The Value of Interactive Polling and Intrinsic Motivation When Using English as a Medium of Instruction

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Abstract: Understanding how technology is used to foster active learning and why it is effective is important in advancing educational practices. The purpose of this study was to test adopting in-class interactive polling to engage college students’ learning in their non-native language. After adopting interactive polling activities for six weeks, non-native speakers of English enrolled in a content-based class taught in English were invited to participate in a survey measuring the outcomes of the intervention. The results showed that students found it more comfortable responding to polls using their smartphones rather than verbally responding to questions in the classroom. Guided by self-determination theory, the results demonstrate that students who report high intrinsic motivation to participate in in-class polling exercises exhibit a more favorable attitude, find the class more engaging, feel they perform better on tests because of the polling exercise, and show higher level of perceived learning than those who reported low intrinsic motivation. The importance of facilitating sustainable student learning by using interactive technology to improve the quality of content-based learning and minimize the potential downside of using English as a medium of instruction is discussed.

Keywords: English as a medium of instruction; interactive learning environment; interactive polling; mobile technology

1. Introduction

Internationalization of higher education is receiving widespread attention. Student mobility across the world is expanding and universities are keen on creating learning environments that can attract a diverse student body. A recent survey of higher education institutions from 126 countries conducted by the International Association of Universities show that the majority of institutions place a high level of importance on internationalization of their institutions [1]. The growing demand for offering courses in English in non-English speaking countries seems to reflect this phenomenon [2]. The learning environment created by universities in South Korea also sets an expectation that college students graduating with an undergraduate degree from a university be equipped with proficient English language skills. As a graduation requirement, students must earn a passing score on a standardized test of English (e.g., IELTS, TOEIC, TOEFL, etc.), and taking courses offered exclusively in English language is common at most Korean universities [3]. To be sure, emphasis on English language and offering courses through the medium of English is confirmed through faculty recruiting as well. English language skill is not only a requirement for the students but also for the faculty members who are often encouraged, or sometimes required, to teach various content areas in English including science and engineering [4,5].

Adopting English as a medium of instruction (EMI) in non-English speaking countries can serve two purposes. First, students may indeed see improvement in their English language skill, which is
often critical for landing a job at a global company; with their foreign language skills, some students may even seek careers abroad. Second, it lends support to the globalization initiatives of the local universities, opening up opportunities to compete with universities across the globe and recruit international students. Furthermore, offering courses in English can attract exchange students who lack language proficiency to consider local institutions and, consequently, increase international student enrollment for local universities. Other external factors that sway universities in Korea to adopt EMI include the Korean government incentivizing universities for offering courses taught in English and university ranking reports using the percentage of courses offered in English as one measure of quality of education.

Using EMI certainly has its merits from both students’ and institutional perspectives. However, adopting EMI means that students end up learning their major subject areas in, what is for most of them, their second language. The challenge is that students attend universities for reasons other than to merely improve their English as a second language—the vast majority of the students attend universities to earn a degree and develop content expertise in a discipline of their choice. In which case, EMI may be seen as a source of discouragement to the students who are not fluent in English or lack confidence in their language skills [5]. Students may develop a perception that they are at a disadvantage by not being able to fully grasp the knowledge and gain skills in their major area simply because of the language barrier [3]. Therefore, to reap the benefits of EMI and minimize the downsides, it is important to examine and develop effective teaching practices to assist students’ learning of the course materials taught in English for non-English majors and non-native speakers of English.

In a classroom, students can engage with the instructor in several ways. Non-verbal engagement includes the use of body language to express their attitude, approval, and/or understanding of the course materials. More active engagements include asking questions, answering questions, and making comments during class discussions. Educators often share that Asian students in general are not enthusiastic about the latter type of engagement [4,6], and EMI can further discourage the already reluctant students. As a potential solution to this problem, this study employed an interactive polling tool called “Poll Everywhere” and asked the students to use mobile devices as an active learning tool.

Active learning is “any instructional method that engages students in the learning process” [7] (p. 223) and usually involves student activity and participation. Studies have shown that active learning techniques can improve student engagement, attitude, recall and retention of information, thinking and writing skills, and academic achievement [7]. Therefore, the purpose of this study is to examine the pedagogical value of using “Poll Everywhere” to foster an engaging learning environment when using EMI with non-native speaking students and make use of mobile technology to improve student experience. The results of this study will provide insight into how facilitating courses taught in English in non-English speaking countries can be improved to create a sustainable learning environment. In addition, the results can be applied to better assist the growing population of international students in English speaking countries who use English as their second language.

1.1. English as Medium of Instruction (EMI)

EMI is defined as the use of English as an instructional language in which an academic subject is taught in non-language academic subject and non-Anglophone contexts [8]. In their investigation of the effect of EMI in Hong Kong, Marsh and colleagues [9] evaluated the academic accomplishment of Chinese high school students. The results showed that students were disadvantaged by EMI in areas such as geography, history, and science in comparison to math. Not surprisingly, students who have better English skills are less negatively affected by EMI [9]. In a study with Korean engineering students, students expressed that they were not satisfied with EMI and felt it interfered with their academic achievement. Despite the negative, the majority of them still supported the school policy as there are benefits such as improvement in English and the opportunities it opens up for further studies abroad [5]. This suggests that students are not entirely content with EMI but there is some agreement that EMI can enhance their language skills in the long run. Similarly, a review of 83 EMI studies in
higher education concluded that research to date does not provide sufficient evidence to conclude whether EMI is beneficial or detrimental to content learning [2].

1.2. Student Engagement and Audience Response System

In a survey of 1857 Korean college students, when asked how often students respond to instructors’ questions, about 41.1% of the students answered favorably, and when asked how often they ask questions in class, 26.9% provided favorable answers [10]. One potential reason for this low level of engagement is that students from Asian cultures are brought up to pay respect to teachers as experts of knowledge and, thus, have tendencies to passively accept teachers’ words. Raising opposing views or voicing dissent can be viewed as a sign of disrespect. A study has shown that college students in Korea and the U.S. favor different learnings strategies—compared to the students in the U.S., Korean students preferred sitting in the front of the classroom, taking word-by-word notes [11]. Another potential explanation is that students are generally shy and afraid of making mistakes in public [6]. A large class size adds to the anxiety of making mistakes in public, and on top of that, speaking in a foreign language to share their views on an academic subject matter further heightens the anxiety.

Even if students are willing to engage with the instructor and speak up during class, it is sometimes not feasible for the instructors to collect student responses in large lecture classes. One method often used to collect a large number of responses in a relatively short period of time is polling [12]. While hand-raising is a simple, technology-free method, instructors can use devices such as a “clicker,” a hand-held device used to collect and display students’ responses to questions, or students’ own mobile device can be used to serve the same purpose.

Clickers have been useful when students did not possess their own portable devices such as smartphones, tablets, or laptops [13]. In current classrooms, college students are most likely in possession of at least one, if not all, of these devices. Therefore, instructors are naturally leaning toward “Bring Your Own Device (BYOD)” [14–16] for the students to participate in some form of in-class activities. “Poll Everywhere” is a web-based platform with capabilities akin to clickers while allowing the use of the students’ own devices to respond. The biggest advantage is that it does not require any downloading of software and, thus, does not have device compatibility issue. Instructors can create multiple choice or open-ended questions, and when activated, students can visit a web address to respond to the poll using their phones. In a study using a large computer science lecture class in the U.S., students responded that they found the class more enjoyable and felt more engaged when “Poll Everywhere” was used during lectures [14]. Indeed, computer-mediated communication tools can provide students less threatening means to communicate resulting in engagement and confidence [17], and anonymity helps students communicate without concerns about making mistakes [6].

A study suggested that Chinese students demonstrate a lower level of creativity than American students because they have been exposed to education that predominantly emphasizes the learning of basic knowledge and analytical skills [18]. While Asian students may shy away from in-class engagement affected by sociocultural values and attitudes toward education, some studies have shown that pedagogical practice matters more than students’ cultural background [19]. Tran [20] also claimed that learning style can be shaped by situational factors such as teaching methodologies. Therefore, the pedagogic practices might explain the passive learning styles of the Asian students, not the student learning styles. Rather than attributing low engagement to cultural background, testing different teaching methods to create an environment for the students to feel safe to make mistakes or share their views is needed.

Based on the discussion above, it is predicted that:

Hypothesis 1 (H1). Students will feel more comfortable responding to questions using their smartphones than verbally.
1.3. Self-Determination Theory (SDT) and Intrinsic Motivation

Motivation is central to learning and scholars have examined such questions as what motivates students, what type of motivation is more effective in learning, and how to develop motivation [21–23]. The assumption is that individuals are affected by internal and external environments and act based on individual internal structure, or intrinsic motivation [21]. Intrinsic motivation refers to the innate human needs for competence and self-determination; when people are not under any type of external pressure (e.g., deadline, evaluation, reward), they have the propensity to seek challenges that suit their competencies and have the need to be self-determining and act out of choice [21,24]. In other words, when intrinsically motivated, people feel competent and self-determining, and as a result, they experience interest, enjoyment, and satisfaction with the given activity itself [21].

In contrast, extrinsic motivation pertains to behaviors where an activity is performed for reasons not inherent to the task but as a means to an end [21,25]. Although people can be motivated to behave without extrinsic rewards or regulation, they are often vulnerable to external factors that affect individuals’ perceived choice. For example, an individual may be involved in an intrinsically interesting activity but face a situation where the causal responsibility for the activity shifts to external when the individual begins to receive rewards [24].

Intrinsic motivation has been associated with positive cognitive, affective, and behavioral outcomes in educational settings [24]. Students with high intrinsic motivation had better long-term memory and presented more school enjoyment, and students who are more motivated and self-determined to do schoolwork were more likely to stay in school than those with lower self-determined motivation [22]. Therefore, it is predicted that when intrinsically motivated to participate in the in-class interactive poll, students will be highly interested in the activity itself and will develop positive attitudes toward interactive polling used in the classroom. As a result, students will find the class more engaging and feel they performed well. If these benefits to learning are felt by students with high intrinsic motivation, they will find using smartphones in class useful.

Hypothesis 2 (H2). Students with high intrinsic motivation to engage in interactive polling will (a) have a more favorable attitude towards using interactive polling, (b) feel the class is more engaging, (c) have higher perceived learning, (d) feel they performed well on tests, and (e) feel using a smartphone in the classroom is more useful than those with low intrinsic motivation.

1.4. The Dark Side of Using Mobile Device in a Classroom

There is ample empirical evidence that shows the positive effect of the use of technology in higher education on academic achievement [13], course completion, and reenrollment [26]. Despite the positives, some instructors may be hesitant to incorporate interactive activity using technology due to several limitations. First, using a mobile device can become a source of frustration for students. For example, depending on the type of the phone a student possesses, there may be technical difficulties [27]. Common technological problems include unreliable connection and potential compatibility problems across devices [16,28].

Second, allowing the use of a personal phone during class can open up opportunities for the students to be distracted from the course content. Supporting this line of reasoning, some studies provide a skeptical view of the pedagogical value of technology in classrooms. Some students find the device distracting as having the device easily accessible could potentially harm their concentration regarding the course materials [27,29]. Similarly, studies have found that the use of technology does not necessarily result in enhanced learning and students face lack of concentration and interruption of work when using mobile devices [30,31]. It is plausible that with limited cognitive resources, when students face more than a single task, their attention is divided and the encoding of information is disrupted [32].
Lastly, permitting technology in classrooms can potentially provide some students to freely engage in non-class related activities with the instructor’s consent. A study has shown that students are likely to use mobile devices for non-academic entertainment purposes such as texting, instant messaging and playing games [33] or browsing the Internet [34] rather than for instructional purposes [28].

However, when students are intrinsically motivated with in-class activities, they are less likely to view technology as a source of distraction but a tool for learning. Therefore, it is predicted that students with high intrinsic motivation participating in the interactive polling will be less affected by the negative side effects of accessing mobile devices during class.

**Hypothesis 3 (H3).** *Students with high intrinsic motivation engaging in interactive polling will (a) find the activity less boring and (b) less distracting than those with low intrinsic motivation.*

2. Materials and Methods

2.1. Description of the EMI Course and Participants

Students in an advertising and public relations course taught in English at a large research university in Seoul, Korea participated in the study. It was a core course intended to enhance students’ understanding of research methods in communication and equip them to conduct their own research. As an EMI course, all lectures, reading materials, and assignments were in English. This course was primarily lecture-based and met twice a week for 75 min each. The majority of the students were advertising and public relations majors in their sophomore year. Fifty-nine students participated; however, one student was a native English speaker and was excluded from the analyses. Out of 58 students, 56.9% were female and 43.1% were male.

2.2. Procedure

The study utilized a quasi-experiment with no comparison group as only one section of the course was offered in English. During the first half of the 16-week semester, the instructor relied heavily on lectures. Visual aids were used simply to illustrate the content of the lecture or as a summary. The midterm was given in Week 8 of the semester. Then, for the next six weeks, the instructor adopted interactive polling as an active learning tool (“intervention”). Prior to the intervention, the instructor confirmed with the class that every student was in possession of a smartphone.

The polls were embedded in the slide presentations that the instructor used as a visual aid (see Figure 1). When prompted on the screen, students used their smartphones to access the poll by visiting a web address with a pool of questions created by the instructor, and responses were displayed on the screen live as the students provided answers on their phones (see Figure 2). Each week, the instructor prepared two to three questions as appropriate. The poll typically contained questions from reading assignments, from a previous or current class session to rehearse important concepts, or questions from a past quiz to review questions the class had difficulty with. While most were multiple choice questions, open-ended questions were sometimes asked. The polls were not embedded in a particular order. Based on how the instructor designed the lesson plan, sometimes the interaction took place at the beginning of the class, at the end, or throughout.

To be truly intrinsically motivated, individuals must feel free from external pressures such as rewards or deadline [21]. To foster an environment that allowed students to be intrinsically motivated, participation was completely voluntary. Students were given enough time to access their phones and participate but participation was not required and grades were not attached to participation. The answers were recorded anonymously, and only the number of participants showed up on the screen. The instructor allowed enough time to ensure that the majority of the class participated.

During the last week of classes, a paper-based survey was conducted to gauge the utility of the active learning tool. Without revealing the exact purpose of the study, the students were informed that the purpose of the survey was to assess classroom engagement in college-level courses taught
in English for non-native speakers. To eliminate exercising any potential influence over students, a graduate student who was not involved with the class handed out the survey questionnaires to the students when the instructor of the course was not present in the classroom. Informed consent was provided before participation, and the students were instructed that their participation is voluntary. To ensure anonymity, no personally identifiable information was collected. In addition to the key concepts examined in the study, questions related to general academic performance and English skills were asked. See Figure 3 for the experimental procedure.

Figure 1. An example of the screen shown to the students in class.

(a) Responding as student

(b) The standard deviation is the:

- Lowest score given by any participant: A 20%
- Computation found by subtracting the lowest score from the highest score: B
- Indication of how close or how far apart scores are from the mean: C 80%
- Computation found by adding all scores and dividing by the number of cases: D

(c) The standard deviation is the:

- Lowest score given by any participant: 0
- Computation found by subtracting the lowest score from the highest score: 0
- Indication of how close or how far apart scores are from the mean: 1
- Computation found by adding all scores and dividing by the number of cases: 0

Figure 2. An example of a typical poll accessed by the students: (a) a student enters the poll anonymously by visiting the web address provided; (b) the student reads the question provided on the screen prepared by the instructor and on one’s phone; (c) the student selects an answer. The aggregated responses are shown on the screen prepared by the instructor in Figure 1.
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Figure 1. An example of the screen shown to the students in class. (a) (b) (c)

Figure 2. An example of a typical poll accessed by the students: (a) a student enters the poll anonymously by visiting the web address provided; (b) the student reads the question provided on the screen prepared by the instructor and on one’s phone; (c) the student selects an answer. The aggregated responses are shown on the screen prepared by the instructor in Figure 1.

Figure 3. The flowchart of the experimental procedure.

2.3. Measures

All items were measured on a 7-point Likert scale ranging from (1) “strongly disagree” to (7) “strongly agree.”

2.3.1. Key Variables

Students’ level of comfort responding to questions in class without technology and through the interactive poll was measured using statements: “I felt comfortable verbally responding to questions” and “I felt comfortable responding to the poll.”

Intrinsic motivation was measured using three items: “I enjoyed using interactive polling in class,” “I found the polling exercise funny,” “I find the polling exercise interesting” (α = 0.91) [35].

Attitude towards using interactive polling was measured using three items “I had a positive learning experience with the polling exercise,” “I would recommend interactive polling be used in future classes,” and “Other instructors should use interactive polling” (α = 0.87).

To measure class engagement, perceived usefulness of interactive polling on tests, and general usefulness of the polling activities, the following statements were used: “The poll made the class more engaging,” “I feel I did better on tests because of the polling exercises in class,” and “Using smartphone in the classroom was a useful addition to the class.”

Perceived learning was measured using three items: “The poll was useful for me to learn the material,” “The poll helped me understand the material,” “I found the polling exercise valuable” (α = 0.91).

The dark side of using interactive polling was measured by asking participants how boring they felt and how distracting the poll activity was: “I thought about what else I could be doing rather than answering the boring poll” and “The classroom polling was distracting.”

2.3.2. Control Variables

As the course was taught in English, students’ competence in English language itself and self-efficacy could affect the student’s overall classroom engagement and their performance in class [4]. To eliminate any confounding effect, self-evaluation of English competency and self-efficacy were measured. Respondents provided self-evaluation of their proficiency level for speaking, listening, reading, and writing in English language on a 7-point scale [36] ranging from (1) “elementary,” (3) “intermediate,” to (7) “advanced” with high mean scores representing high competence in English (α = 0.90).

Self-efficacy refers to what an individual believes he or she can achieve [37]. Self-efficacy was measured using five items on a 7-point scale ranging from (1) “strongly disagree” to (7) “strongly agree”: “Compared with others in this class, I think I’m a good student,” “I am sure I can do an excellent job on the problems and tasks assigned for this class,” “I think I will receive a good grade in this class,” “My study skills are excellent compared with others in this class,” “Compared with other students in this class I think I know a great deal about the subject” (α = 0.92) [38].

Indeed, moderately positive correlations were found between intrinsic motivation and competence in English (r = 0.43, p < 0.01) and intrinsic motivation and self-efficacy (r = 0.44, p < 0.01). Therefore, both were included in the analyses as control variables.
3. Results

3.1. The Mode of Interaction and the Level of Comfort Responding to Questions

A paired-sample t-test was conducted to compare students’ comfort levels with responding to questions verbally in class versus responding to the poll using their smartphones. Supporting H1, the means showed that students felt more comfortable responding to the poll (M = 5.19, SD = 0.93) than verbally responding to questions (M = 4.40, SD = 1.66), t(57) = 3.89, p < 0.001.

3.2. Intrinsic Motivation and Engagement

To compare students with high and low intrinsic motivation, participants were divided into two groups using a median split (the mean was 5.32 and the median was 5.33). A cut-off point of 5.33 was used; participants whose average intrinsic motivation score was 5.33 or lower were considered low intrinsic motivation group (n = 32; M = 4.58, SD = 0.77) and others were considered high intrinsic motivation group (n = 26; M = 6.22, SD = 0.37), t(56) = 10.54, p < 0.001. Each group’s means and standard deviations for the key measures can be found in Table 1.

| Measures                              | Intrinsic Motivation |       |       |
|---------------------------------------|----------------------|-------|-------|
|                                       | Low                  | High  |
|                                       | Mean (SD)            | Mean (SD) |
| Attitude towards interactive poll     | 4.65 (0.78)          | 6.03 (0.60) *** |
| Class engagement                      | 4.84 (0.95)          | 6.19 (0.75) *** |
| Perceived usefulness on tests         | 4.41 (0.80)          | 5.27 (1.40) ** |
| Perceived learning                    | 4.70 (0.92)          | 5.82 (0.65) *** |
| Useful addition of smartphone in class| 4.84 (1.02)          | 5.65 (1.16) |
| Activity perceived boring             | 3.83 (0.86)          | 3.58 (1.79) |
| Activity perceived distracting        | 3.90 (1.06)          | 3.08 (1.50) * |

Note: * p < 0.05, ** p < 0.01, *** p < 0.001.

A series of analysis of covariance (ANCOVA) was run to test H2 and H3 controlling for self-rated competency in English and self-efficacy in regards to the course because of their potential influences on intrinsic motivation and the dependent measures. The results showed significant differences between those who were high and low in their intrinsic motivation to participate in the interactive polling exercise. Those who showed high intrinsic motivation had more favorable attitudes toward interactive polling (F[1,54] = 35.81, p = 0.00, partial $\omega^2 = 0.38$), found the class more engaging (F[1,54] = 23.45, p = 0.00, partial $\omega^2 = 0.29$), felt they did better on tests because of the polling exercise (F[1,54] = 9.40, p = 0.00, partial $\omega^2 = 0.13$), showed higher level of perceived learning (F[1,54] = 16.17, p = 0.00, partial $\omega^2 = 0.21$) than those who reported low intrinsic motivation. Thus, H2(a), H2(b), H2(c), and H2(d) were supported.

However, there was no significance difference between the two groups on how students evaluated the usefulness of using smartphone in the classroom (F[1,54] = 2.59, p = 0.11, partial $\omega^2 = 0.03$). Therefore, H2(e) was not supported.

3.3. Intrinsic Motivation and the Dark Side of Using Interactive Polling

Students with varying levels of intrinsic motivation did not differ on their responses to the statement on what else they could be doing rather than answering the boring poll (F[1,53] = 0.56, p = 0.46, partial $\omega^2 < 0.01$). Thus, H3(a) was not supported. As predicted, students with low intrinsic motivation felt the classroom polling was more distracting (F[1,53] = 7.85, p = 0.01, partial $\omega^2 = 0.11$) than those with high intrinsic motivation, supporting H3(b).
4. Discussion

EMI in higher education is prevalent and is continuing to increase at universities across the globe \[3,39,40\]. The problem is that, often, there is an imbalance between the instructor’s ability to communicate in English and students who are not fluent speakers of English. This creates a challenge in classrooms where learning the language is not necessarily the focus of study. A significant number of studies examine how to use mobile technology to support language learning \[41–43\]; however, the primary goal of the courses taught in English at college level is for the students to learn the content. Acquiring language skill is merely a secondary goal. Therefore, research that focuses on using EMI to teach a specific content area is needed, and this study contributes to the literature by providing empirical evidence on how instructors can assist student learning of a subject area taught in their non-native language using interactive polling. The increased emphasis on EMI is not restricted to Korean universities. Stakeholders in higher education in other parts of Asian countries including Japan \[44\] and China \[9,20,39,40\] are keen on pedagogical best practices. Thus, the results are applicable to neighboring Asian countries when adopting EMI.

Overall, this study successfully demonstrates the pedagogical value of using personal smartphones for college students to participate in interactive polling activities with the purpose of better engaging students who are taking courses in their non-native language. Students generally had a positive attitude towards the interactive poll, felt the activities made the class engaging, felt they performed better on tests because of the polling exercises, and felt the interactive activities using their smartphones was a useful addition to the class.

Students’ motivation towards interactive polling, however, moderated the effect. Students with high intrinsic motivation towards interactive poll showed a more favorable attitude toward the in-class activity, found the class more engaging, felt they did better on tests because of the polling exercise, and showed higher levels of perceived learning than those who reported low intrinsic motivation. The potential dark side of using smartphones in the classroom was not a critical problem for those with high intrinsic motivation—using smartphones for interactive polling is less distracting for the students with high intrinsic motivation than those with low intrinsic motivation. The varying responses based on motivation suggests that to successfully adopt interactive polling in class, creating interesting and fun exercises is essential to increase intrinsic motivation.

4.1. Practical Implications

First, the results suggest that utilizing technology to encourage student participation enhances learning. Whether instructors should allow the use of technology in the classroom, and to what extent, is a question that still lacks concrete answer. Some studies in the past have demonstrated the downsides of allowing technology use. For example, according to a study conducted with college students in Brazil, minutes spent on mobile phones, and especially during class, significantly reduced a student’s academic achievement \[45\]. On the other hand, using technology is unavoidable when engaging with digital natives \[46\]. The results of this study contribute to the body of knowledge that educators may adopt technology when using EMI to engage students with confidence. Consistent with previous studies \[14,16,47\], students generally showed favorable attitudes toward the use of interactive polling using their smartphones. The concern that allowing smartphone use in classrooms distracts students was found not to be a problem in the current study. One potential explanation is that students are already tech savvy and have formed “hyperconnected relationship” with their devices \[48\] so that multitasking is a natural practice among them. Of course, allowing smartphones or other mobile devices in the classroom without any restriction creates a different classroom climate compared to occasionally using smartphones to participate in polling exercises. Nevertheless, the results of this study do imply that guided use of a mobile device can enhance learning. Instead of banning mobile phone usage, it may benefit the students to experience how smartphones can be used for educational purposes, and more instructional methods need to be developed.
Second, when assigning an in-class activity, attaching points to every task is not always necessary. In the current study, students participated without any external reward (e.g., positive feedback, grade, etc.). Participating in the in-class activity was voluntary and the responses were collected anonymously. In other words, students engaged not for any type of reward but simply to be engaged with the task. Past studies have shown that student autonomy promotes student learning [49] and keeps them more engaged [50]. This leads to the issue of how to motivate the students. In the current study, a novel interactive polling tool was introduced to the students to increase engagement. The key finding here is that students need to have intrinsic motivation for engaging with the activity to maximize perceived learning. While the interactive polling tool used in the study was engaging, it lacked the competition aspect of gamification [51,52] that could further motivate the students and improve academic performance. Searching for and testing pedagogical practices that could add rewards without sacrificing intrinsic motivation is needed.

4.2. Limitations and Future Direction

One limitation of this study is that all measures were self-reported. While this is not problematic for most measures, the measure for competence in English, in particular, may not have provided an accurate assessment of students’ language competency. In future studies, measures such as English language competency or comprehension level could be replaced with standardized testing scores or grades for the course.

Another limitation is that the study was designed with one class. A small sample size was inevitable as only one section of the course was offered in English. As this was a foreseen limitation, the researcher took care to control for measures such as self-efficacy to examine the cause and effect relationship between the use of a smartphone on student learning. Lastly, when adopting and applying the method described in this study, one needs to note that the class was held at a large private university in Korea where English proficiency level is generally high. Nevertheless, students still find active class engagement difficult especially in an EMI setting that lacks instructional aid. A student population with lower English language competency may either benefit more from interactive polling or feel even more distracted, and this will need to be addressed in future studies.

As explained in the method section, the number of times the instructor engaged with students using the interactive polling was limited to two or three times per class period. This resulted in a positive outcome. However, there may be a boundary condition where when it reaches a certain level, too much interaction can become a source of distraction for the students.

Lastly, another recent phenomenon at Korean universities is the rising population of international students from both English-speaking and non-English speaking countries. In a typical undergraduate class, international students may take up anywhere from 10% to as much as almost 50% of the student body. This further complicates learning and engagement in the classroom and, thus, requires further research to assist student learning in such a diverse setting.

5. Conclusions

This study examined the effect of adopting an interactive polling exercise in class and allowing undergraduate students to participate in in-class activities using their own smartphones. The results showed positive effect of interactive polling by demonstrating that students feel more comfortable engaging with the instructor through mediated communication than providing verbal responses. Although students in general felt the interactive polling was a useful addition to the class, this effect was moderated by intrinsic motivation. When students found it enjoyable to participate in the interactive polling, they were more favorable towards the in-class activity. Those who scored high on intrinsic motivation felt more engaged with the class and had a more positive outlook towards their academic achievement than those who scored low. These findings add empirical evidence to the extant literature on SDT by showcasing that intrinsic motivation is key to classroom engagement.
A study has shown that students’ perception of an instructor’s readiness and skills to use a mobile device as an educational tool influences the behavioral intention of using a mobile device during class. Faculty members in higher education have expertise in their subject matter but may not be well trained as facilitators of technology for pedagogical use. Using technology in classrooms does not imply better engagement by default; integrating technology to better facilitate student learning requires careful planning and observation of the students, coupled with appropriate assessment. Therefore, before initiating application of interactive polling in the classroom, institutions should be aware of the faculty members’ capabilities in facilitating the class using technology.

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References

1. Marinoni, G.; de Wit, H. Internationalization of Higher Education in the New Political Climate. Inside Higher Ed. Available online: https://www.insidehighered.com/blogs/world-view/internationalization-higher-education-new-political-climate (accessed on 18 January 2020).

2. Dearden, J. English as a Medium of Instruction—A Growing Global Phenomenon. London: British Council. Available online: https://www.britishcouncil.org/sites/default/files/e484_emi_cover_option_3_final_web.pdf (accessed on 1 November 2019).

3. Oh, K.W. More Korean Universities Offer English-Only Lectures. Korea Herald. Available online: http://www.koreaherald.com/view.php?ud=20140319001185 (accessed on 1 November 2019).

4. Kang, S.; Park, H. English as the medium of instruction in Korean engineering education. Korean J. Appl. Linguist. 2005, 21, 155–174.

5. Kim, E.G.; Yoon, J.R. Korean science and engineering students’ perceptions of English-medium instruction and Korean-medium instruction. J. Lang. Identity Educ. 2018, 17, 182–197. [CrossRef]

6. Young, S.S.C. Integrating ICT into second language education in a vocational high school. J. Comput. Assist. Learn. 2003, 19, 447–461. [CrossRef]

7. Prince, M. Does active learning work? A review of the research. J. Eng. Educ. 2004, 93, 223–231. [CrossRef]

8. Macaro, E.; Curle, S.; Pun, J.; An, J.; Dearden, J. A systematic review of English medium instruction in higher education. Lang. Teach. 2018, 51, 36–76. [CrossRef]

9. Marsh, H.; Hau, K.T.; Kong, C.K. Late immersion and language of instruction in Hong Kong high schools: Achievement growth in language and nonlanguage subjects. Harv. Educ. Rev. 2000, 70, 302–347. [CrossRef]

10. Song, C.-J. A study on the teaching and learning activities, student-teacher communication, and course satisfaction. Asian J. Educ. 2014, 15, 171–200. [CrossRef]

11. Lee, H.-J.; Lee, J.; Makara, K.A.; Fishman, B.J.; Teasley, S.D. A cross-cultural comparison of college students’ learning strategies for academic achievement between South Korea and the USA. Stud. High. Educ. 2017, 42, 169–183. [CrossRef]

12. Hunsu, N.J.; Adesope, O.; Bayly, D.J. A meta-analysis of the effects of audience response systems (clicker-based technologies) on cognition and affect. Comput. Educ. 2016, 94, 102–119. [CrossRef]

13. Brady, M.; Seli, H.; Rosenthal, J. “Clickers” and metacognition: A quasi-experimental comparative study about metacognitive self-regulation and use of electronic feedback devices. Comput. Educ. 2013, 65, 56–63. [CrossRef]

14. Kappers, W.M.; Cutler, S.L. Poll everywhere! Even in the classroom: An investigation into the impact of using Poll Everywhere in a large lecture classroom. Comput. Educ. J. 2015, 6, 140–145.

15. Song, Y.; Kong, S.C. Affordances and constraints of BYOD (Bring Your Own Device) for learning and teaching in higher education: Teachers’ perspectives. Internet High. Educ. 2017, 32, 39–46. [CrossRef]

16. Stowell, J.R. Use of clickers vs. mobile devices for classroom polling. Comput. Educ. 2015, 82, 329–334. [CrossRef]

17. Beauvois, M.H. Computer-assisted classroom discussion in the foreign language classroom: Conversation in slow motion. Foreign Lang. Ann. 1992, 25, 455–464. [CrossRef]

18. Niu, W.; Sternberg, R.J. Societal and school influences on student creativity: The case of China. Psychol. Sch. 2003, 40, 103–114. [CrossRef]
19. De Waelsche, S.A. Critical thinking, questioning and student engagement in Korean university English courses. *Linguist. Educ.* **2015**, *32*, 131–147. [CrossRef]

20. Tran, T.T. Is the learning approach of students from the Confucian heritage culture problematic? *Educ. Res. Policy Pract.* **2013**, *12*, 57–65. [CrossRef]

21. Deci, E.L.; Ryan, R.M. *Intrinsic Motivation and Self-Determination in Human Behavior*; Plenum: New York, NY, USA, 1985.

22. Deci, E.L.; Vallerand, R.J.; Pelletier, L.G.; Ryan, R.M. Motivation and education: The self-determination perspective. *Educ. Psychol.* **1991**, *26*, 325–346.

23. Pintrich, P.R. A motivational science perspective on the role of student motivation in learning and teaching contexts. *J. Educ. Psychol.* **2003**, *95*, 667–686. [CrossRef]

24. Deci, E.L.; Ryan, R.M. *Handbook of Self-Determination Research*; University of Rochester Press: Rochester, NY, USA, 2002.

25. Deci, E.L.; Koestner, R.; Ryan, R.M. A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychol. Bull.* **1999**, *125*, 627–668. [CrossRef]

26. Nora, A.; Snyder, B.P. Technology and higher education: The impact of e-learning approaches on student academic achievement, perceptions and persistence. *J. Coll. Stud. Retent. Res. Theory Pract.* **2008**, *10*, 3–19. [CrossRef]

27. Gikas, J.; Grant, M.M. Mobile computing devices in higher education: Student perspectives on learning with cellphones, smart phones & social media. *Internet High. Educ.* **2013**, *19*, 18–26.

28. Wang, Y.S.; Wu, M.C.; Wang, H.Y. Investigating the determinants and age and gender differences in the acceptance of mobile learning. *British J. Educ. Technol.* **2009**, *40*, 92–118. [CrossRef]

29. Hawi, N.S.; Samaha, M. To excel or not to excel: Strong evidence on the adverse effect of smartphone addiction on academic performance. *Comput. Educ.* **2016**, *98*, 81–89. [CrossRef]

30. Cheon, J.; Lee, S.; Crooks, S.M.; Song, J. An investigation of mobile learning readiness in higher education based on the theory of planned behavior. *Comput. Educ.* **2012**, *59*, 1054–1064. [CrossRef]

31. Wood, E.; Zivcakova, L.; Gentile, P.; Archer, K.; dePasquale, D.; Nosko, A. Examining the impact of off-task multi-tasking with technology on real-time classroom learning. *Comput. Educ.* **2012**, *58*, 365–374. [CrossRef]

32. Pashler, H. Dual-task interference in simple tasks: Data and theory. *Psychol. Bull.* **1994**, *116*, 220–244. [CrossRef]

33. Barak, M.; Lipson, A.; Lerman, S. Wireless laptops as means for promoting active learning in large lecture halls. *J. Res. Technol. Educ.* **2006**, *38*, 245–263. [CrossRef]

34. Bugeja, M.J. Distractions in the wireless classroom. *Chron. High. Educ.* **2007**, *53*, C1–C4.

35. Buil, I.; Catalán, S.; Martínez, E. Do clickers enhance learning? A control-value theory approach. *Comput. Educ.* **2016**, *103*, 170–182. [CrossRef]

36. Clément, R.; Dörnyei, Z.; Noels, K.A. Motivation, self-confidence, and group cohesion in the foreign language classroom. *Lang. Learn.* **1994**, *44*, 417–448. [CrossRef]

37. Bandura, A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychol. Rev.* **1977**, *84*, 191–215. [CrossRef][PubMed]

38. Pintrich, P.R.; de Groot, E.V. Motivational and self-regulated learning components of classroom academic performance. *J. Educ. Psychol.* **1990**, *82*, 33–40. [CrossRef]

39. Guo, H.; Tong, F.; Wang, Z.; Min, Y.; Tang, S. English-vs. Chinese-medium instruction in Chinese higher education: A quasi-experimental comparison. *Sustainability* **2018**, *10*, 4230. [CrossRef]

40. Lin, T.; He, Y. Does bilingual instruction impact students’ academic performance in content-based learning? Evidence from business school students attending bilingual and L1 courses. *Sustainability* **2019**, *11*, 263. [CrossRef]

41. Abdous, M.H.; Camarena, M.M.; Facer, B.R. MALL technology: Use of academic podcasting in the foreign language classroom. *ReCALL* **2009**, *21*, 76–95. [CrossRef]

42. Hong, J.C.; Hwang, M.Y.; Tai, K.H.; Chen, Y.L. Using calibration to enhance students’ self-confidence in English vocabulary learning relevant to their judgment of over-confidence and predicted by smartphone self-efficacy and English learning anxiety. *Comput. Educ.* **2014**, *72*, 313–322. [CrossRef]

43. Viberg, O.; Grönlund, Å. Cross-cultural analysis of users’ attitudes toward the use of mobile devices in second and foreign language learning in higher education: A case from Sweden and China. *Comput. Educ.* **2013**, *69*, 169–180. [CrossRef]
44. Aizawa, I.; Rose, H. An analysis of Japan’s English as medium of instruction initiatives within higher education: The gap between meso-level policy and micro-level practice. *High. Educ.* **2018**, *77*, 1125–1142. [CrossRef]

45. Felisoni, D.D.; Godoi, A.S. Cell phone usage and academic performance: An experiment. *Comput. Educ.* **2018**, *117*, 175–187. [CrossRef]

46. McArthur, J. Composing podcasts: Engaging digital natives in the communication classroom. *Commun. Teach.* **2009**, *23*, 15–18. [CrossRef]

47. Andergassen, M.; Guerra, V.; Ledermüller, K.; Neumann, G. Browser-based mobile clickers: Implementation and challenges. In *Proceedings of the IADIS International Conference—Mobile Learning*; IADIAS Press: Berlin, Germany, 2012; pp. 189–196.

48. Jiang, J. How Teens and Parents Navigate Screen Time and Device Distractions. Available online: [http://www.pewinternet.org/2018/08/22/how-teens-and-parents-navigate-screen-time-and-device-distractions/](http://www.pewinternet.org/2018/08/22/how-teens-and-parents-navigate-screen-time-and-device-distractions/) (accessed on 1 November 2019).

49. Ryan, R.M.; Deci, E.L. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am. Psychol.* **2000**, *55*, 68–78. [CrossRef] [PubMed]

50. Niemiec, C.P.; Ryan, R.M. Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Sch. Field* **2009**, *7*, 133–144. [CrossRef]

51. Hanus, M.D.; Fox, J. Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Comput. Educ.* **2015**, *80*, 152–161. [CrossRef]

52. Kyewski, E.; Krämer, N.C. To gamify or not to gamify? An experimental field study of the influence of badges on motivation, activity, and performance in an online learning course. *Comput. Educ.* **2018**, *118*, 25–37. [CrossRef]