

Psychometric Properties of WhatsApp Use and Perceived Academic Performance: An Exploratory Factor Analysis

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Abstract

This paper presents validation study to determine psychometric adequacy of a measure of WhatsApp use and students' perceived academic performance. A sample of 200 undergraduate students from Northwest University Kano was drawn through convenient sampling technique. The internal consistency of the measure was found to be adequate with .779. In addition to that, the instrument revealed acceptable psychometric properties and three divergent factors were identified that reflect the use of WhatsApp and students' perceived academic performance. The factors labeled as "academic communication", "perceived academic performance" and "learning enhancement" explaining 33.75%, 15.31%, and 11.09% of the variances respectively. Moreover, the instrument demonstrates factorial validity, construct validity and structure of measures of constructs and the three factors solution explain 60.16% of total variance.

INTRODUCTION

In the present epoch of rapid development of Information and Communication Technology (ICT), social media is seen as the most useful means of communication among people in most of their activities such as economic and educational activities. WhatsApp as a means of communication in the present day, it is used to share information, files, pictures, audio and video, sending instant messages as well as conducting real time conversations. Moreover, WhatsApp application is viewed indifferent smart phone applications that operate on nearly all current types of devices and operating systems. The application has been on the market

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since 2010; the declared purpose of the developers was to help students to fully participate in learning process.

The advantages of using WhatsApp among students of higher learning include relationship enhancement, improving learning motivation, offering personalized course materials and developing collaborative abilities among students (Wheeler & Wheeler, 2008). This means that WhatsApp has potentials for enhancing students' learning performance through their instant communication with each other. The technical advantages of WhatsApp in other hands is its simplicity, affordability, privacy (in comparison to other social networks like Facebook or Twitter), and its widespread use among teachers and students in their private life made it a prime choice (Bounnik & Deshen, 2014). They also find that the use of WhatsApp facilitates quick transfer of links to study materials, unlike any other technologies which often do not work or other forms of communication that students just do not use after school hours. Sending study materials through WhatsApp ensures that everyone gets the message, whether it is a video intended for class or a copy of a solution for an exercise sent after school hours.

The driving factor toward the use of WhatsApp in educational institutes is its relative advantages which are mentioned above, ease of accessibility, convenience, functionality and flexibility (Brown, 2010). Many researches reveal that the use of social media such as WhatsApp in educational setting support social constructivist theory of learning, it immanently improves students' construction of understanding and promotes students' skills of interaction (Schroeder, Minocha, & Schneider 2010). WhatsApp could best help introvert students so that they can learn and function through online group learning with less or no anxiety to raise questions before their teachers and colleagues in the real classroom (Bounnik, Deshen, & Gan, 2014). Many researches were conducted on students' use of WhatsApp in higher learning institutes in many countries like England, USA, Malaysia and Ghana. Little researches are available on WhatsApp use among higher learning students in Nigeria especially the northern part of the country like Kano. Therefore, the present study aims to examine and validate psychometric properties of Northwest University students' use of WhatsApp using Exploratory Factor Analysis.

Literature Review

In the present world with digital inhabitants, communication between group of students and between students and their respective teachers has become digitalized through different means of digital communication like Email, SMS, Facebook and WhatsApp (Deshen, 2014). Each of these means of communication has its distinct characteristics that affect its appropriateness in teaching and learning (Calvo, Arbiol & Iglesias, 2014). WhatsApp as one of the recent means of communication has been used by teachers and students in the higher learning institutes due to its availability in Apple iOS, Google

Android, Blackberry OS, Microsoft windows phones and others (Amry, 2014).

Teachers create WhatsApp group for their students for a particular class that facilitate communication between the members of that group (teachers – students and students-students communication). The reason why WhatsApp is adopted by many people especially in the school is the less expensiveness of the application combined with the ability to send unlimited number of messages, immediacy, the capacity to conduct many conversations with different people simultaneously and sense of privacy the application has (Church and de Oliveira, 2013).

The benefits of using WhatsApp among students of higher learning have been identified by many researchers. For instance, Wheeler and Wheeler (2008) expressed that WhatsApp has potentialities of enhancing students' relationship, improving their motivation, offering personalize course materials and developing collaborative abilities among students. In addition to that, Schroeder, Minocha, and Schneider, (2010) revealed that WhatsApp in educational setting support social constructivists theory of learning, it immanently improves students' construction of understanding and promotes students' skills of interaction. Besides that WhatsApp could best help introvert students so that they can learn and function through online group learning with less or no anxiety to raise questions before their teachers and colleagues in the real classroom (Bouhnik, Deshen, & Gan, 2014).

Since WhatsApp is relatively new phenomenon, little research exists to identify the underline dimensions of students' use of WhatsApp and their perceived academic performance. Therefore, this research aims to examine and validate psychometric properties of Northwest University students' use of WhatsApp and their perceived academic performance using an Exploratory Factor Analysis.

Methodology

Principal Component Analysis with Varimax Rotation was used to produce the dimension of differentiation between the items. To determine if the items are suitable for factor analysis, two statistical tests were used. The first is the Bartlett Test of Sphericity which is used to examine interdependency among the items. The second is the criterion of KMO (Kaiser-Meyer Olkin Measure of Sampling Adequacy) which was used to examine sample sufficiency (Kaiser, 1974). Correlated factor method of axis was used to extract factor solutions.

The criterion of Eigen value >1 was used for defining the number of factors that were kept (Kaiser, 1960, Sharma, 1996, Hair et al, 1995). However, the acceptance of each item to be included in the factor loading must load to it more than 0.5. Moreover, each factor must have more than two variables. For the statistical data elaboration and check of the instrument factorial structure the software S.P.S.S., edition 18 was used. The

evaluation of questionnaire reliability (internal consistency of the items) is done by Cronbach's α (Cronbach, 1984), which is regarded as the most important reliability index and it is based on the number of items of the questionnaire, as well as the correlation between the items (Nunnally, 1978).

Sample and Sampling Procedure

Quantitative research designed was employed in this study. Students of Northwest University, Kano were considered as target population of the study. During the time of this research, there were about 3000 undergraduate students at the university. Based on the population, sample size of this study should constitute of 341 undergraduate students as suggested by Krejcie and Morgan (1970). The sample was drawn through convenient sampling procedure. 341 questionnaires were distributed by the researcher and his associates to the students but 200 usable ones were retrieved and used in the analysis.

Instrument of the Study

The instrument used in this study was developed by the researcher through (a) identification of various survey items from a comprehensive analysis researches on WhatsApp use in educational settings and (b) validating the content of the instrument by getting input from the Subjects Matter Expert. In respect to the former, 16 items were derived out from the comprehensive analysis of empirical studies on WhatsApp which were retrieved from different articles and journals via internet search. For the latter, the identified items were validated through distributing the items to two experts in both instructional technology and educational psychology to examine the appropriateness of the instruments in measuring what they are intended to measure. Their feedbacks were considered in either retaining or deleting any of the instruments before they are used in the actual research.

The instruments consisted of two parts. First part is about demographic information of the participants such as gender, age, level of students and so forth. The second part of it consisted of 16 items used to measure students' academic use of WhatsApp, students' academic performance and their learning enhancement through the use of WhatsApp. Each item of the instrument used 5 point Likert Scale that ranged from 1-Strongly Disagree to 5 Strongly Agree. Participants were asked to rate their level of agreement to each item by circling a number that suit their view. For the purpose of this study, the second part of the instrument is taking into consideration in this study.

Factor Analysis

The researcher applied the Exploratory Factor Analysis (EFA) to determine the underlying dimensional structure of students' use of WhatsApp and its Academic Influence Scale from the items. The Kaiser-Meyer-Olkin measure was .770, above the recommended value of .5 (Hair 2010, Tabachnick, 2007). In addition, Bartlett's test of sphericity was significant ($\chi^2(120) = 761.217$, $p = .000$). However, the diagonals of the anti-image correlation matrix and the communalities were all over .5. These results suggested that factor analysis was appropriate and the sample size was sufficient for meaningful factorability (Pett et al., 2003). The choices of EFA and Varimax rotation were made based on the exploratory nature of this study and the low correlation among latent factors (Pett et al., 2003). Based on the overall indicators, factor analysis was carried out with items 5, 8, 9, 10 and 11 deleted having failed to meet the requirements.

Three factors were extracted from the instrument based on the analysis of Kaiser Normalization criteria (Pett et al., 2003), and scree plots, (Baldrige & Veiga, 2001; Balser, 2007; Balser & Harris, 2008; Cleveland et al., 1997; Colella, 2001; Stone & Colella, 1996). The factors are labeled as academic communication, perceived academic performance and learning enhancement explaining 33.75%, 15.31%, and 11.09% of the variances respectively. The total variance explained of the three factors is 60.16%. Table 1 elaborates each of the three factors and its reliability. Each of the factor had an initial Eigen values >1 that explained 3.371%, 1.531%, and 1.109% of the variances respectively. Correlation matrix produced in the output shows that majority of the correlation coefficients are observed to be moderate. Therefore, the assumption is fulfilled.

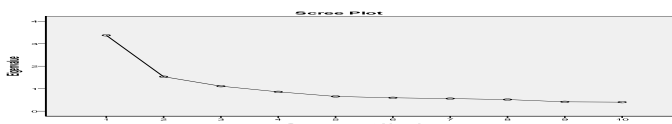


Figure 1: Scree Plot

The above figure indicates a distinct break up to the third factor. Meaning that, three factors were extracted from the data because their Eigen Value is higher than 1.

Reliability

The internal consistency of alpha coefficient of the entire instrument is .779 which signifies that acceptable and adequate. Moreover, all of the factors gained adequate reliability for exploratory research which is above .600 (Lackey, & Sullivan, 2003). Table 1 shows Cronbach's alpha value of each factor.

Table 1
Identified factors from the study and their reliability and item loadings

Latent Factor and Its Constituted Items	Factor Loading	Alpha
Factor 1: Academic Communication		.722
I use WhatsApp to discuss assignments	.773	
I use WhatsApp to discuss course contents	.768	
I use WhatsApp to exchange information about courses	.715	
I use WhatsApp to exchange learning ideas	.569	
Factor 2: Perceived Academic Performance		.713
Through the use of WhatsApp I get answers to some questions related to my study	.813	
My knowledge increases through the use of WhatsApp	.782	
I am able to do better on exams after using WhatsApp	.724	
Factor 3: Learning Enhancement		
My research skills have improved through the WhatsApp use	.760	.601
My grade has improved by the use of WhatsApp for class discussion	.722	
Through WhatsApp I get more ideas on our class projects/ assignments from my colleagues	.684	

- 1- Factor one: Academic communication is the first factor identified from the instrument; it consists of four items reflecting students' academic communication with one another such as their discussion on class assignment, course content through the WhatsApp.
- 2- Perceived Academic performance. This is second factor explored from the instrument which consists of three items presenting students' perception that through the use of WhatsApp their performance in the school increases.
- 3- Learning enhancement is the third factor extracted in this study which has three items. It depicts that students' academic use of WhatsApp enhance their learning and research skills.

Conclusion

The main objective of this study is to examine psychometric properties of WhatsApp and perceived Academic performance by giving emphasis in determining the construct validity of the instrument.

On the other hand, the exploratory factor analysis provides three main constructs labeled as academic communication, perceived academic performance and learning enhancement. The psychometric properties of the instruments were adequate with indicators such as variance explained, communalities, anti-image, rotated component matrix and Eigen values for each of the respective construct. The adequacy of the psychometric properties justifies that the instrument has successfully passed exploratory stage, indicating that the instrument is ready to be subjected to further analysis.

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