

# A STUDY ON FACTORS PROPELLING THE ADOPTION OF MOBILE LEARNING AMONG STUDENTS AND INSTRUCTORS OF PUBLIC AND PRIVATE UNIVERSITIES IN PAKISTAN

Mehak Rehman, University of the Punjab Gujranwala

## ABSTRACT

*Present research aims to examine the impact of behavioral factors on the adoption of mobile learning. Data were collected from 300 students and 100 lecturers from one public and two private universities by using structured questionnaire. Judgmental sampling technique was used to select the suitable respondents. Student respondents were in different years of their education from the fields of business administration, commerce and information technology. Data were analysed through SPSS 20 and AMOS 21 software. Results indicate that perceived ease of use and perceived usefulness has a significant positive impact on intention to adopt mobile learning.*

**Keywords:** Higher Education, Mobile Learning, Pakistan, Universities, Technology.

## INTRODUCTION

Mobile technology has proved as an important element in the education sector (Iqbal & Ashraf, 2017). Usage of mobile technology for the purpose of learning and teaching is called m-learning or mobile learning. Mobile learning is a different concept from e-learning/electronic learning. In mobile learning process, smartphones and tablets are used whereas e-learning is done through wired internet connections and desktop computers (Tan et al. 2014). M-learning enables a user to have wireless access to the knowledge (Liu et al. 2010). With the passage of time, concept of m-learning is getting popular throughout the world (Park et al. 2012). Gikas & Grant (2013) stated that m-learning is an efficient approach and it can replace the traditional system of e-learning of higher education institutions. In the today's modern age, students are ready to adopt mobile learning as they are proficient to use latest technological devices (Pozzi, 2007). Even so, the scope of the adoption of mobile learning by students and lecturers is limited (Liu et al., 2010). However, the reason of this limited scope is unknown. Thus, it generates a need to explore the factors playing their role in the adoption of mobile learning especially in the context of developing countries (Mohammadi, 2015).

Pakistan is a fast-growing developing country in the context of internet usage. Technological statistics of Pakistan demonstrate that a significant potential in the country for the adoption of m-learning. Telecom sector revenues were reached at PKR 449.6 billion during financial year 2014-2015. Data revenues of telecom sector have been increased for almost 3 times during last 7 years (i.e., PKR 77.9 billion in 2014-2015). This is a positive indicator in the arousal of 3G/4G technologies demonstrating the increasing trend of internet usage. During the financial year 2014-2015 telecom sector contributed PKR. 126.6 billion to the national economy. Due to an increase in the usage of smartphones, tablets and laptops, data revenues are expected to rise. Mobile penetration has increased from 71.73% during 2013 to 76.6% during 2014 which is the highest figure in the recent years. Mobile phone users are increasing day by day i.e., during financial year 2013-14 total number of users was

128.25 million which has been increased to 139.9 million at the end of financial year 2014-15 with an increased growth rate from 6.7% to 9.1%. Broadband penetration of Pakistan stands at 2.07% as of June 2014 which was at 1.52% during 2013. NGMS (Next Generation Mobile Service) services have increased the broadband penetration in the country by providing internet broadband services on smartphones. Broadband subscribers were 2.72 million during financial year 2013 whereas at the end of financial year 2014 this figure raised up to 3.79 million. During the financial year 2014-15 broadband subscribers were more than 16.89 million which is indicating a positive trend of the users towards the broadband (PTA Annual Report 2013-14; PTA Annual Report 2014-15).

Above statistics indicate enough potential for the adoption of mobile learning by the student and lecturers in higher education institutions in the country. However, this area of research was found to be overlooked by the previous researchers. Therefore, present study aims to examine the impact of behavioral factors towards the adoption of mobile learning among students and lecturers in public and private universities in Pakistan. For this purpose, we adapted the model developed by Cheon et al. (2012) based on the Theory of Planned Behavior. Perceived ease of use and perceived usefulness are considered as the behavioral factors propelling the adoption of mobile learning whereas, attitude towards mobile learning is considered as a mediating variable.

This research has both theoretical and practical significance. By adopting a theoretical model based on TPB, this research contributes to the theory in the context of mobile learning. Furthermore, this research is a significant contribution to the literature on mobile learning in terms of developing countries like Pakistan. Practically, findings are helpful for the higher education decision makers to effectively employ the concept of m-learning in higher education institutions.

## LITERATURE REVIEW

The transformation of electronic learning to mobile learning is called m-learning (Sharma & Kitchens, 2004). Development of handheld devices based on wireless technologies i.e., smartphones and tablets are the attributes of popularity of m-learning (Park et al., 2012). Term m-learning means learning by using mobile devices i.e., smartphones, tablets, and MP4 devices etc., (Tan et al., 2014). These devices are handheld, portable (i.e., can be transported easily in someone's purse or pocket and their batteries are rechargeable) and have less weight (Maseeh, 2019; Nordin et al. 2010). Rodriguez (2011) studied that the development of free applications and tools has intensified the utilisation of mobile learning. University students belong to the millennial generation and this segment of students is considered as technology savvy (Junco and Mastrodicasa, 2007). These individuals are exceedingly proficient at multi-tasking with latest handheld devices such as tabs, mobile phones, laptops, cameras, etc., which are ever-present among this generation (Taleb & Sohrabi, 2012). Barbosa & Geyer (2005) studied that they consider the smartphones as necessity not luxury. They carry and use their handheld devices (i.e., tablets, smartphones) with them and use these devices absolutely for their personal usage (Evans, 2008). Millennial is a generation who can absorb, produce, and share the contents from their technological devices individually as well as in groups (Ferreira et al. 2013; Palacios-Marqués et al. 2015). Mahat et al. (2012) suggested that usage of latest technologies in the process of learning can be a source of motivation for this generation. This system of learning is useful for those students who are un-attached with their courses and they are facing poor performance.

In higher education institutions, mobile learning can be used to carry traditional teaching as well as to advanced systems designed for educational institutions (Ferreira et al., 2013). The usage of mobile phones in universities can be of three different types i.e.

administrative functions like timetabling and calendaring; referencing functions like dictionaries and electronic books and other functions like activities of feedback (Patten et al. 2006). Mobile technologies are applicable formally and informally in learning system. The mobile learning via different mobile devices e.g. cell phones, smart phones and tabs are used to construct, gather and access valuable resources to communicate with others (Kukulka-Hulme et al. 2011).

There are many behavioral intentions which are not under the control of a human are explained in Theory of Planned Behavior (Ajzen, 1991, 2001). TPB is more realistic to investigate the behavioral process i.e. adoption of new technologies. Behavioral attitude, the first and important element in TPB is produced by behavioral beliefs and it is a scale to measure the behavior negatively or positively (Ajzen, 1991). There are more chances for an individual to perform a particular behavior if they have a propitious attitude towards behavior (Ajzen and Driver, 1991; Miesen, 2003).

Cheon et al. (2012) developed a model to study the intentions of higher education students and their course instructors to adopt m-learning. They tested their proposed model in a university of southwest region of USA among undergraduate students. Ajzen and Fishbein (1980) suggested in their study that behavior beliefs should be classified from a particular population or context as prominent believes are related to the context so in this study we will focus on the behavioral beliefs.

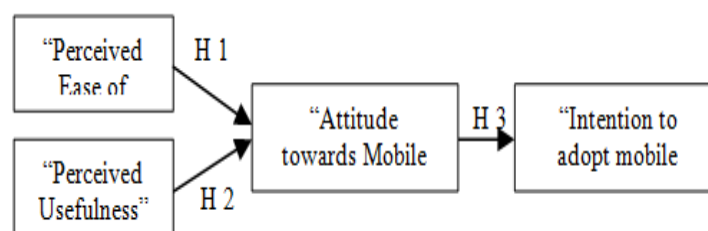
Researches proved that attitude and the beliefs of attitude towards behavior have positive relationship with each other (Chris et al. 2012; Davis, 1989). We have conceptualized the two variables which can influence the mobile learning's attitude; first one is "the perceived ease of use" and second is "the perceived usefulness". These are derived from TAM (The Technology Acceptance Model) (Davis, 1989). There are more chances to adopt the m-learning if both, the students and their instructors perceive that it is easy to use and will cause the improvements in their academic performance. Regarding this, following three hypotheses were developed Figure 1.

University students' and instructors';

*H<sub>1</sub>: Perceived ease of use has a positive impact on attitude towards mobile learning.*

*H<sub>2</sub>: Perceived usefulness has a positive impact on attitude towards mobile learning.*

*H<sub>3</sub>: Attitude towards mobile learning has a positive impact on intention to adopt mobile learning.*



**FIGURE 1**  
**MOBILE LEARNING**

## Methods

Present research was a cross-sectional study by nature and the data were collected only for one time. Research population for this research was the students and instructors of all the public and private universities of Pakistan. But it was not possible for the researchers

to collect the data from all of the students and instructors of public and private universities. So, the stratified sampling approach was adopted and a limited number of sampling units was selected for data collection. The sampling units for this research were the university students and instructors.

“GPower” software was used to find the lowest sample size of students required for data collection for this study. The model has 1 predictor (for the variable “The Intention to Adopt Mobile Learning”), we set (0.2) the effect size and 0.95 as power needed. The total required sample size was 262 for students’ population. And hence the primary data were collected from slightly larger number of respondents (300 individuals) than required.

MacCallum et al. (1999) proposed in their study that the sample size should be at least 100 respondents. So, researchers collected the data from 100 instructors from three universities. The number of the sampling units from public university was 34 respondents and it was 33 respondents from remaining two private universities.

Stratified sampling technique was used to record the responses from 300 under graduate and post graduate students as well as from 100 instructors from three different public and private universities of Pakistan. The targeted respondents were from business administration, commerce and information technology departments. The respondents voluntarily participated in the study and they were from different classes i.e. from 13th to 18th year of education and have enough information about mobile learning. The respondents who were the instructors were teaching different courses in the above said departments.

The data were collected through a structured questionnaire. The respondents were provided some basic introduction of m-learning at the start if they want to verify that they have the right sense of mobile learning although these respondents have an understanding about the mobile learning. Then the respondents were requested to record their responses on the questionnaire.

Respondents’ perceptions about m-learning are pertaining from the variables “Perceived Ease of Use”, “Perceived Usefulness”, “Attitude towards Mobile Learning” and “The Intention to Adopt Mobile Learning”. A seven degree Likert scale (1 = “strongly disagree” to 7 = “strongly agree”) was adopted from Cheon et al. (2012) to measure these variables.

Questionnaire was consisted of fifteen different questions. All of the items of the questionnaire were adopted from (Yeap et al. 2016). First two questions were about the gender and level of study of the respondents and the third question was about the average time spent by the respondents while using mobile internet. Remaining twelve questions were asked to measure each variable of the research.

The collected data was analyzed by using Amos and SPSS softwares. First of all, the reliability of the scale was tested by finding the value of Cronbach alpha through SPSS. Afterwards it was necessary to test the convergent and discriminant validity of the scale. For this purpose, the values of average variance extracted (AVE) and composite reliability (CR) was calculated through Amos. In addition, the factor loadings against all of the elements were also calculated. The values of standardized beta, standardized error and student’s t were calculated to test the proposed hypotheses.

## RESULTS AND DISCUSSIONS

The descriptive statistics of the students and teachers are separately shown in Table 1 and Table 2 respectively that female students have the percentage 55.3% while there are only 44.7% male students. It indicates that there are a greater number of female students in Pakistani universities as compare to male students. On the other hand, there are 58% male instructors and 42% female instructors in Pakistani universities.

48.7% of the student respondents were studying at the undergraduate level and 51.3% of the total respondents were at the post graduate level of their studies. While 56% of the instructors were the M. Phil scholars and 30% were Ph. D scholars whereas there are only 14% instructors who have the doctorate degree. This shows that in Pakistani universities, the number of Ph. D's is very low.

22% students claimed that they use the mobile internet less than one hour daily while there are a greater number of the students who use the mobile internet from 1 to 5 hours every day having percentage of 62.3%. There were 15.7% student respondents who claimed that they use the mobile internet more than 5 hours each day.

20% of the instructors argue that they spend less than one hour while using mobile internet while 52% claimed that they spend 1 to 5 hours on mobile internet. Remaining 28% instructors spend more than 5 hours on mobile internet.

These findings indicate that majority of the respondents are habitual to use the mobile internet and they spend much of their time on using mobile internet regardless of their status i.e. students or instructors. This means that there is a probability that they will accept the concept of mobile learning.

Items	Frequency	Percentage
Gender		
Male	134	44.7
Female	166	55.3
Level of Education		
Under graduate	146	48.7
Post graduate	154	51.3
Doctorate	-	-
Time spend on internet daily		
Almost never	2	.7
Less than 1 hour	66	22
1-5 hours	187	62.3
6-10 hours	27	9
11-15 hours	9	3
16-20 hours	5	1.7
More than 20 hours	4	1.3

Items	Frequency	Percentage
Gender		
Male	58	58
Female	42	42
Qualification		
M. Phil	56	56
Ph. D (Scholar)	30	30
Ph. D	14	14
Time spend on		

internet daily		
Almost never	1	1
Less than 1 hour	20	20
1-5 hours	52	52
6-10 hours	11	11
11-15 hours	4	4
16-20 hours	7	7
More than 20 hours	5	5

**Table 3**  
**MEASUREMENT OF CONVERGENT VALIDITY (STUDENTS)**

Construct	Items	Factor Loadings	Mean	CR	AVE
Perceived Ease of Use	PEU1	0.909	5.98	0.977	0.684
	PEU2	0.998			
	PUE3	0.991			
Perceived Usefulness	PUF1	0.961	6.01	0.964	0.901
	PUF2	0.98			
	PUF3	0.906			
Attitude Towards Mobile Learning	ATM1	0.99	5.73	0.896	0.743
	ATM2	0.82			
	ATM3	0.76			
Intention to Adopt Mobile Learning	IAM1	0.991	5.94	0.988	0.967
	IAM2	0.986			
	IAM3	0.974			

**Table 4**  
**MEASUREMENT OF CONVERGENT VALIDITY (INSTRUCTORS)**

Construct	Items	Factor Loadings	Mean	CR	AVE
Perceived Ease of Use	PEU1	0.839	5.63	0.913	0.779
	PEU2	0.92			
	PUE3	0.887			
Perceived Usefulness	PUF1	0.902	5.88	0.885	0.722
	PUF2	0.879			
	PUF3	0.762			
Attitude Towards Mobile	ATM1	0.906	5.91	0.967	0.908
	ATM2	0.993			

Learning	ATM3	0.959			
Intention to Adopt Mobile Learning	IAM1	0.701	6.03	0.866	0.867
	IAM2	0.873			
	IAM3	0.899			

**Table 5**  
**MEASUREMENT OF DISCRIMINANT VALIDITY (STUDENTS)**

	PEU	PUF	ATM	IAM
PEU	.827			
PUF	.789**	.949		
ATM	.573**	.502**	.862	
IAM	.602**	.577**	.521**	.983

**Table 6**  
**MEASUREMENT OF DISCRIMINANT VALIDITY (INSTRUCTORS)**

	PEU	PUF	ATM	IAM
PEU	.882			
PUF	.780**	.849		
ATM	.501**	.521**	.952	
IAM	.662**	.651**	.617**	.931

**Table 7**  
**HYPOTHESES TESTING (STUDENTS)**

Relationship	Hypothesis	Std. Beta	Std. Error	t	Decision
PEU → ATM	H1	0.469	0.077	11.94**	Not rejected
PUF → ATM	H2	0.132	0.069	9.30**	Not rejected
ATM → IAM	H3	0.521	0.048	9.64**	Not rejected

**Table 8**  
**HYPOTHESES TESTING (INSTRUCTORS)**

Relationship	Hypothesis	Std. Beta	Std. Error	t	Decision
PEU → ATM	H1	.242	.013	5.17**	Not rejected
PUF → ATM	H2	.333	.015	11.71**	Not rejected
ATM → IAM	H3	.617	.079	3.94**	Not rejected

It was necessary to check the reliability of the data before moving forward towards the data analysis. For this purpose, values of Chronbach alpha were calculated. Cronbach values were fulfilling the standard which means that the data is reliable.

Table 3 indicates the mean values of the answers of student respondents. All of the mean values are lying between 5.73 to 6.01 which indicate that majority of the students

respond “agree” and “strongly agree” on Likert scale. It means that the students are agreed to adopt mobile learning. Afterwards, the values of average variance extracted and composite reliability were calculated using Amos (Table 3). All of the values of factor loadings, AVE and CR were under the desired range. Hence it proved the convergent validity of the scale used to record the responses of the students.

Similarly, Table 4 shows the mean values of instructors’ responses. These values fall between 5.63 to 6.03. This shows that instructors are also ready to adopt mobile learning as they record their responses as “agree” and “strongly agree”. To check the convergent validity of the tool used to record the responses from instructors, again Amos was used and the values of factor loadings, AVE and CR were calculated (Table 4). These values were lying under the acceptable range hence it proved the convergent validity of the scale.

Correlations among the variables were checked through SPSS. Table 5 and Table 6 are showing the values of correlations among the variables for students and instructors respectively. Square roots of all the AVEs were taken to determine the discriminant validity of the measures which should be greater than all possible correlations. Diagonal elements in bold face in Table 5 and Table 6 are showing that the values of square roots are greater than all the correlations. Hence discriminant validity of the scale is proved.

Table 7 and Table 8 are showing the details of the hypotheses testing for students and instructors respectively. All of the hypotheses were not rejected and the results were significant with p value less than 0.05 hence the results are significant.

- Hence it can be concluded that university students’ and instructors’;
- Perceived ease of use has a positive impact on attitude towards mobile learning.
- Perceived usefulness has a positive impact on attitude towards mobile learning.
- Attitude towards mobile learning has a positive impact on intention to adopt mobile learning.

## CONCLUSION

This research was conducted to check the factors propelling the adoption of mobile learning among students and instructors of public and private universities in Pakistan. For this purpose, data were collected and analyzed using SPSS and AMOS. Results indicated that perceived ease of use and perceived usefulness have their positive impact on attitude towards mobile learning and similarly attitude towards mobile learning has its positive impact on intention to adopt mobile learning. These results are similar with the findings of (Yeap et al., 2016). Hence it can be concluded that in the developing countries like Pakistan, there is a need to introduce the mobile learning platforms which can be useful for students and instructors.

In our research we discussed the behavioral factors that affect the adoption of mobile learning among higher education students and /lecturers. The research framework which we used was designed by Cheon et al. (2012) whose findings were that behavioral factors have a great impact on the adoption of m-learning. The findings of our study also show that the behavioral factors play a significant role towards the intention to adopt the new technology.

Our research findings show that all the variables have the impact on the adoption of mobile learning so higher education decision makers should encourage the students and instructors to go for the mobile learning in universities of Pakistan. The findings of the study are also useful for researchers as well as decision maker to recognize the variables that play a more significant role in adopting the m-learning and pay more heed to improve them. Our results show that the students and teachers are ready to adopt the m-learning concepts for learning and teaching their courses respectively. In today’s digitalized world, social media requires more investments to get the benefits of behaviors of the students and teachers



towards the adoption of mobile learning. Educational authorities should put their efforts to implement the m-learning system in the educational institutions. The education jurisdiction and other decision makers should promote the students and instructors to share their experience regarding m-learning that may act as a motivational factor for other students and teachers to adopt m-learning.

### Limitations and Directions for Future Studies

In our study we only discussed one aspect: the behavioral factors, further research can be conducted to find the impact of other factors of TAM i.e. normative beliefs and control beliefs which can also influence the intentions of the students towards the adoption of mobile learning.

### REFERENCES

- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211.
- Ajzen, I. (2001). Nature and operation of attitudes. *Annual review of psychology*, 52(1), 27-58.
- Ajzen, I., & Driver, B.L. (1991). Prediction of leisure participation from behavioral, normative, and control beliefs: An application of the theory of planned behavior. *Leisure sciences*, 13(3), 185-204.
- Barbosa, D.N.F., & Geyer, C.F.R. (2005). Pervasive personal pedagogical agent: A mobile agent shall always be with the learner. In *IADIS International Conference Mobile Learning 2005* (pp. 281-285).
- Cheon, J., Lee, S., Crooks, S.M., & Song, J. (2012). An investigation of mobile learning readiness in higher education based on the theory of planned behavior. *Computers & education*, 59(3), 1054-1064.
- Chris Yang, H., Liu, H., & Zhou, L. (2012). Predicting young Chinese consumers' mobile viral attitudes, intents and behavior. *Asia Pacific Journal of Marketing and Logistics*, 24(1), 59-77.
- Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.
- Evans, C. (2008). The effectiveness of m-learning in the form of podcast revision lectures in higher education. *Computers & education*, 50(2), 491-498.
- Ferreira, F., Dias, F., Braz, J., Santos, R., Nascimento, R., Ferreira, C., & Martinho, R. (2013). Protege: a mobile health application for the elder-caregiver monitoring paradigm. *Procedia Technology*, 9, 1361-1371.
- Gikas, J., & Grant, M.M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. *The Internet and Higher Education*, 19, 18-26.
- Iqbal, H., & Ashraf, H.A. (2017). Impact of behavioral factors towards the adoption of mobile learning among higher education students in public and private universities: A pitch. *Accounting and Management Information Systems*, 16(3), 406-412.
- Kukulska-Hulme, A., Sharples, M., Milrad, M., Arnedillo-Sánchez, I., & Vavoula, G. (2011). The genesis and development of mobile learning in Europe. In *Combining e-learning and m-learning: New applications of blended educational resources* (pp. 151-177). IGI Global.
- Liu, Y., Li, H., & Carlsson, C. (2010). Factors driving the adoption of m-learning: An empirical study. *Computers & Education*, 55(3), 1211-1219.
- MacCallum, R.C., Widaman, K.F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological methods*, 4(1), 84.
- Mahat, J., Ayub, A.F.M., & Luan, S. (2012). An assessment of students' mobile self-efficacy, readiness and personal innovativeness towards mobile learning in higher education in Malaysia. *Procedia-Social and Behavioral Sciences*, 64, 284-290.
- Maseeh, H.I. (2019). Digital mobile advertising: A Pitching research letter. *Journal of Accounting and Management Information Systems*, 18(4), 640-646.
- Miesen, H. W. (2003). Predicting and explaining literary reading: an application of the theory of planned behavior. *Poetics*, 31(3-4), 189-212.
- Mohammadi, H. (2015). Social and individual antecedents of m-learning adoption in Iran. *Computers in Human Behavior*, 49, 191-207.
- Nordin, N., Embi, M.A., & Yunus, M.M. (2010). Mobile learning framework for lifelong learning. *Procedia-Social and Behavioral Sciences*, 7, 130-138.
- Palacios-Marqués, D., Merigó, J.M., & Soto-Acosta, P. (2015). Online social networks as an enabler of innovation in organizations. *Management Decision*.

- Park, S.Y., Nam, M.W., & Cha, S.B. (2012). University students' behavioral intention to use mobile learning: Evaluating the technology acceptance model. *British journal of educational technology*, 43(4), 592-605.
- Patten, B., Sánchez, I.A., & Tangney, B. (2006). Designing collaborative, constructionist and contextual applications for handheld devices. *Computers & education*, 46(3), 294-308.
- Rodriguez, J.E. (2011). Social media use in higher education: Key areas to consider for educators.
- Sharma, S.K., & Kitchens, F. L. (2004). Web services architecture for m-learning. *Electronic Journal of e-Learning*, 2(1), 203-216.
- Taleb, Z., & Sohrabi, A. (2012). Learning on the move: the use of mobile technology to support learning for university students. *Procedia-Social and Behavioral Sciences*, 69, 1102-1109.
- Tan, G.W.H., Ooi, K.B., Leong, L.Y., & Lin, B. (2014). Predicting the drivers of behavioral intention to use mobile learning: A hybrid SEM-Neural Networks approach. *Computers in Human Behavior*, 36, 198-213.
- Tapscott, D. (1998). *Growing up digital* (Vol. 302). San Francisco: McGraw-Hill Companies.
- Yeap, J.A., Ramayah, T., & Soto-Acosta, P. (2016). Factors propelling the adoption of m-learning among students in higher education. *Electronic Markets*, 26, 323-338.

**Received:** 30-Jan-2023, Manuscript No. AMSJ-23-13174; **Editor assigned:** 02-Feb-2023, PreQC No. AMSJ-23-13174(PQ); **Reviewed:** 08-Mar-2023, QC No. AMSJ-23-13174; **Revised:** 20-Apr-2023, Manuscript No. AMSJ-23-13174(R); **Published:** 08-May-2023