**Learning in the Smartphone Era: Viewpoints and Perceptions on Both Sides of the Lectern**

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This study examined the viewpoints of lecturers and students regarding the roles of smartphones in the classroom: how legitimate is it to use them in class, and in what ways? Does the usage of smartphones impair in-class learning processes, and if it does, can we tie specific uses with specific disruptions to the class? Conversely, could it be that using smartphones in class might benefit learning processes?

Our inspection sought to uncover the possible existence and nature of attitudinal gaps between students and lecturers by comparing viewpoints and perceptions from both sides of the lectern. The study was conducted among lectures (n=236) and undergraduate students (n=336) from seven academic institutions in Israel. Respondents answered an online questionnaire that included questions about their smartphone usage patterns, perceptions regarding the legitimacy of using smartphones in class, and assessments concerning the smartphone’s potential contribution to and disruption of learning processes in the classroom.

**Theoretical background**

Recent years have seen a steady growth in the volume of research devoted to the integration of smartphones into the educational system and the academic learning environment (Campbell, 2013; Kukulska-Hulme, 2007, 2010). The main discourse that dominates this field of study oscillates along the continuum between the benefit and the harm caused by smartphone use during class time. On the one hand, researchers have been examining the positive contributions smartphones can make to learning processes (Kumar, 2011; Ng, Zakaria, Lai, & Confessore, 2014; Purcell, Heaps, Buchanan & Friedrich, 2013; Norris, Hossain, & Soloway, 2011; Soukup, 2011). These studies focus on the positive educational potential of using mobile phones in general and of smartphones in particular, and go so far as to call out for educational systems to adopt 21st century pedagogical strategies that would transform smartphones into significant learning aids (White & Turner, 2011, Purcell, Heaps, Buchanan & Friedrich, 2013, Norris, Hossain, & Noroway, 2011). On the other hand, there are studies that identify the deficiencies, problems, and disorders that the mobile medium creates in the context of learning (Jacobsen & Forste, 2011; Kraushaar & Novak, 2010; Kuznekoff & Titsworth, 2013; Lawson & Henderson, 2015; Tindell & Bohlander, 2012). Many of these studies seek to raise an alarm about the dangers and negative repercussions of the increasing use of smartphones during class time, which, in their view, is a distracting element that causes multi-faceted detriment, both potential and real, to students’ academic performance (End, Worthman, Mathews, & Wetterau, 2009; Jones & Madden, 2002; Kraushaar & Novak, 2010; Kuznekoff & Titsworth, 2013; Tindell & Bohlander, 2011).

In the interest of broadening the scope of research on the subject, the present study sought to focus on both sides of the lectern – lecturers and students – regarding the use of smartphones within the academic classroom. This was accomplished through a comparative examination of perceptions about the legitimacy of smartphone use during classes and about its potential contribution to those classes, in the eyes of both students and lecturers.

## Smartphone usage

Interest in the research of mobile phone users has been steadily increasing since the end of the 20th century (Brown, Green, & Harper, 2001; Katz, 2006; Katz & Aakhus, 2002; Ling & Helmersen, 2000; Rice & Katz, 2003). However, the unique qualities of the smartphone are not just an improvement on previous cellular technology. These qualities give smartphones the status of new convergence technology in that they combine the characteristics of cell phones with those of personal computers. Smartphone users can, potentially, access countless content and information channels; they can perform a variety of activities, such as receiving and sending written messages, playing games, taking photos, and being active on online social networks.

Ritzhaupt, Liu, Dawson, and Barron (2013) have identified three levels of digital divide in this area: (1) impartial access to hardware, software, and the Internet; (2) the frequency with which students and teachers use technology in the classroom and for what purposes; and (3) the degree of students’ knowledge about how to implement information and communication. The nature of teaching in academic institutions requires that lecturers use technologies and the web in their dealings with students and the academic system. Lecturers are obligated to run course sites, respond to requests from students by email, transfer grades in a computerized manner, and so on. Therefore, we assume that there is no digital divide in access to basic digital technologies between lecturers and students. However, it can be assumed that to some extent there are generational gaps between students and lecturers, which are expressed in the frequency and purpose of use. Salajan, Schönwetter, and Cleghorn (2010) found that there were age-related differences between what Prensky (2001) calls “digital natives” (the students) and “digital immigrants” (the teachers) when interfacing with digital technologies, even though these differences were minimal and did not apply broadly to all available technologies or their specific implementations.

Our first research hypothesis was that there would be a difference found in the amount of smartphone usage between lecturers and students, and that students would use smartphones more frequently and for a wider range of purposes than lecturers.

The study of smartphones in the learning environment is usually integrated into a broader analysis of academic learning in a technological environment. The use of smartphones in academia has also been examined as part of the emerging theories on mobile learning, or M-Learning (Charles, Taylor, & Vavoula, 2007; Soukup, 2011). Studies in this field focus on alternative learning or complementary learning in the mobile environment (Wang et al., 2009). The discussion of the potential role of the smartphone in the learning process intensified in light of studies examining the growing challenge of keeping students’ attention during classes (Biggs & Tang 2007). Thus, for example, one of the main issues that have been examined lately in this field is the analysis of the implications and repercussions of the Bring Your Own Device policy, wherein academic systems encourage students to bring their smartphones, tablets, and laptops to the classroom, and make pertinent use of them in relation to subjects that come up during the lecture (Kay, Benzimra, & Li, 2017). Studies have identified smartphones as having positive potential in a wide range of functions such as long-distance learning (Traxler, 2009), collaborative learning (Corbeil & Valdes-Corbeil, 2007), and encouraging independent content creation (Hartnell-Young & Vetere, 2008). Another topic central to contemporary research is the contribution of mobile media to expanding the learning environment beyond the boundaries of the academic institution, rendering the learning processes almost continuous in that learning can be done anywhere and at any time (Kukulska-Hulme, 2005; Mueller, Wood, De Pasquale & Cruikshank, 2012; Tossell, Kortum, Shepard, Rahmati, & Zhong, 2015). Mueller et al. (2012), who investigated the implications of the use of BlackBerry devices inside and outside the classroom, indeed identified the potential contribution of the device to the expansion of learning circles; as they put it, “Mobile devices by definition can transport the learning context beyond the traditional classroom environment” (p. 50).

Tossell et al. (2015) found that in order to unlock the potential of the smartphone as a learning support tool, its unique intrinsic properties are not enough on their own. The key is a positive attitude on behalf of the lecturers and the development of clear guidelines for mobile learning. Avidov-Ungar and Eshet-Alkakay (2011) focused on analysing the attitudes of school teachers toward the introduction of advanced learning technologies into the classroom. They, too, pointed to the importance of positive approaches, on the one hand, and confidence in mastering the technologies on the other. They argue that these are the cardinal variables to ensure the success of the integration process.

Our second research hypothesis was that there would be a difference between students and lecturers in regards to the legitimacy accorded to the use of smartphones during class time, with the level of legitimacy ascribed by students being higher than that ascribed by the lecturers.

A study conducted by Malka, Ariel, Avidar, and Chen-Levy (2013) served as the starting point for the present study. Their research focused on analysing the role and function of the smartphone in the academic environment, from the perspective of the students themselves. Through 60 in-depth interviews with undergraduate students, the researchers found that students attribute great importance to the smartphone in their everyday lives in the academic environment. The interviewees pointed out several domains in which the device serves them, while streamlining and facilitating their student lives. A relatively small number of students also indicated some negative aspects of using the device. According to the researchers, it is possible to differentiate between three strata of smartphone use: (1) Classroom use: the majority of the participants reported actively using the device during classes, especially for the purpose of receiving and sending text messages, checking news updates, and social networking. Many also claimed to use the device to look up and verify concepts, data, and facts, whether for the sake of completing missing information or to “double-check the lecturer.” Some of the interviewees indicated that for students coping with attention deficit problems, focusing on monotonous activities on their smartphones during classes helped increase concentration. There were repeat testimonies of this phenomenon both as self-reports and as assessments of classmates’ behaviours. (2) Use for learning purposes outside the classroom: all the interviewees actively participated in study groups, group projects, and shared educational content via the WhatsApp and Facebook applications. Many reported taking advantage of the ubiquitous availability of the Internet for more effective time management during exam periods, using relevant applications to collect learning materials and complete missing information, and enjoying easy access to vital information communicated by the institution. (3) Negative aspects of use in the academic environment: a small number or respondents referred to the negative implications of the presence of the smartphone in academic-learning contexts. Their criticism focused on possible disruptions of the learning process, both during classes and while preparing for exams.

The use of smartphones for learning purposes in general, and especially in the two positive manners mentioned above, is in line with the approach presented by Malka, Ariel, Avidar, and Cohen (2017), according to which new media and various online platforms can serve us in a variety of ways and in different fashions, according to external circumstances; they cannot be looked at using the same methodology that has been to examine old media in the past.

Tossell et al. (2015) reported that formal learning through mobile technologies leads to informal learning (seeking out information, photography of relevant content, etc.), initiated by the students themselves. Mobile technologies contribute to the expansion of the learning environment beyond the boundaries of the academic institution and to engagement in learning processes anywhere and at any time (Kukulska-Hulme, 2007, 2010; Soukup, 2011; Naismith, Lonsdale, Vavoula, & Sharples, 2004; Mueller et. al, 2012). Kukulska-Hulme (2010) maintains that more and more students are active in technology-based social support network to improve their academic performance, especially by exchanging information, advice, and missing study materials with their fellow schoolmates. These networks are almost invisible to the lecturers. However, since they have a relatively high impact on the students’ academic lives, the lecturers should be aware not only of their existence but also of the content transmitted through them. The researcher assumes that a change in attitudes in relation to technology, and indeed the creation of a new learning culture that enables and normalizes the integration of communication technologies in the academic learning environment, is a very important first step in closing the apparent digital divide.

Our third research hypothesis was that there would be a difference in the estimated contribution made by the smartphone to in-class learning between lecturers and students, and that the students’ estimate of its contribution would be higher than that of the lecturers.

## Methodology

A four-part questionnaire was developed for the study. The first part pertained to background information; the second part looked at smartphone usage patterns in light of the participants’ assessment of self-efficacy and reported frequency of activity; the third part consisted of Likert-style statements that required participants to score the legitimacy of performing various actions on a smartphone during class on a scale; and the fourth part examined the perception of the possible contribution (harmful or beneficial) that a smartphone-equipped environment can make to classroom proceedings.

The questionnaire was distributed among 336 students and 236 lecturers at a large college in the north of Israel. It examined three main elements: smartphone usage patterns, the legitimacy attributed to carrying out activities on a smartphone during class, and the assessment of the smartphone’s contribution to in-class learning. The questionnaire was sent to the institutional email accounts of lecturers and undergraduate students at large academic institutions in Israel. Reminders to fill out the questionnaire were also sent online to the lecturers by the Center for the Promotion of Teaching and to the students by the Dean of Students. Data were collected over approximately two weeks.

## Results

### Students' profile

336 students responded to the questionnaire. The mean age of the students was 30.1 (SD = 9.8) and the median age was 26. 35% of students were in their first year of undergraduate studies, 37% were in their second year, 24% were in their third year, and 5% were in their fourth year. In terms of gender, 75% of the participating students were women, and 25% were men.

### Lecturers profile

236 lecturers from nine academic institutions in Israel responded to the questionnaire. The mean age of the lecturers was 48.6 (SD = 9.2). 67% of the lecturers were women. 87.4% defined themselves as secular and 8% as religious to some degree. In terms of teaching experience, 59% had been teaching for 10 years or more, 24% between 5 and 10 years, 11% between 2 and 5 years, and 7% for less than 2 years. Most of the lecturers (60%) taught theoretical courses, and the rest taught workshops and various practical courses. 68% of the lecturers worked part-time (out of this group, about half worked less than half-time and the other half worked more than half-time), and the rest had full-time positions.

### Smartphone usage patterns

To examine smartphone usage patterns, the questionnaire takers were asked to report the frequency at which they performed various tasks using their devices on a scale that ranged from “Not at all” to “Regularly.” Table 1 lists the activities for which both groups used their smartphones most frequently (either “Often” or “Regularly”). Among the lecturers the most frequent actions performed on a smartphone were: logging onto online social networks, listening to music, and watching videos. Among the students the most frequent actions performed on a smartphone were: surfing the web, texting, and logging onto online social networks.

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| --- | --- | --- |
| **Lecturers** | **Students** |  |
| 58% | 60% | Voice calls |
| 57% | 75% | Texting |
| 70% | 67% | Sending/checking emails |
| 41% | 76% | Surfing the web and performing searches |
| 81% | 55% | Listening to music |
| 74% | 54% | Watching videos |
| 75% | 58% | Using GPS |
| 85% | 69% | Logging onto online social networks |

Table 1. Frequent smartphone usages (“Often” and “Regularly”) among lecturers and students

An index of smartphone usage was created from the items listed above (internal consistency Cronbach’s alpha was 0.86 among students, and 0.77 among lecturers). The average usage index was 3.76 (SD = .74) for students and 3.78 (SD = .7) for lecturers. To examine the difference between the students’ and the lecturers’ smartphone usages, an independent sample T Test was performed and no significant difference was found between the averages (t (519) = .12, p > .05). Therefore, our first research hypothesis was not confirmed.

In addition, the survey participants were asked to personally determine their level of smartphone usage based on the following categories: a) Basic usage – for the purpose of voice calls and text messaging only; b) Regular usage – voice calls, text messaging, and a limited number of mobile apps; c) Advanced usage – frequent use of apps in addition to the other elements of basic usage. Among the students, 60% defined themselves as “regular” users, 38% as “advanced” and only 2% identified themselves as “basic users.” Among the lecturers, 48% defined themselves as “regular” users, 49% as “advanced” users, and 3% as “basic” users.

### Smartphone use for teaching purposes

Among the lecturers, 46% had never made use of smartphone apps as teaching aids, and about a quarter used them rarely, 19.5% used them occasionally and only 10% of lecturers used mobile teaching apps often and/or regularly. As for general usage of the smartphone as a search tool or as a way to expand lesson content, 14% of lecturers reported that they often asked students to look up class-related queries on their smartphones, and 36% reported doing so occasionally. Most of the lecturers (60%) asked students to look up information on their smartphones only rarely or not at all.

An overwhelming majority of lecturers (92%) did not encourage silent smartphone usage as a substitute or preventative measure for class disruption. However, about a third of lecturers had never actively made a remark to a student regarding this kind of usage. On the other hand, 35% of lecturers reported actively forbidding the use of smartphones during class, and an additional 13% occasionally enforced this rule.

### Legitimacy of smartphone use during class

A number of statements examined the extent to which various activities performed on a smartphone during class were considered legitimate. Figure 1 presents the differences in the students’ and lecturers’ evaluations regarding the legitimacy of several activities. It is possible to identify similarities in the illegitimacy both groups attributed to highly visible activities. Listening to music using a headset connected to a smartphone was considered illegitimate by 88% of the lecturers, while 6% considered it partially legitimate and 6% considered it legitimate. Similarly, among students, 73% viewed listening to music via the smartphone as an illegitimate activity to engage in inside the classroom, and 10% saw it as legitimate. Another activity that is slightly less visible is actively using smartphone apps in plain sight. Among lecturers, 67% considered this activity illegitimate during class, 21% saw it as partially legitimate, and 12% saw it as legitimate. In contrast, only 35% of students considered this action illegitimate, while 35% saw it as partially legitimate, and 30% saw it as legitimate. The disparities between lecturers and students were even more significant in regards to usages that can be defined as concealed. Thus, there was a large difference between the percentage of students who considered it legitimate to place the device on the table in plain sight, without touching it or actively using it (74% legitimate, 7% illegitimate), and the percentage of lecturers who considered this a legitimate action (62% legitimate, 16% illegitimate). The disparity was even wider when it came to using the smartphone under the table, which 68% of lecturers considered illegitimate as opposed to only 35% of students. Similarly, random scrolling (without typing) was seen as a legitimate activity in the eyes of close to half of the students, while 61% of lecturers saw it as illegitimate.

Figure 1. Legitimacy of using a smartphone during class for various activities (“legitimate” or “absolutely legitimate”)

A legitimacy index for smartphone usages was created out of the items examined above (internal consistency Cronbach’s alpha was 0.70 among students, and 0.84 among lecturers). The average legitimacy index was 2.96 (SD = .91) for students and 2.37 (SD = .79) for lecturers. To assess the difference in legitimacy attributed to smartphone use during class between the students and the lecturers, an independent sample T test was performed, and found that there was a significant difference between the findings (t(531) = 7.82, p < .001). This means that the level of legitimacy attributed by students to smartphone use during class was significantly higher than that attributed by the lecturers. Thus, our second research hypothesis was confirmed.

### Contribution of smartphone use to in-class learning

Figure 2 shows the contributions that each of the two groups (students and lecturers) attributed to smartphone use in class. As we can see, lecturers, on the whole, see smartphone use as harmful to important in-class processes of learning and internalizing the material such as: classroom discussion, summarizing lesson content, the ability to pay attention and concentrate, and maintaining an atmosphere of learning. The positive contributions of the smartphone, according to the lecturers, is in widening the scope of possible classroom activities (72%), and knowledge enrichment (57%). In contrast, the students attribute much lower levels of contribution to smartphone use in class in general, with the exception of the contribution of texting as a substitute for chatter (31% among students as opposed to 20% among lecturers). According to the students, smartphones contribute mainly by widening the scope of pedagogical activity (45%) and helping them follow visual presentations (38%). Most of the students saw most smartphone usages as neither harmful nor beneficial to in-class learning.

Figure 2. Students’ and lecturers’ assessments of the smartphone’s contributions to in-class learning

An index of smartphone contribution assessment was created out of the items examined above (internal consistency Cronbach’s alpha was 0.83 among students, and 0.87 among lecturers). The average contribution assessment index was 3.35 (SD = 1.03) for students and 3.47 (SD = 1.31) for lecturers. To assess the difference in the contribution attributed to smartphone use during class between the students and the lecturers, an independent sample T test was performed, and found that there was no significant difference between the findings (t(519) = 1.2, p < .05). Therefore, our third research hypothesis was not confirmed.

### The correlation between legitimacy, usage patterns, and contribution assessment

Among students, it was found that the higher their levels of smartphone usage, the more positive contribution they attributed to smartphone use in class (r = .374, p < .001). In addition, it was found that the higher their levels of smartphone usage, the less legitimacy they attributed to smartphone activities during class (r = -.2, p < .001). There was no correlation between the legitimacy attributed to smartphone use in class and the assessed contribution of use (r = 0.7, p > 0.05).

Among lecturers, no correlation was found between smartphone usage level and the assessment of the smartphone as positively contributing to in-class learning (r = -.12, p > .05). Likewise, there was no correlation found between smartphone usage levels and the legitimacy attributed to using smartphones during class (r = -.1, p> 0.0). On the other hand, a significant positive correlation was found between the attributed levels of legitimacy and the assessment of the smartphone’s contribution to in-class learning (r = .64, p < 0.001).

To examine the mediating role of legitimacy in the correlation between the level of usage and assessment of the ’smartphone’s contribution to in-class learning, we used Hayes’ (2018) PROCESS bootstrapping command with 5,000 iterations (model 4). The analysis treated the smartphone usage index as a predictor variable, the legitimacy of smartphone use within the classroom as the mediator, and the evaluation of the smartphone’s’ contribution as the dependent variable. Results showed that the 95% confidence interval for the indirect effect of smartphone usage on the assessment of the ’smartphone’s contribution did not include 0 (95% CI [.187, .472] with 5,000 resamples, F (2,443) = 26.28, p< .001, Rsq=32.57%). The model indicated indirect effects of the level of usage on the assessment of the smartphone’s contribution (see Figure 3).

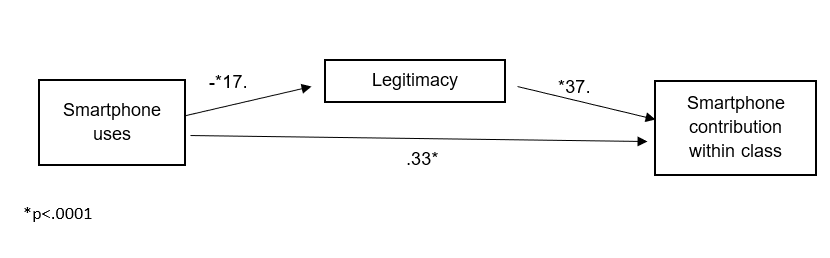


Figure 3. The mediating function of legitimacy between smartphone usage and smartphone contribution assessment

No significant differences were found among students divided by year of study. The lecturers’ teaching experience and position scope also were not found to correlate with their opinions. In addition, there were no significant differences found between genders or types of classes taught.

## Discussion

Similarly to other studies (Mueller et al., 2012; Tossell et al., 2015; Elliott-Dorans, 2018), the present study reveals disparities in perception between lecturers and students with regard to smartphone use during academic classes. These disparities pertain both to the legitimacy of different activities carried out using the smartphone during class, and to the positive and negative effects attributed to its use.

The findings indicate that the level of smartphone usage is high among both groups; students, more than lecturers, view the various activities performed on a smartphone as legitimate to undertake during class. However, most of the activities they found legitimate were of the least noticeable type of disturbance from the list presented to the students. Both students and lecturers saw the smartphone as a device with the potential to enrich lessons and expand knowledge but reported that it interfered with classroom discussion and internalization of the material; they were minimally aware of its potential contribution to students with attention and concentration problems.

Given that the presence of the smartphone in the classroom is not likely to cease in the foreseeable future, it is appropriate to try and reduce these disparities between the two groups, especially with regard to perceptions of legitimacy. It seems reasonable to assume that the coordination of expectations between lecturers and students regarding the acceptable modes of smartphone use will lead to an improvement in the classroom atmosphere, making it easier to focus on the beneficial uses of the smartphone as a learning aid. Rather than aspiring to make the “nuisance” go away, lecturers would be better advised to learn to recognize not only the detriment that the use of a smartphone may cause but also the ways in which it could potentially contribute to learning, and to communicate openly and coherently on the subject with students.

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