GOOGLE FORMS AND SMARTPHONES: EVALUATION OF AN ALTERNATIVE TO CLICKER SYSTEMS FOR COLLECTING FEEDBACK FROM STUDENTS

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Abstract

This paper presents findings from a pilot study that examined the use of the Google Forms service with a smartphone as a convenient and costless substitute for audience response systems (“clickers”), for instance to collect feedback from students during lectures in near real time. Clickers can be used as a form of technological support in large study groups for questioning or student polling, as well as in diverse teaching activities. The solution tested in our pilot study was a combination of (1) use of a smartphone device by students to complete an online feedback survey created by using the Google Forms service, (2) use of the online application Bitly to shorten the original URL of the Google Forms survey, and (3) students’ feedback to the lecturer during his/her teaching in near real-time by responding to the online survey items. The participants in our pilot-study were undergraduate and graduate students of a Central European university. To investigate the applicability of our alternative solution to using clickers, in designing scales in the evaluation survey of our technological solution (Google Forms + smartphones) the variables related to technology acceptance theories (TAM, exTAM) were used. The results of our study indicate that the use of the Google Forms service and students’ smartphones can be easily adopted by most college students as an effective and no-cost substitute for rather expensive clicker systems.

Keywords: technology in education, mobile assessment, real-time feedback, clicker systems, online survey, Google Forms, smartphone.

1 INTRODUCTION

Information and communication technologies play an important role in higher education – not only in teaching and learning but also in assessment. In higher education systems students can be perceived as partially independent knowledge consumers, and teachers as agents who facilitate their knowledge acquisition. To do so, teachers, among other things, may be interested in creating new ways of enriching their lectures and nurturing student engagement in their courses. One of potential means to improve students’ involvement and participation during lectures is to collect student feedback in real time and adapt the course of lecturing accordingly. This can contribute to a more learner-centric environment in large classes, which can eventually have a significant impact on developing students’ skills and knowledge.

Audience response systems (also called “personal response systems” or “classroom response systems” and popularly labeled as “clickers”) have been used for collecting feedback from students and formative assessment in various technological formats from primary school to university level of teaching (see: [1]). Such systems have recently become fairly affordable, even though some technical strain related to their uses is still an issue [2]. A “clicker” system uses remote devices with a keyboard (usually only with numbers) which communicate via a radio signal with a central device connected to a computer. However, for recording student “voting” or responding to questions widely available short messages from a mobile phone (SMS) can also be used, as well as web browsers and smartphones.

Audience response systems (ARS) allow students to answer course related questions using a “clicker” type device or application. This method of using technology in the classroom has become a common practice in higher education, for instance as a tool for generative learning [3]. Instead of mechanical-electronic devices, in both small and large groups of students teachers can also use online questionnaires or surveys to check students’ understanding of content or to get feedback to redirect their lecture. The application of both kinds of audience response systems in classroom can have a positive effect on attendance and motivation, as well as encourage students to be more active in the teaching and learning process [4]. Generally speaking, students experience traditional teaching methods as sometimes inappropriate and most of the classroom lectures as too static, so using ARS
as a method of students’ evaluation of teaching and facilitation of students’ more active involvement in learning processes are factors that can positively influence their acceptance of ARS in classroom [5].

The use of ARS offers many advantages such as increased student motivation for class attendance, increased and easier student interaction, greater satisfaction and improved student learning [6]. One study [7] revealed that the use of ARS can have positive effects on educational experience of shy students who often have difficulties with expressing their opinions in traditional classroom teaching. When ARS is used in the form of an online survey, for instance to increase the interactivity during lectures, teachers can examine student understanding of the course content, ask questions about the preferred direction of the continuation of the current lecture, and/or gather feedback about the student’ satisfaction with the topic and delivery of the lecture. It must be noted that mobile polling has a potentially stronger influence than the classical clicker system. Using smartphones for mobile polling increases students’ attention during the lecture and may reduce students’ anxiety, while the teachers can immediately observe the outcomes of their lecture and try to improve their teaching [7].

ARS can be equally applicable in small and large classroom groups. The EduMECCA project funded by the European Lifelong Learning Program introduced web-based ARS that gathered students’ responses using mobile devices and services [8]. This ARS was similar to a traditional clicker system and the teacher had various options to create voting questions or responses on the ARS website. Students used their smartphones or other portable devices to access the ARS website by a unique session code for that lecture in order to answer the questions. As the research was conducted in small teaching groups, both the teacher and the students had the opportunity to establish collaboration, give opinions about the ongoing course content and receive real-time feedback. The student response system also provided equal opportunities for all students due to anonymity.

Various feedback methods can be used in teaching with ARS to improve students’ motivation to learn. New opportunities encourage them to become more dedicated and self-efficient. Moreover, lecturers’ external control also helps students to better understand the learning content and resolve uncertainties with a feeling of being supported (see: [9]).

ARS can also increase teacher-student interaction and cooperation, as well as facilitate the engagement of students when appropriate and proven teaching methods are implemented (see: [10]). However, research [11] has shown that teachers may consider audience response systems as disturbing and demanding because of time required to prepare teaching materials, use of technology and novel interaction procedures. Therefore, ease of use is one of the most important predictors of ARS application in teaching. Also, large groups and time limitation are considered as key constraints that teachers face in inspecting students’ understanding or collecting feedback from them, for instance regarding course satisfaction. However, lecturers sometimes do not have sufficient time to repeatedly test students’ understanding, which is why the method for collecting feedback has to be easy to implement in classroom and have all the functionalities that will motivate students and support their learning activity [12].

2 THE USE OF GOOGLE FORMS IN TEACHING

Availability, ease of use and various other beneficial characteristics of ARS can be used to improve traditional teaching (see [13]), as well as to provide feedback on the teaching process, the delivered of a lecture and its content. Drawing on the experience of a three-year project in mobile learning (mLearning) associated with integrating web 2.0 tools in tertiary education, Cochrane [14], recommends shifting away from traditional electronic devices that are available in the classroom toward encouraging students to use their own devices, such as smartphones, for learning, collaboration and assessment of the quality of teaching and course materials. Google Forms is a web 2.0 application that allows the user to create questionnaires and online surveys to collect various data from a large number of respondents. Furthermore, Google Forms allows real-time presentation of responses in graphical form and the possibility to subsequently analyze the collected data with the Google Sheet application.

The survey made in the Google Forms application is stored on Google Drive. The web link to the online survey is automatically generated and can be easily shared and distributed to different devices and platforms for the selected sample of students. Major benefits of Google Forms for collecting feedback from students in real time are (a) support for various types of questions (closed, open or multiple choice questions), (b) anonymity of virtually unlimited number respondents, and (c) automated
frequency analysis of collected responses with graphic display of collected data that is available in real
time while students are answering the questions during the lecture [15].

Mobile learning, or m-learning facilitated by smartphones, has become an important driver in higher
education and academic activities both for students and teachers. According to the Pew Research
Center survey [16] completed in November 2016, as many as 92% of people in the United States
aged 18-29 owned a smartphone, and, according to a similar Nielsen survey [17] in 2016, as many as
98% of Millennials in the United States aged 18-24 were smartphone owners.

Applying online surveys in class can enrich classical face to face teaching with benefits for both sides
involved in this process: students’ interest for the lecture can be collected and presented in near real
time; lecturers can redirect course content in accordance with students’ interests; anonymity of replies
allows students to freely express their opinions and level of understanding of the course content,
which provides important feedback to the teacher; mental presence and students’ participation in class
can be increased [1], [18]. All of the listed benefits can be achieved with the use of Google Forms.
Arranged in a graphic diagram, the results of collecting students’ responses with Google Forms can be
made immediately visible to the students, which allows further analysis and comments by both the
teacher and the students [19].

The use of ARS or clicker systems for formative feedback can be a promising form of assessment but
sometimes difficult to implement in large groups when feedback has to be delivered in a short time
period. However, the emulation of clickers with the use of Google Forms and students’ smartphones
allows teachers to provide formative feedback to students in near real time.

3 METHODOLOGY

Collecting feedback from students is an important factor of quality instruction in higher education,
while providing feedback to students, for instance as a means of formative assessment, can contribute
to their motivation and course achievement. According to Gibbs and Simpson [20] there are ten
conditions for effective formative assessment, the following three of which have been considered for
the purpose of this research owing to their relevance for higher education and applicability in the use
of ARS: (1) sufficient feedback is provided to students, with adequate frequency and proper detail, (2)
feedback is given timely, when it is still important to students in a way that orients them to focus on
further learning or provides assistance in achieving learning goals, and (3) feedback related to the
purpose of their assignments, as well as to the criteria for their achievement in learning tasks.

Providing feedback to students is especially important in large enrollment classes. However, setting up
a classroom for the use of clickers for a large student audience may be time consuming, complicated
and costly. Moreover, positive acceptance of the use of ARS systems or clickers by students should
not be taken for granted. Trees and Jackson [1] found that various factors influence students’
perception of clickers, for instance the desire to be involved and engaged in the teaching and learning
process in large classes, as well as their belief that feedback can contribute to learning.

Having in mind the importance of providing feedback to students, as well as problems associated with
the use of clickers in large classes, the authors of this study have examined the use of Google Forms
tool in combination with students’ smartphones as a low-cost, easy to use and practical solution for
large study groups.

The results of the use of Google Forms and smartphones as a variant of ARS was demonstrated in
several study groups of students in the 2015/2016 and 2016/2017 academic years. In addition, with
one group of students a small-scale pilot study was performed with the use of variables from
technology acceptance models (TAM; [21]) and the variable “perceived enjoyment” from the extended
TAM (exTAM; [22]). Technology acceptance variables were included for the purpose of comparison,
since this study replicates (with a slightly modified approach) a similar research conducted by Wu and
Gao [23], who investigated the factors influencing students’ attitude in relation to the use clickers in the
classroom.

3.1 Problem and objectives

Clicker systems (audience response systems) can be costly, time consuming or complicated to use by
the teachers and/or students. Also, there is always a potential risk related to investment in such a
technology, as it may prove to be impractical or not accepted according to expectations. Therefore,
one of the main goals of our study was to examine (in large student groups and traditional classroom
settings) whether an audience response systems (clicker system) can be emulated with the following combination of widely available and free of charge technologies: (a) web survey created in Google Forms, (b) Bitly web application for shortening of URL’s, (c) students’ use of smartphones to use a Google Forms survey to provide feedback to the lecturer in near real time, all of which were used in conjunction with (d) evaluated and proven pedagogical techniques for the application of such technologies to enrich the traditional learning environment.

Three research questions were formulated for our study:

1. Is the Google Forms application technically suitable as a replacement technology for traditional audience response systems (“clickers”) in large classroom groups with students using their smartphones during the lecture to respond to the online survey?
2. Do college students find this new way of collecting feedback appropriate?
3. Is the use of Google Forms and smartphones comparable to the use of clickers regarding selected variables from technology acceptance models?

3.2 Respondents

The empirical part of our study was performed in the summer semester of the 2015/2016 and 2016/2017 academic years on a total of four groups of students (in one or two lecture sessions for all groups). All of the students were enrolled in the same college in the Republic of Croatia.

In the 2015/2016 academic year the participants in our study were 67 first year (bachelor) students who attended the undergraduate course Communication in Organization, as well as 39 first year graduate students who attended the Managerial Communication and Leadership course. The demographic characteristics (gender and age) of these two convenience samples are presented in Table 1.

<table>
<thead>
<tr>
<th>COURSE TITLE (SAMPLE GROUP)</th>
<th>Communication in Organization (N=67)</th>
<th>Managerial Communication and Leadership (N=39)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Frequency</td>
<td>Percentage</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>20.9%</td>
</tr>
<tr>
<td>Male</td>
<td>53</td>
<td>79.1%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-19</td>
<td>39</td>
<td>58.2%</td>
</tr>
<tr>
<td>20-21</td>
<td>22</td>
<td>32.8%</td>
</tr>
<tr>
<td>22-23</td>
<td>3</td>
<td>4.5%</td>
</tr>
<tr>
<td>24-25</td>
<td>2</td>
<td>3.0%</td>
</tr>
<tr>
<td>26 or more</td>
<td>1</td>
<td>1.5%</td>
</tr>
</tbody>
</table>

In the 2016/2017 academic year the participants in our study were 91 first year students who attended the undergraduate course Communication in Organization, as well as 30 first year graduate students who attended the Managerial Communication and Leadership course (for the latter the demographic variables were not collected with the mobile survey). The demographic characteristics (gender and age) of the first sample are presented in Table 2.
### Table 2. Demographic characteristics of two groups of respondents in the 2016/2017 academic year.

<table>
<thead>
<tr>
<th>COURSE TITLE (SAMPLE GROUP)</th>
<th>Communication in Organization (N=91)</th>
<th>Managerial Communication and Leadership (N=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percentage</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>19</td>
<td>20.9%</td>
</tr>
<tr>
<td>Male</td>
<td>72</td>
<td>79.1%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-19</td>
<td>35</td>
<td>38.5%</td>
</tr>
<tr>
<td>20-21</td>
<td>50</td>
<td>54.9%</td>
</tr>
<tr>
<td>22-23</td>
<td>6</td>
<td>6.6%</td>
</tr>
<tr>
<td>24-25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>26 or more</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### 3.3 Instruments

For the purpose of the empirical part of our study several online surveys were created in Google Forms to supplement a traditional lecture on the topic of leadership. Similar lectures lasting for approximately 90 minutes were delivered to groups of students (at the undergraduate and graduate level) in the summer semester of 2015/2016 and 2016/2017 academic years.

In the 2015/2016 academic year, at the end of the last lecture on leadership, a short paper-and-pencil survey was also administered for the assessment of the applicability and convenience of combining a smartphone with a Google Forms online survey as a means for the improvement of the teaching and learning process in large classes.

For easier access with a smartphone device the URL to the Google Forms mobile survey was shortened and customized by with the Bitly link management platform (https://bitly.com/) to only 11 characters (for instance: “bit.ly/CO-1”).

Finally, in the 2016/2017 academic year, at the end of the last lecture on leadership a survey with 5 self-assessment scales that measured technology acceptance variables (see Appendix 1) was administered among students who were enrolled in the Communication in Organization course. This survey was comparable to the survey used by Wu and Gao [23] to investigate the factors of students’ adoption of clickers in the classroom.

It is important to emphasize that the number of respondents for mobile surveys varied since the attendance in lectures was not obligatory and because not of all respondents who attended a specific lecture session completed the online survey or the final paper-and-pencil survey.

### 4 RESULTS

#### 4.1 Technological applicability of Google Forms and smartphones as an audience response system

##### 4.1.1 Students’ capability to access the mobile survey

To answer the first research question regarding the applicability of the use of smartphones and Google Forms online surveys for collecting feedback from students during a lecture (i.e. for emulation of a “clicker” system), the responses of subjects to the final paper-and-pencil survey from both convenience samples in 2015/2016 academic year were analyzed (with a total of N=106 subjects). For the question “Were you able to access the mobile survey?” from the final paper-and-pencil survey the following answers were obtained: 84.0% of subjects answered “Yes”, 7.5% answered “Yes with problems” and
8.5% answered “No”. That means that in our convenience sample in the 2015/2016 academic year almost 10% of students were not able to respond to our mobile survey as a substitute for ARS or clicker system. However, in our sample of students (N=91) who responded to the final paper-and-pencil survey while attending the Communication in Organization course in 2016/2017 academic year, a somewhat greater percentage (95.6%) of students responded with “Yes” to this survey question, while 2.2% of them responded “Yes, with difficulties”, and only 2.2% responded with “No” or did not provide an answer. This means that about 90% (or more) of students enrolled in higher education could be expected to be technically capable for accessing a mobile survey created with Google Forms. Therefore the conclusion regarding the first research question would be that it is possible to use students’ smartphones and Google Forms for collecting feedback from students (as a substitute for a “clicker” system) with at least 90% of average college students who attend lectures in large study groups.

4.1.2 Usefulness of mobile surveys

The responses of both groups of students in our convenience samples (total N=106) in the 2015/2016 academic year regarding the question “Do you consider the usage of mobile survey as a useful addition to (at least some) lectures / seminar classes?” are presented in Fig 1. As many as 72.3% of students responded with “Yes” and “Mostly yes” to this question in the final paper-and-pencil survey. However, in the sample of students (N=91) who responded to the final paper-and-pencil survey while attending the Communication in Organization course in 2016/2017 academic year a much greater percentage of students (91.2%) responded with “Yes” and “Mostly yes” to this question. It can be concluded that most of the students in our convenience samples considered mobile surveys as useful, which justifies their use as a substitute for ARS or clickers.

4.1.3 Students’ perception of mobile surveys

To investigate students’ perceptions of online surveys various questions were asked (in both 2015/2016 and 2016/2017 academic years) in an online form or with a paper-and-pencil survey that was given to students after the lecture in which Google Forms and students’ smartphones were used to collect and provide feedback. This was done to answer the second research question: “Do college students find this new way of collecting feedback appropriate?”

The responses of both groups of students in our convenience samples (total N=106) in the 2015/2016 academic year regarding the question “Do you find it interesting to perform an online evaluation of a course?” are presented in Fig 2. Again, as many as 75.4% of students responded with “Yes” and “Mostly yes” to this question in the final paper-and-pencil survey. Similar responses were obtained for the following questions:

- “Is it suitable to use a mobile survey for anonymous evaluation of course content and collecting feedback?” (There were 76.4% responses with “Yes” and “Mostly yes”.)
- “Do you consider the use of a mobile survey as valuable addition to seminar classes?” (As many as 81.2% of students responded with “Yes” and “Mostly yes”.)
- “Do you find it suitable to gather students’ opinion using mobile devices for evaluation of students’ presentations?” (78.3% of students responded with “Yes” and “Mostly yes”.)
From the results that are presented in Fig. 2, as well as after an analysis of the percentage of positive students’ responses (“Yes” and “Mostly yes”) to previously listed survey questions, it can be concluded that, regarding the second research question, most students find that collecting feedback with smartphones and Google Forms surveys is appropriate. Also, the inter-generation stability/consistency of students’ responses was found regarding data obtained by comparison of the responses given by the students who were enrolled in different academic years (2015/2016 and 2016/2017). Similar responses were obtained in study groups regarding the following questions: “Do you want to listen to a case example related to the importance of education in leadership?” (60% to 73% of students in four study groups responded with “Yes”); “Was the topic ‘Leadership’ presented sufficiently clearly/understandably during the lecture/seminar?” (72.9% to 73.3% of students responded with “Yes” in all three groups after the lecture); “Should more or less time be devoted to the topic ‘Leadership’ during lectures?” (68% to 75% of students responded with “Equal time” in two generations of students who attended the Communication in Organization course).

4.2 The use of Google Forms and smartphones as audience responses systems in relation to technology acceptance models

Wu and Gao [23] used the extended technology acceptance model (exTAM) to investigate the factors of students’ adoption of clickers in the classroom. For the purpose of our study we have used similar self-response scales as those authors to measure the following exTAM variables: Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Perceived Enjoyment (PE), Attitude (ATT), and Intention (I).

In their study, Wu and Gao have used AMOS 17.0 software to test a structural-equation model of the relations of exTAM variables regarding their acceptance model of ARS called iClickers. The highest correlations in their structural model were between the following variables: (a) PEOU was positively associated with PE (.499), (b) PE was positively associated with PU (.554), (c) PU was positively associated with ATT (.675), and (d) PU was positively associated with Intention (.678).

In our study we have used the data collected with a paper-and-pencil survey which was administered after three lectures on the topic “Leadership” during which students’ smartphones and Google Forms were used to collect student feedback. Sample questions that were delivered to students via Google Forms during lectures and seminars are presented in the preceding section of this paper. In addition, several questions were also administered with Google Forms as formative assessment during those lectures. The self-assessment scales in the paper-and-pencil survey for collecting data on exTAM variables are presented in the Appendix. The same exTAM variables were measured as in the Wu and Gao [23] study. For our convenience sample of 91 students who were enrolled in the course Communication in Organization in the 2016/2017 academic year the Cronbach alpha coefficients that were calculated for all of the exTAM scales were in the range from 0.79 to 0.88 (see Appendix).

The inter-construct correlations between exTAM variables for our convenience sample (N=91) are presented in Table 2, while the model for SmartPLS data analysis is presented in Fig. 3. In our study we have obtained similar inter-construct correlations in comparison with the study performed by Wu and Gao [23] on acceptance of the iClickers system: (a) PEOU was positively associated with PE (.35), (b) PE was positively associated with PU (.56), (c) ATT was positively associated with Intention (.55), (d) PU was positively associated with Intention (.63). It must be noted that the association of PE with ATT in our model was below 0.20 and therefore not presented in Fig. 3. The adjusted $R^2$ of our model was 0.47 in relation to Intention. Also, the Standardized Root Mean Square Residual (SRMR)
value for our model was 0.081 which indicates a good model fit (according to Hu and Bentler [24] acceptable values of SRMR for model fit would be in the range from 0.08 and 0.10).

Table 3. Inter-construct correlation of exTAM variables regarding students’ use of smartphones and Google Forms as ARS (N=91; **p<0.01; 2016/2017 academic year; students who were enrolled in the Communication in Organization class)

<table>
<thead>
<tr>
<th>SCALE LABEL</th>
<th>PEOU Perceived Ease of Use</th>
<th>PU Perceived Usefulness</th>
<th>PE Perceived Enjoyment</th>
<th>ATT Attitude</th>
<th>I Intention</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEOU Perceived Ease of Use</td>
<td>-</td>
<td>.075</td>
<td>.346**</td>
<td>.457**</td>
<td>-.023</td>
</tr>
<tr>
<td>PU Perceived Usefulness</td>
<td>.075</td>
<td>-</td>
<td>.562**</td>
<td>.455**</td>
<td>.631**</td>
</tr>
<tr>
<td>PE Perceived Enjoyment</td>
<td>.346**</td>
<td>.562**</td>
<td>-</td>
<td>.663**</td>
<td>.418**</td>
</tr>
<tr>
<td>ATT Attitude</td>
<td>.457**</td>
<td>.455**</td>
<td>.663**</td>
<td>-</td>
<td>.548**</td>
</tr>
<tr>
<td>I Intention</td>
<td>-.023</td>
<td>.631**</td>
<td>.418**</td>
<td>.548**</td>
<td>-</td>
</tr>
</tbody>
</table>

The third research question of our study was: “Is the use of Google Forms and smartphones comparable to the use of clickers regarding selected variables from technology acceptance models?” When the data obtained by Wu and Gao [23] and their structural model regarding the iClickers system are compared to the structural model presented in Fig. 3, it can be concluded that there is considerable similarity between these two sets of research results and that our solution which combines students’ use of smartphones in combination with Google Forms surveys as ARS performs in a very similar manner as their iClickers system regarding student acceptance of such technology.

Figure 3. The structural model as a result of SmartPLS analysis of exTAM variables regarding students’ use of smartphones and Google Forms as ARS (N=91; 2016/2017 academic year; students who were enrolled in the Communication in Organization class).

5 CONCLUSION

In our study we have investigated the use of the Google Forms web application with a smartphone as a substitute for audience response systems (‘clickers’) in large study groups for student polling and formative assessment. Our solution was a combination of (1) use of a smartphone device by students to complete an online survey created by using the Google Forms application, and (2) use of the online application Bitly to shorten and customize the original URL of the Google Forms survey. To investigate
the applicability of our solution in more detail self-assessment scales were designed (comparable to the research performed by Wu and Gao [23]) with the variables related to extended technology acceptance model (exTAM). Regarding our research questions we can conclude that: (a) for most college students in our study the use of Google Forms and smartphones was a technically suitable replacement for traditional audience response systems (“clickers”); (b) most college students in our study evaluated this new way of collecting feedback as appropriate; and (c) the use of Google Forms and smartphones in our study was comparable to the use of clickers (see Wu and Gao study [23]) regarding selected variables from technology acceptance models that were observed.

REFERENCES


APPENDIX

SELF-ASSESSMENT SCALES RELATED TO TECHNOLOGY ACCEPTANCE MODELS (TAM & exTAM)
(Adapted from: [23])

PEOU – Perceived Ease of Use (Cronbach $\sigma = .81$)
PEOU1. It was simple for me to learn to use the mobile survey.
PEOU2. The interaction with the mobile survey was clear and easily understandable.
PEOU3. I would find it easy to respond to similar mobile surveys in the future.
PEOU4. I believe that in general it is not difficult to use a mobile survey.
PEOU5. I had no technical problems in using the mobile survey.

PU - Perceived Usefulness (Cronbach $\sigma = .87$)
PU1. The use of a mobile survey could increase my interest in the course material.
PU2. My efficacy in learning could increase with a more frequent use of mobile surveys.
PU3. With the use of a mobile survey I can receive or provide important feedback regarding teaching.
PU4. I believe that the use of a mobile survey is potentially very useful.
PU5. With the use of a mobile survey I could better understand the teaching material.

PE - Perceived Enjoyment (Cronbach $\sigma = .88$)
PE1. The use of a mobile survey is entertaining.
PE2. It is interesting for me to use a mobile survey.
PE3. I enjoy using a mobile survey.
PE4. I can have more fun while attending courses in which mobile surveys are used.
**ATT - Attitude** (Cronbach $\sigma = .79$)
ATT1. I believe that it would be a good idea to use mobile surveys in future courses.
ATT2. I have a generally positive attitude toward using mobile surveys.
ATT3. I don't like using mobile surveys. (R)
ATT4. I like having the opportunity to fill in mobile surveys about teaching.

**I - Intention** (Cronbach $\sigma = .79$)
I1. I would use mobile surveys whenever possible.
I2. I would rather enroll in courses which use mobile surveys.
I3. I would recommend courses in which mobile surveys are used to my friends.
I4. I intend to use mobile surveys in other courses if they are made available to me.