed the behavioral intention of consumers using SNS ads where a framework using a set of parameters (i.e. perceived personalization, ad credibility, ad avoidance, ad skepticism, and ad attitude) was developed. Alalwan (2018) also developed a theoretical framework that examines the purchase intentions of users on SNS. The researcher examined his framework from two different sides and used two different sets of parameters for each side. Parameters included the interactivity of the ads, perceived relevance, informativeness and performance expectancy from one side, and from the other side users' habits and hedonic motivation were also examined.

As can be noticed, many researchers in the literature discussed users' intentions, while in this research our main focus is users' experience suffering these ads. Although the final outcome is different, some parameters have intersected (e.g. personalization). Personalized advertising is an approach to match social media user's information with their interests. Therefore, personalized advertisements tailored to social media users' needs reacted the way they respond when exposed to the ads, affecting their user's experience positively or negatively. Since ads personalization can be judged by how social media users react towards them, their reaction can be attributed to two major factors: ads useful features (i.e. usefulness) and ads content appear personalized (i.e. personalization).

As a start, it is important to show that usefulness and personalization are mutually exclusive factors, showing no significant dependency on each other. Further, the usefulness of online social media ads can be attributed to various important features (i.e. close ads feature, reasons to block similar ads feature, links related to the ads feature, similar ads feature, and why you can see this ad feature). We aim at investigating the relation between how users perceive the usefulness of social media ads. Furthermore, perceived personalization of social media ads can be

attributed to various important characteristics depicted by users (i.e. commercial ads on certain social media page locations were personalized, paid ads were personalized, location-aware social media ads were personalized, history-based ads were personalized, and social media pages are personalized). According to Figure 1, the following hypotheses can be drawn:

**H1:** There is a correlation between social media users' perceived usefulness of ads and personalized ads.

**H2:** Social media users do not find ads useful.

**H3:** Social media users do not find ads personalized.

**H4:** Perceived usefulness has no effect on the usage of the host architecture.

**H5:** Personalization has no effect on the usage of the host architecture.

**H6:** Usage of host architecture does not affect user experience.

**H7:** There is a significant difference between clusters of student answers in terms of personalization and perceived usefulness effect on user experience.

#### 4. Method

This work investigates the aforementioned research questions as follows. First, exploring the correlation between perceived usefulness and the personalization of ads to show that they are mutually exclusive. Then, analyzing how social media users perceived usefulness and personalization of ads from their point of view. Further, investigating the effect of usefulness and personalization on social media users' choice of host architecture. Furthermore, investigating the effect of the host architecture on the users' experience, and whether a certain architecture implies a better user experience compared to others. Finally, showing the differences in students' answers on the effect of personalization and perceived usefulness on the user experience by showing segregated clusters of students in terms of answers.

Similar approach is performed in the literature as in Alalwan (2018), where a self-administrative questionnaire for Jordanian users who have a previous experience in using Social media was created. However, the research focuses on different variables such as the relevance of social media ads to users. Another similar approach in (Johnston et al., 2018), conducted their experiment with young users using two questionnaires targeting and comparing two different types of users: YouTube users, and Facebook users. The questionnaire of (Wu, 2016) was conducted on MSN users to examine their assumptions by studying MSN ads. Another work (Voorveld and Noort, 2014) built questionnaires dividing the research sample into three main groups where each group was exposed to a different set of ads. One group was exposed to interactive ads using SNS platforms ads, a second group was exposed to traditional media (i.e. TV) ads, while the last group was exposed to both: traditional media and SNS ads. After that, subjects were asked to fill a questionnaire.

This work attempts to investigate the proposed research questions following the same methodological approach used in the literature as participants were asked to fill a questionnaire based on their experience using SNS. A study conducted by UNESCO<sup>1</sup> with the help of 1,081 young users ranging between 18 and 29 years old, including 679 students, were conducted. Young users were selected as the percentage of users who are using SNS in Jordan are 62.8% of the total population, among which 92% of these users use SNS daily, with the highest percentage of 94% using Facebook. This supports our approach as sampling from university students is, to a high extent, suitable to generalize the findings of this research as they are highly exposed to SNS and they use it almost on a daily basis. Similarly (Wu, 2016), also collected information from several undergraduate students studying at the college of journalism and communications, as the author justified the appropriateness of the sample based on the heavy usage of undergraduate students to SNS. Another

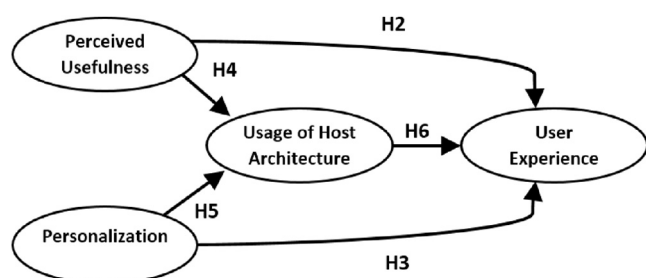


Figure 1. Theoretical model.

<sup>1</sup> Jordan Youth Media Perception Survey Ages 18–29, 2015

work of Johnston et al. (2018) also based their results upon questionnaire responses from university students from Taiwan and Vietnam ranging between 18 and 22 years old. To generalize the questionnaire findings, Alalwan (2018) also used both undergraduate and postgraduate students to conduct a pilot study.

Although the used methodological approach is common, there have been some limitations including, but not limited to, not all answers were valid for assessment as few participants tended to select the same option for all answers. In addition, the questionnaire was provided in both languages: Arabic and English, as not all students are fluent in English.

#### 4.1. Sample

For this purpose, 1,015 undergraduate students have been asked to answer a group of 20 questions regarding the previous five levels. This process took place in the Department of Information Technology at King Abdullah II School for Information Technology, particularly in the Social Media Networks (SMN) course. A number of 1,100 students were officially enrolled in the SMN course, 1,015 of them completed this survey (Questionnaire). Out of the 1,015 responses 691 were females with a percentage of (68.1%) and 324 males with a percentage of (31.9%). The ages of the participants ranged from 18-23 ( $M = 18.2$ ,  $SD = 0.42$ ), and over 25% of the participants were in the age range of 18–19 years old. Students were from 19 different faculties, with the majority were from business school and foreign languages with 21% and 12.2% respectively. It is also interesting to notice that students were from 23 different nationalities with a majority of Jordanian students followed by Kuwaiti, Palestinian, and Iraqi nationalities covering 83.8%, 6.9%, 2.6%, and 2.1% respectively.

#### 4.2. Procedure

Several university-labs were utilized to complete this procedure, we also restricted the experiment to be in one day to any effect from other participants, in order to achieve the best level of honesty. After the participants were distributed into the labs, they were asked to access Moodle, the e-learning platform where the questionnaire was placed<sup>2</sup>. They accepted the ethical consent form and started answering the questionnaire. By the end of the questionnaire participants were thanked by a debriefing message.

#### 4.3. Measures

The scale of this study was a 5 - point Likert scale item, ranging from strongly disagree (1) to strongly agree (5). We used this kind of criteria because it is considered more popular and performs better than the other methods in such study as mentioned in the literature. For example, the work in (Adelson, 2010) proposed a study about the response of students from grades 3 to 6 to the mathematics attitudes instrument. The response was for the 4-point Likert-type scale and compared it to the 5-point Likert-type scale, which has an additional neutral point. Further, the students randomly received the two formats of Me Survey and Math. The results show that the 5-point scale achieved better for three reasons, first because of the population of the students the reliability estimation was higher with 0.049, while the second reason, it has a stronger pattern coefficient, and finally provided less misfit for the model.

The survey questions were grouped into three categories, as shown in Table 1. The first category is related to the personalized criteria, while the second category is related to the perceived usefulness of the ads, the third category was about the general user experience. It is important to note that the study contains students from nineteen different faculties.

<sup>2</sup> It is important to note that this work received official approval by ethical committees and administration at the University of Jordan prior to distribute any questionnaire.

## 5. Results & discussions

Social media content effect on understanding the personalized preferences & user behaviors. Although social media service providers contain/reveal personalized information, it cannot be determined if it is useful & tailored to be used to help the user or not, and this is what is being explored in this research.

This idea was tested with the help of 1,015 undergrad students from 23 different nationalities with the majority were from Jordan (i.e. 83.8%). Students are from different backgrounds, scattered over 19 Faculties with the majority from the school of business (i.e. 21%), followed by the students from the school of foreign languages (i.e. 12.2%). Students were from different levels, with the majority from the 3rd year students of ages between 19-20 (i.e. 30%), then 2nd Year Students of ages between 18-19 (i.e. 25%). It is worth mentioning that 31.9% of the sample size were males, while the remaining 68.1% were females.

### 5.1. Preliminary tests

To characterize the physical and logical platforms of social media users, the below questions regarding the OS (i.e. HA1), social network (i.e. HA2), and the hardware platform (i.e. HA3) has been analyzed. As reported in Table 2 average scores per question indicates that most users tend to use mobile phones with an Android operating system to access Facebook and/or twitter.

To be specific, combinations of answers were plotted as shown in Figure 2, which validates our conclusions as a spike of user count is displayed. The numbers in the figure are explained in Table 3 below where the bottom most level (general) is for HA3, while the top most level (specific) is for HA1. For instance, the spike appears at  $HA3 = 3$ ,  $HA2 = 2$ ,  $HA1 = 2$  indicating that most users use mobile phones running Android OS to connect to Twitter. The numbers show that Android mobile phones are the most used devices for accessing social networks among this age group. This can be attributed to the fact that Android phones are generally cheaper than iOS phones, as well as, cheaper than tablets or laptops.

At first, we test for the correlation between the questions of each studied factor (i.e. personalization, usefulness). Results show that among the questions of each factor independently, there exist no multicollinearity relationship. Further, correlations between factors questions were also investigated to detect whether a multicollinearity between question answers exists. Results reported in Table 4 show significantly low correlations, thus, showing no collinearity between question answers.

Furthermore, Friedman Test was conducted to test whether the distributions of the questions of each factor are equal. Results reported in Tables 5 and 6 show that means are different for the questions of each factor. When testing for significance, it was found that significance is below 0.05 and thus we reject the hypothesis that the distributions of the questions are equal.

Finally, testing for our hypothesis H1, results show that the correlation between personalization and usefulness factors is significant at the 0.01 level, thus we reject the hypothesis that there is a correlation between the two factors, and support the alternative hypothesis that the two factors are significantly independent, i.e. with respect to our research group there is no evidence that personalized ads are perceived useful.

### 5.2. Effect of usefulness on user experience

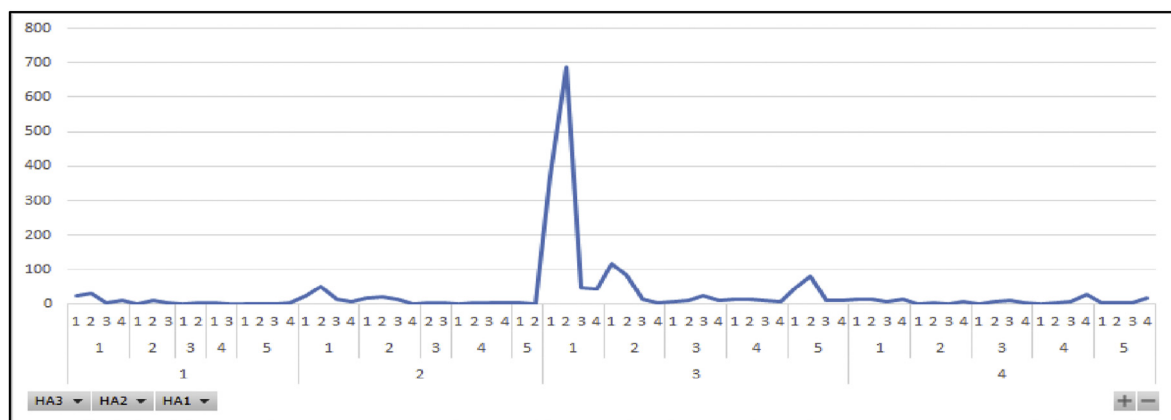
H2: social media users do not find social media ads useful. As calculated, Pearson's pairwise correlation values between each user experience question (i.e. E1, E2, E3, E4, and E5) and all other usefulness questions (i.e. U1, U2, U3, U4, and U5) were close to zero, showing no significant linear correlations (i.e. no dependency) between them. After performing a t-test to determine whether the usefulness of social media ads affects the user's experience, a significant effect was found for the

**Table 1.** Questions asked at the survey sorted with respect to the representing aspect and their code IDs.

	Q.ID	Question Text
<b>Personalization</b>	A1	I find ads by social media that are displayed on the right side of the page personalized
	A2	I find ads that are paid to be shown social media providers personalized
	A3	I find ads linked to sponsored ads in social media personalized
	A4	I find ads on social media based on my previous browsing history personalized
	A5	I Find different social media pages personalized
<b>Perceived Usefulness</b>	U1	I Find ad blocking feature on social media useful
	U2	I find the feature that allows users to give reasons why the ad to be removed useful
	U3	I find the feature showing the links linking ads shown on social media with the title of the main ad useful
	U4	I find the recommendation for similar pages/ads/ pre-clicked pages/ads useful
	U5	I find an explanation of why this ad was shown to me useful
<b>User Experience</b>	E1	Ads on Social media stirred competition among electronic publishers and this directly reflected the benefit of social media users
	E2	It is better to read ads material on social media than print
	E3	Social media helped me find research ads team and reach researchers of common interest
	E4	I can easily change the default ads privacy setting for my account after it is created on most social networking sites
	E5	Sites tell me when I create an account how my information will be used by the site and tell me whether my information will be shared with some institutions and companies

**Table 2.** Statistics of respondents' answers to questions regarding the host platform.

	HA1 (OS Type)	HA2 (Social Network Brand)	HA3 (Platform HW)
Mean	1.809 (Android)	1.552 (Facebook & Twitter)	2.800 (Mobile Phone)
Standard Error	0.024	0.034	0.020
Median	2	1	3
Mode	2	1	3



**Figure 2.** Histogram on the answers' combinations of the host architecture questions listed in Table 3.

**Table 3.** Questions asked at the survey on the host architecture.

Host Architecture	Q.No	Question
	HA1	What kind of operating system is installed on your cell phone?
	HA2	Which of these social networks do you use most?
	HA3	Which of the following do you use to connect to social networks?

**Table 4.** Pearson correlations between perceived usefulness and personalization questions, where numbers annotated with \*\* indicates that correlation is significant at the 0.01 level, and numbers annotated with \* indicate that correlation is significant at the 0.05 level.

	U1	U2	U3	U4	U5
A1	0.056	0.103**	0.206**	0.139**	0.144**
A2	0.145**	0.114**	0.216**	0.209**	0.096**
A3	0.206**	0.200**	0.179**	0.247**	0.213**
A4	0.176**	0.208**	0.187**	0.225**	0.179**
A5	0.239**	0.270**	0.261**	0.231**	0.209**

**Table 5.** Friedman test results for the personalization questions.

Q.ID	Ranks	Mean Rank
A1	I Find ad blocking feature on social media useful	3.21
A2	I find the feature that allows users to give reasons why the ad to be removed useful	3.29
A3	I find the feature showing the links linking ads shown on social media with the title of the main ad useful	2.94
A4	I find the recommendation for similar pages/ads/pre-clicked pages/ads useful	2.80
A5	I find an explanation of why this ad was shown to me useful	2.77

**Table 6.** Friedman test results for the perceived usefulness questions.

Q.ID	Ranks	Mean Rank
U1	I find ads by social media that are displayed on the right side of the page personalized	2.87
U2	I find ads that are paid to be shown social media providers personalized	2.85
U3	I find ads linked to sponsored ads in social media personalized	3.12
U4	I find ads on social media based on my previous browsing history personalized	3.13
U5	I Find different social media pages personalized	3.02

relationship, since the  $t = 1.96$ ; thus, at  $p < 0.05$  there is evidence to reject the hypothesis. Therefore, it can be concluded that usefulness affects users' experience, i.e. young users find ads' usefulness features as a feature of user experience including closing the ads, and explaining the logic behind showing ads.

### 5.3. Effect of personalization on user experience

H3: social media users do not find ads personalized. As calculated, Pearson's pairwise correlation values between each user experience question (i.e. E1, E2, E3, E4, and E5) and all other personalization questions (i.e. A1, A2, A3, A4, and A5) were close to zero, showing no significant linear correlations (i.e. no dependency) between them. After performing a t-test to determine whether the personalization of social media ads affects the user's experience. A significant effect was found for the relationship, since the  $t = 1.96$ ; thus, at  $p < 0.05$  there is evidence to reject the hypothesis. Thus, it can be concluded that personalization affects users' experience, i.e. young users consider personalized ads as a feature indicating enhanced user experience.

### 5.4. Effect of perceived usefulness and personalization on the usage of host architecture

To study the mediation role of the host architecture, three hypotheses will be examined (i.e. H4, H5, and H6). However, to test for multicollinearity between the usage of host architecture and both usefulness and personalization questions, Pearson's pairwise correlations show that there are no dependencies between the usage of host architecture answers among other questions of personalization and usefulness as all correlations are close to zero. Following each hypothesis is examined individually.

#### 5.4.1. Effect of perceived usefulness on the usage of host architecture

H4: Perceived useful has no effect on the usage of the host architecture. Pearson's pairwise correlation values between perceived usefulness questions and usage of host architecture questions were close to zero, showing no significant correlations (i.e. no dependency) between them. After performing a paired t-test between means to determine whether the appearance of social media ads affects the usage of host architecture. A significant effect was found for the relationship, since the  $t = 1.96$ ; thus, at  $p < 0.05$  there is evidence to reject the hypothesis. Thus, it can be concluded that perceived usefulness affects usage of host architecture, i.e. host architecture can be a decisive factor of the perceived usefulness of the ads. This can be attributed to the availability of various software that allow useful ads' features on some host architectures compared to others.

#### 5.4.2. Effect of personalization on the usage of host architecture

H5: Personalization has no effect on the usage of the host architecture. Pearson's pairwise correlation values between personalization questions and usage of host architecture questions were close to zero, showing no significant correlations (i.e. no dependency) between them. After performing a paired t-test between means to determine whether the personalization affects the usage of host architecture. A significant effect was found for the relationship, since the  $t = 1.96$ ; thus, at  $p < 0.05$  there is evidence to reject the hypothesis. Thus, it can be concluded that personalization affects usage of host architecture, i.e. host architecture can be a decisive factor of the personalized ads. This can be attributed to how much information can be collected and shared by different host architectures (e.g. Android vs. iOS, mobile phones vs. laptops). This comes in harmony with (NDSS'16) where it is claimed that mobile Ads can collect a lot of user's data.

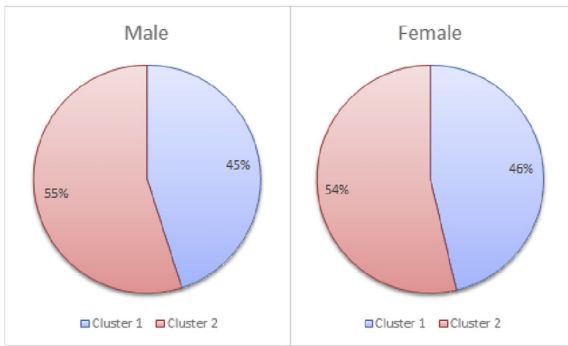


Figure 3. Percentages of gender distribution over the clustered data.

5.4.3. Effect of usage of host architecture on user experience

H6: Usage of host architecture does not affect user experience. Pearson's pairwise correlation values between usage of host architecture questions and user experience questions were close to zero, showing no significant correlations (i.e. no dependency) between them. After performing a paired t-test between means to determine whether the usage of host architecture affects the user's experience. A significant effect was found for the relationship, since the  $t = 1.96$ ; thus, at  $p < 0.05$  there is evidence to reject the hypothesis. Thus, it can be concluded that host architecture affects users' experience.

5.5. Clustered data

Student answers were clustered using k-Means into two clusters. Demographics before and after clustering are shown in Figure 3. It is shown in Figure 3 that the male/female percentages show almost identical distribution of both genders over the two clusters. Therefore, it

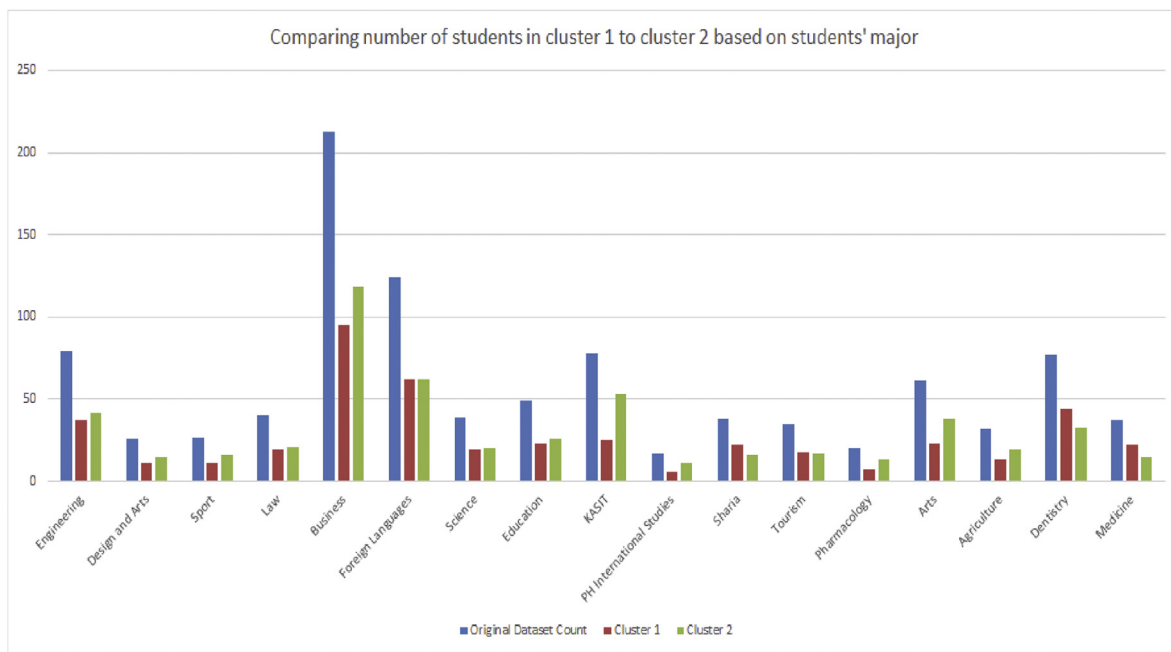


Figure 4. The student ratios in each cluster, sorted according to their field of study.

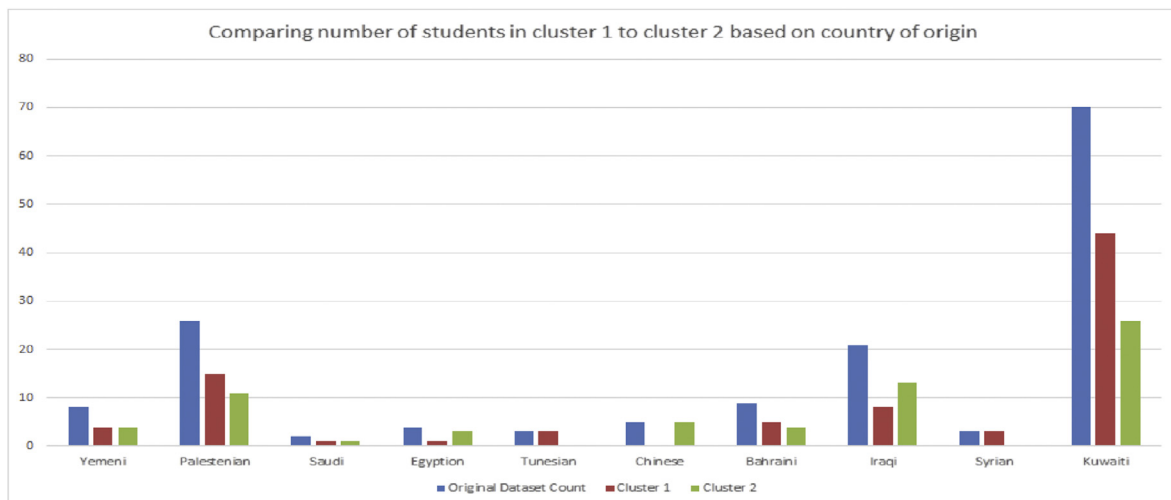


Figure 5. A comparison of student ratios over clusters, sorted by country.



**Table 7.** Average answers score for each of the questions in each cluster.

Answer Average	A1	A2	A3	A4	A5	U1	U2	U3	U4	U5
Cluster 1	3.29	3.15	2.97	3.02	3.13	2.51	2.48	2.98	2.95	3.17
Cluster 2	2.26	2.33	2.18	2.13	2.17	2.08	1.98	2.06	2.21	2.14

deems necessary to study whether a difference exist depending on their field of study or country of origin.

Figure 4 shows a tendency of most schools' students to prefer Cluster 2 over cluster 1; however, numbers show close numbers at most schools. This does not apply to the schools of Business, KASIT, and Arts as a significant difference between the two selections exist, given that they tend to agree with a higher degree to the survey question statements. This can be attributed to the fact that they are tech savvy, and by study nature are highly exposed to social media ads compared to other schools' students (Accounting, Marketing, MIS, CS, CIS, IT, and Graphic Design).

Although they show almost uniform split over the clusters in Figure 5, Jordanian students were not reported due to their large number, and to fit other countries' students into the figure. Some countries with only one student were not reported as well.

### 5.6. Clustering results

Results show that there are two clusters: students that agree less to the questions statements, and students that agree more to the question statements. As shown in Table 7, we can hypothesize that there is a significant difference between clusters of student answers in terms of appearance and usefulness effect on user experience.

H7: there is no significant difference between clusters of student answers in terms of personalization and perceived usefulness effect on user experience.

A t-test assuming unequal variances reports a  $t = 2.20$ ; thus, at  $p < 0.05$  there is not enough evidence that there is no difference between the two clusters, rejecting the null hypothesis and supporting our hypothesis, i.e. student answers follow two different patterns (with significant difference) indicating different conclusions. In other words, students' exposure to social media ads among some schools compared to other schools' students show significant differences in their perception of usefulness and personalization of ads with respect to user's experience. Possibly, the lack of technical knowledge of how to find useful ads' features affect their user experience negatively, as shown in Table 7 (U1 through U5).

## 6. Discussions

In previous works, it was reported that some ads' features can affect the user experience. For example, a study covering ad reviews to identify ad complaint topics from the play store was performed. It was found that most ad complaints were about user interface (UI) related topics and three topics were brought up the most often: the frequency with which ads were displayed, the timing of when ads were displayed, and the location of the displayed ads (Gui et al., 2017). In a similar context, a study on ads characteristic features (i.e. interesting, repeated, long, etc.) on how does the user experience, when exposed to video ads, affect the user actions was performed (Arantes et al., 2018). In another study, it was suggested that enforcing user interaction with the ad can improve user's attitude towards mobile advertising (Visuri et al., 2017). In a more relevant work, a study on how chatbot's perceived helpfulness and perceived usefulness predict perceived intrusiveness of chatbot advertising, and how does the latter, in turn, influence patronage intentions were performed. As predicted, perceived intrusiveness of chatbot advertising was found to be dependent on perceived helpfulness and perceived usefulness of the chatbot (Van den Broeck et al., 2019).

It can be noticed that our work is different. Even though some features might seem relevant, our work is not concerned with the ads content/

characteristic features (e.g. ads duration, ads screen location, ads frequency, etc.), rather, the features that allow users to interact with the ads area. In addition, our work is distinct in that the effects of ads personalization and usefulness were not studied collaboratively, or with a mediator, on the user experience.

## 7. Conclusions

This research aims at studying the user experience in terms of perceived usefulness, ads personalization, and host architecture. Although the literature suggests many studies with variant features, this research contributes by examining these distinct parameters extensively while suggesting a theoretical framework to further investigate them. In addition, this research investigates user experience rather than users' intention or behavior. This work was conducted by a representative sample size of 1,015 young participants covering various nationalities representing the well exposed, frequent and active users, with an age range of 18–23 to answer a survey of 18 questions covering the four features. The theoretical framework has suggested the connection of these parameters and how they affect eventually the user experience to work as a theoretical foundation to our work.

The results show that the research factors were independent, and that social media users find social media ads useful, and personalized. In addition, it was found that the perceived usefulness and personalization significantly affect the usage of host architecture which significantly affects users' experience. A significant difference between clusters of student answers in terms of personalization and perceived usefulness effect on user experience, was also found.

Although the results remain positive a number of limitations exist, which can be summarized by: the collective sample size, the large number of research questions, and the various awareness level of the research subjects. At first, the large number of research questions deemed a long time to prepare a comprehensive research environment, and to help research subjects answer all questions without getting bored; therefore, the questionnaire was designed to be concise and precise. In addition, many users may not realize whether ads are personalized or sponsored; thus, the level of awareness about these topics is probably very different among the sample of users.

## Declarations

### Author contribution statement

D. A. Al Qudah: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

B. Al-Shboul: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

A. Al-Zoubi: Performed the experiments; Wrote the paper.

R. Al-Sayyed: Conceived and designed the experiments; Performed the experiments.

A. I. Cristea: Analyzed and interpreted the data; Wrote the paper.

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### Competing interest statement

The authors declare no conflict of interest.

### Additional information

No additional information is available for this paper.

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