THE INFLUENCE OF INTERACTION APPS ON TEACHER-PARENT INTERACTION PATTERNS IN AN ELEMENTARY-LEVEL ENGLISH CLASS

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Abstract

Good teacher-parent communications are associated with better academic performance and reduced failure rates for lower-achieving students in American schools, and teacher-parent interactions are correlated with children's language learning (Kraft & Rogers, 2015). Traditionally, paper homebooks (the booklets used to inform parents of their children's daily homework), phone calls, and PTA meetings improve teacher-parent communications. However, how teacher-parent interactions are affected by e-homebooks or interaction apps is under-investigated. This study explores how teacher-parent interactions are influenced by interaction apps in an elementary-level English class in Taiwan. Nineteen students and their parents participated in this study for one semester. Three apps, AppleTree, ClassDojo, and ClassTing, were studied. Online observations and surveys were used to collect data. Findings show that employing teacher-parent interaction apps encourages parent engagement and changes parental involvement from the collaborative pattern (positive and direct) to the compromising pattern (positive but indirect). Although technology in teacher-parent teacher communications seems to have a positive effect on directing parents' attention to students' schoolwork, developing more constructive communication between English teachers and parents remains an issue. Furthermore, the culture of app designers might be unconsciously embedded in app design and might reshape users' parental involvement.

Abstract in Chinese

美國的教育研究指出，良好的親師溝通能有效提升，低學業成就學生的學業成績與通過率。而親師互動也的確會影響學生的語言學習 (Kraft & Rogers, 2015)。傳統上，家庭聯絡簿、電話、以及親師座談會是親師溝通的主要管道。然而，在現代科技發達的社會，親師溝通的成效如何受到使用電子聯絡簿的影響，卻是少有研究。這個研究的研究主題，即是針對電子聯絡簿如何在台灣國小的英語課程，影響親師互動。19位國小學童以及他們的父母，被邀請來參加這個為期一學期的研究。三種電子聯絡簿應用軟體：AppleTree, ClassDojo, 和ClassTing，在這個研究當中使用。網路觀察以及問卷是主要的研究資料蒐集方法。研究結果顯示使用電子親師聯絡簿確能增進親師互動，但也使得親師互動類型從由合作(正向而直接)溝通類型居多，轉為妥協(正向而間接)得溝通類型居多，雖然使用科技應用軟體的確吸引了更多父母與國小英語教師的溝通互動，並花更多時間注意孩子的功課，但如何在英語教師與家長使用電子溝通應用程式的同時，發展出有效而具建設性的溝通內容，仍是待研究的課題。

Keywords: parental involvement, interaction apps, English learning, elementary school, teacher-parent communications

The Influence of Interactions Apps on Teacher-Parent Interaction Patterns in an Elementary-Level English Class

Abundant studies have shown that enhancing teacher-parent communication is strongly correlated with the improvements of grade-school students' academic performance (Cheung & Pomerantz, 2011; Kraft & Rogers, 2015). In addition, language learning researchers have long paid attention to language stimuli provided at home and the relationship between home and school literacy environments (Heath, 1983; Heath & Street, 2008; Street, 2003; 2008).

Plenty of educational research shows that teacher-parent interactions have significant impacts on children's language learning. Therefore, improving connections between teachers and parents should be a major concern of English teachers. Traditional methods to connect teachers and parents in Taiwanese public schools include paper homebooks, phone calls, and PTA meetings. In recent years, accompanying the advancements of technological devices, many untraditional e-homebooks and interaction apps have been largely used by schoolteachers in Taiwan. Nevertheless, the questions of if the technological devices really enhance parental participations on their children's schoolwork and of how teacher-parent interaction patterns are influenced by the interaction apps is still unanswered. To this end, this research is intended to investigate how teacher-parent interaction patterns are affected by different interaction apps in an elementary-level English class in Taiwan. Nineteen students and their parents participated in this study for one semester. Three apps, AppleTree, ClassDojo, and ClassTing were employed in this study. Online observations and two surveys were used to collect numerical data. The overarching questions in the current study are as follows: (a) What are the usage frequencies of the adopted 3 interaction apps in this study? (b) How are the teacher-parent interaction patterns influenced by the 3 apps?

Literature Review

In order to understand the questions better, this literature review provides reviews of studies on parental involvement, models of teacher-parent interactions, and channels of teacher-parent interactions. A brief introduction of the three apps adopted in this study is also presented.

Parental Involvement

The correlations between parental involvement and student performance have been richly documented in the research literature (Behrman, Parker, Todd, & Wolpin, 2015; Cheung & Pomerantz, 2011; Fan & Chen, 2001; Houtenville & Conway, 2008; Kraft & Rogers, 2015). Most previous literature indicates that parental involvement is a good predictor of children's performance at school. In other words, if better communications can be built up between teachers and parents, students' higher academic performance can be anticipated. However, research evidence also shows that schools in many places, including the US and Taiwan, generally fail to fully engage parents and to provide them with information about their children's learning in school (Lamy, 2013; Chang, 2000). It seems to be crucial for educational researchers to put efforts into enhancing parental involvement by identifying barriers (Network, 2004) and creating connections (Kraft & Rogers, 2015).

Parental involvement also plays a significant role in children's language learning and development by shaping the literacy environment and literacy practices in their homes (Heath, 1983; Hsin, 2011). In Glynn and Glynn's (1986) study, interventions were given to investigate the effectiveness of shared reading by Cambodian mothers and children learning English as a second language in New Zealand. Results show that during a shared reading program (mothers and daughters reading together) the mothers and children introduced to shared reading in a multiple-baseline, cross-subjects design markedly increased their rate of progress through book levels.

Sénéchal and LeFevre (2002) researched early home literacy experiences that classified two kinds of parental involvement at home, informal literacy practices, including shared book reading to promote children's vocabulary growth, and formal literacy practices, including teaching children the sounds and names associated with letters, correlated to their later literacy development. Hess and Holloway (1984) noted five areas of parental involvement associated with children's literacy development: value placed on literacy, press for achievement, availability and instrumental use of reading materials, reading with children, and opportunities for verbal interaction. Most previous studies show that parental involvement also plays an important role in children's language and literacy learning.

However, there are reports identifying barriers for parents to regularly be involved with their children's schoolwork. In the US, the National Coalition for Parent Involvement in Education (NCPIE) (Network, 2004) identified five barriers that hinder American parents from becoming involved with their children's education. These barriers include limited English ability, limited literacy, economic disadvantage, and racial and ethnic minority background. This report reinforces that interventions and assistance for teacher-parent communications for parents from different backgrounds are needed.

Parental involvement plays a critical role in every aspect of children's learning. Furthermore, for language learning, better teacher-parent communications can help parents to shape a better home language environment full of adequate linguistic stimuli. Constructive teacher-parent communications and connections can facilitate children's English learning. Nevertheless, there are still predicaments that prevent parents from maintaining good communications with teachers. Interventions designed to strengthen communication is needed.

Models of Teacher-Parent Interactions

To create an effective intervention of parental involvement, it is necessary to first understand patterns of teacher-parent interventions. In Power and Bartholomew's (1987) ecological analysis of family-school relationship patterns, they identify avoidant, competitive, merged, one-way, and collaborative relationship patterns. They also conclude that effective interventions must balance ecological analysis with sociocultural influences in developing strategies for change.

Swap's (1993) "Developing Home-School Partnerships: From Concepts to Practice" reviews the practical ideas offered to help educators move toward school and family partnerships. Important distinctions are drawn in approaches that avoid or promote full partnerships. In this book, the school and family partnership models include a protective model, a school-to-home transmission model, a curriculum enrichment model, and a partnership model. Swap concludes that the partnership model is a better and more responsive approach that enables schools to implement a comprehensive program of school and family connections.

Whitehead (1988) proposes a framework for determining the importance of cohesion and communication between families and day care. The four types of teacher-parent partnership identified are high cohesion/high communication, low cohesion/high communication, high cohesion/low communication, and low communication/low cohesion. It is suggested by the author that high cohesion and communication are desirable for parents of infants or families of children with special needs, while decreasing cohesion with continued high communication may be appropriate as children grow older.

Chang (2000) categorizes teacher-parent interactions into direct and indirect patterns based on methods of involvement for Taiwanese parents. The factor of attitude adds a new dimension to these patterns. Chang therefore proposes four sub-categories, including compliant, compromising, collaborative, and conflicting, in the instruments for teacher-parent interaction models by mixing the two factors, involvement and attitude. Detailed explanations of each model are provided in the following subsections.

Collaborative

This is the pattern in the dimension of direct involvement and a positive attitude. Teachers and parents in this pattern interact often and closely. Parents are frequently involved in class affairs and discuss children's issues with a positive attitude in the hope that their children can receive better education. This is regarded by Chang as the healthiest teacher-parent interaction pattern for Taiwanese parents. Teachers and parents can work together in a cordial atmosphere under this interaction pattern.

Conflicting

This is the pattern in the dimension of direct involvement but a negative attitude. Parents belonging to this pattern usually disagree with the teachers or even show strong and apparent disapproval. The conflicts of teachers and parents might show apparently and sometimes it slows down the teacher-parent cooperation.

Compromising

This is the pattern in the dimension of indirect involvement but a positive attitude. Parents of this pattern usually allow teachers to make any decision at school as long as nothing harmful happens to their children. They do not actively participate in school activities. Under this pattern the parents neither show their eagerness to participate in improving their children's schoolwork nor interfering the teachers' teaching. The parents' attitude might make the teachers feel helpless even though they are not harmful.

Compliant

This is the pattern in the dimension of indirect involvement but a negative attitude. Parents of this pattern usually disapprove of teachers. However, they are reluctant to express their opinions to teachers directly. Under this pattern the parents are generally reluctant to work with the teachers to improve their children's schoolwork because from their hearts the parents disapprove of the ways the teachers teach.

Chang's (2000) self-designed survey (Appendix 2) for quantitatively estimating these four teacher-parent interaction models was also employed in this study. This instrument was designed especially for parents in Taiwan. This survey contains three main questions for the parents: (a) When you disagree with the teacher, what will you do? (b) When you disapprove your children's homework assigned by the teacher, what will you do? (c) When you disapprove the teacher's class managements and disciplinary rules, what will you do?

Table 1: Interaction model

		Attitude	
		Positive	Negative
Involvement	Direct	Collaborating	Conflicting
	Indirect	Compromising	Compliant

Channels for Teacher-Parent Interactions

Because of the fast development of communication technologies, traditional paper communications have been gradually replaced by e-communications. Accompanying fast-changing technological devices, in addition to the traditional tools such as paper homebooks, phone calls, and visits, there have been efforts from schools to adopt a larger variety of tools, such as texting systems, websites, and apps, to contact and engage parents (Chen, Yu, & Chang, 2007; Chena & Chena, 2015).

Chen, Yu, and Chang (2007) found that their self-designed e-homebook system provided a place for students, parents, and teachers to communicate, implemented an integrated performance measurement method, and conducted a better teaching strategy support interface for elementary education. Research supports that modern technologies might be used as an efficient tool to enhance teacher-parent communications so that general school performance and student behaviour might be improved. However, the question how teacher-parent communications are affected by interaction interfaces remains unanswered.

Three Apps for Teacher-Parent Interactions

The three apps used in this study, AppleTree, ClassDojo, Classting, were selected because of their innovation, compatibility, and observable nature. The three apps are all designed for the

teacher-parent interactions, not for teacher-student or student-parent interactions. The three apps are described in detail in the following sections.

AppleTree

AppleTree is a free online communication platform between elementary schoolteachers and parents and is available on IOS, Android, and web. It was designed by an American company, Chatter, Inc. According to the homepage of the platform (https://www.goappletree.com/about), it was designed for the purpose of facilitating critical connections between teachers and parents, simplifying teachers' communication responsibilities, and helping teachers build the support system a student needs to succeed.

AppleTree's key features include private and group messaging, a fully integrated calendar, interactive volunteer invites, one-touch progress reports, instant updates with photos and videos, and emergency alerts. Teachers can easily send communications from their handheld devices or desktops, and parents receive them however they prefer: in the AppleTree app, via email, or via SMS (https://www.goappletree.com).
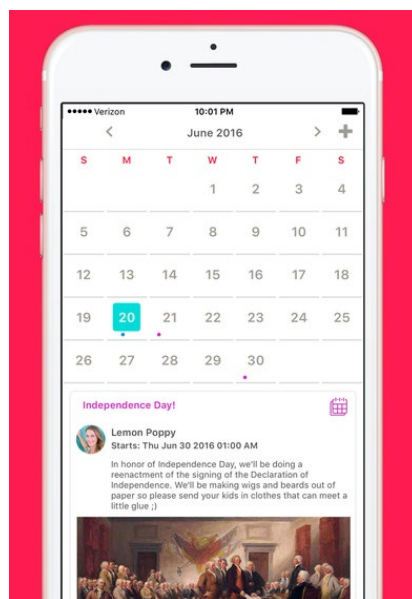

Figure 1. AppleTree on iOS

ClassDojo

ClassDojo is a free communication app for K-8 schools that allows parents to view their kids' work at school. It is one of the most popular teacher-parent interaction apps in the US. The designers aim to connect teachers, parents, and students who use it by sharing photos, videos, and messages throughout the school day. With this feature, the designers hope that children's growth mindsets and empathy will both be developed in the connection process. According to a company report (https://www.classdojo.com/zh-tw/learnmore/?redirect=true), it has been actively used in 90% of American K-8 schools and in over 180 countries. Its interface has been translated and used in 35 languages, including Chinese. The Chinese platform is easier for the Taiwanese parents to understand. ClassDojo comprises the following features:

- Classroom: Classroom is where teachers and students build their classroom culture. They choose skills and values, things like creativity or teamwork, and share feedback on progress with each other.
- Messages: Messages allows teachers, parents, and school leaders to instantly message each other. Messages can be translated into 35 different languages, and Quiet Hours lets teachers set away times so parents know when they are not available.
- Stories: Stories are instantly updated streams of pictures and videos from the school day. Every class, school, and student has their own Story, all of which are shared with

parents. Stories can be separated into School Stories (for school leaders), Class Stories (for the teachers and parents), and Student Stories (students' portfolios of each day).

- Big Ideas: Big Ideas provide ways for teachers and parents to access original content that helps students learn about important concepts and socio-emotional skills.

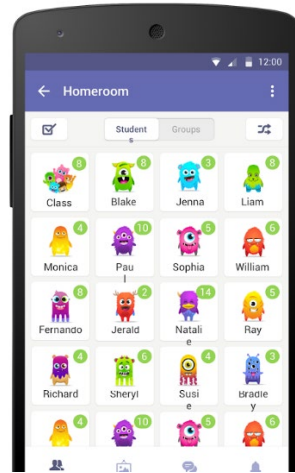(https://www.classdojo.com/zh-tw/?redirect=true)

Figure 2. ClassDojo

ClassTing

ClassTing is an SNS (social network site) application developed by a former elementary school teacher in South Korea. Its features allow students to share notes, photos, and videos with parents and teachers by using smart devices and computers, and students can also send private or anonymous messages to their teachers. The major features of ClassTing are a message board on which members can post their opinions or thoughts, a news board on which teachers can announce classroom news or information, a photo album, and a video room for sharing video clips (Khine, 2015).

ClassTing has become the most popular SNS learning platform in South Korea. There are more than 2 million users in South Korea, and the app designers have also developed an English platform via a partnership with UCLA CREST (https://www.newswire.com/press-release/classting-koreas-largest-ed-tech-startup-brings-social-based). In addition, its Chinese platform has also been successfully launched. Its basic features are free, but users need to pay for using extra features. ClassTing is very secure as well.

Figure 3. ClassTing

Table 2: Comparison of AppleTree, ClassDojo, and ClassTing

Features	AppleTree	ClassDojo	ClassTing
Send protected private messages to parents	✓	✓	✓
	Individual and group	Individual and group	Individual and group
Post parent feedback to teachers	✓ (Can be turned off)	✓	✓
Send group messages	✓	✓	✓
Share photos, videos, and files	✓	✓	✓
Communicate immediately with all users		✓	
Send class announcements in text form	✓		✓
Send announcements on app message boards	✓	✓	✓
Send announcements via email	✓		✓
Translate messages	7 European languages, no Chinese	Integrated with Google translate	English, Japanese, Korean, Spanish, and Chinese
Class calendar	✓		
Call for volunteers or a PTA conference	✓		
A layout similar to popular social media apps, such as Facebook	✓	✓	✓
Pricing	Free	Free	Free (for basics)
Android	✓	✓	✓
iOS	✓	✓	✓
Website	✓	✓	✓

Current Study

This study is designed to specify how teacher-parent interaction patterns are influenced by the web-based interaction interfaces of AppleTree, ClassDojo, and ClassTing and determine what implied meanings can be derived for English educators as well as for app designers. To this end, this study adopts a quantitative approach by delivering two surveys for parents to record the view frequencies and conducting pre- and post-tests of teacher-parent collaboration patterns. The school administrators generally welcome educational experiments to be conducted in the school. However, they limit the number of the experimental class to one only.

Settings

A medium-sized elementary school in central Taiwan was invited to participate in this study. The settings are described as in the following sections. Due to the limited number of class the school agrees upon, there is no control group used in this study.

School Population

The school was built more than 20 years ago in a suburban area in Taiwan. The student population is 750 and there are 60 staff members, including teachers and administrators. The average student number in each class is 25.

Parents

Most parents hold bachelor's degrees. The percentage of bachelor holders in the age group 25-34 is as high as 71.1% in Taiwan (Dec. 24, 2017, The Merit Times). The most common communication channels between teachers and parents are paper homebooks, PTA meetings, or messages forwarded by the PTA to the school.

Participants

The participating class was the one class of nineteen fourth graders that was randomly assigned into three groups. Each group adopted either AppleTree, ClassDojo, or ClassTing: six used AppleTree, six used ClassDojo, and seven used ClassTing.

Teacher Lu is the English teacher of this participating class and a graduate from a university of education in Taiwan. She had six years of teaching experience prior to this study and exclusive to this school. Although Teacher Lu graduated from a university of education, she had never taken a course relevant to teacher-parent interactions. Her skills for communicating with the parents, according to her own descriptions, were acquired through *learning by doing*.

The Used Features of the Three Apps

Because of the different features provided by the three different apps, how the apps were used in this study varied slightly. The used features of AppleTree, ClassDojo, and ClassTing are illustrated in the following sections.

AppleTree

AppleTree is an integrated interactive app for teachers and parents. Its features comprise a message board, class calendar, and private messages to parents.

- Message board: If there were any excellent groups or individual performances in class, they would be posted here. The contents of the events on the class calendar are also shown here.
- Class calendar: This class had English classes on every Monday, Wednesday, and Friday. Homework after these three weekdays were marked on the class calendar. The announcement of all forms of English competitions were also included here.
- Private messages to parents: If there were any improper situations with students, such as turning in homework late, the teacher could privately message parents to help them understand what happened.

ClassDojo

The unique feature of ClassDojo is that student reports are shared with parents daily. Parents can see their children's feedback and portfolios at home and be connected to the teacher and the school. The functions of ClassDojo employed in this study included student reports, message boards, and private messages to parents.

- Student reports: The teacher can share student reports with individual parents.
- Message board: If there are any excellent groups or individual performances in school, they would be posted here. The contents of the events on the class calendar are also shown here.
- Private messages to parents: If there were any improper situations with students, such as turning in homework late, the teacher could privately message parents to help them understand what happened.

ClassTing

ClassTing is a useful tool for a modern *flipped classroom* due to the fact that it is easy to post supplementary links for students. One of its functions, the private counseling room, enriches communications between teachers and parents. The features of ClassTing employed in this

study included posting supplementary links, the message board, and the private counselling room.

- Posting supplementary links: The teacher posted the weekly course schedule in advance and posted the excellent performances of groups or individuals and information about English contests.
- Message board: The teacher posts homework and dates of examinations here.
- Private counselling room: If there were any improper situations with students, such as turning in homework late, the teacher could privately message parents to help them understand what happened.

Interaction activities

Regularly Updated Posts

The researchers created different accounts on the apps for the English teacher so the researchers could have access to and assist with updates in the apps. The class posts were updated every other week. The researchers would help to upload photos, videos, and documents to the apps after English classes. All updates on the apps were the same or similar. The tasks of regular updates included posting new announcements, updating class photos, checking and replying to feedback from parents, posting announcements for teachers from other classes, and remaking the app homepages to fit the needs of the participating class.

Table 3: Schedule of Updates

Number	Date of updates	Contents
1	Oct. 17, 2016	Greetings
2	Oct. 21, 2016	Homework and test
3	Oct. 25, 2016	Homework and test
4	Oct. 30, 2016	Promotion of Halloween activities (photos)
5	Nov. 5, 2016	Test
6	Nov. 10, 2016	Homework
7	Nov. 18, 2016	Class photos and test
8	Nov. 22, 2016	Class photos
9	Nov. 25, 2016	Test
10	Nov. 28, 2016	Homework
11	Dec. 2, 2016	Class photos
12	Dec. 9, 2016	Class photos
13	Dec. 14, 2016	Class photos and homework
14	Dec. 16, 2016	Homework
15	Dec. 23, 2016	Class photos
16	Dec. 30, 2016	Class photos and test
17	Jan. 2, 2107	Acknowledgments to parents

Online Observations

Online observation data comprised feedback from parents and view frequency and number of likes for every post. Feedback from the parents was checked and recorded regularly. View frequency and number of likes for each post was recorded every other week.

Instruments

Two surveys were used to measure the influence of the three teacher-parent interaction apps on teacher-parent interaction patterns: a background survey of parents and Internet and app use (see Appendix 1) and the instrument (see Appendix 2) for the interaction models. The first survey was sent to every parent at the beginning of the semester and collected one week later. The second survey was sent to the parents in the fourth week; the interaction model survey was conducted twice, at the outset and the end of the study. This survey was designed by Chang (2000) especially for the purpose of quantitatively investigating different teacher-parent interaction models in Taiwan. It covers three main questions: (a) When you disagree with the

teacher, what will you do? (b) When you disapprove your children's homework assigned by the teacher, what will you do? (c) When you disapprove the teacher's class managements and disciplinary rules, what will you do?

In Chang's study, the Cronbach α test was used to measure the internal reliability of the survey, and the result was 0.9031, indicating that the instrument has excellent internal reliability.
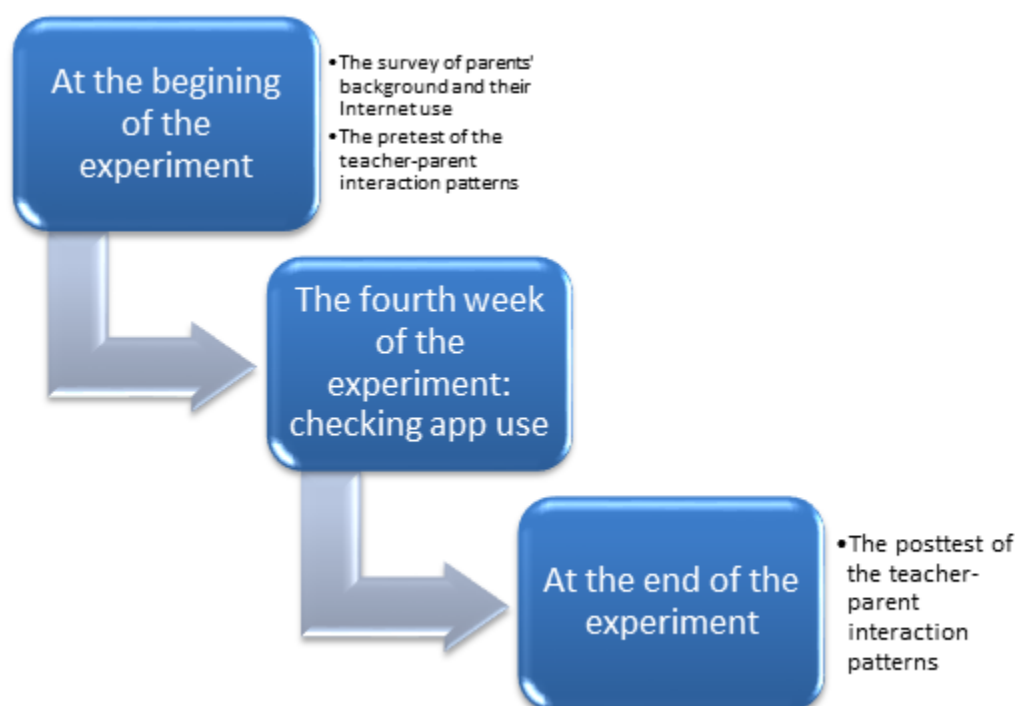

Figure 4. Survey schedule

Findings

There are several significant findings from the two surveys, the app records of the numbers of likes and views, and the comparison of the pre-test and post-test on teacher-parent interaction patterns. The results indicate first that parents have similar occupational backgrounds (see Table 4). Second, parents have common Internet use habits, and the majority of them use the Internet either every day or five to six days a week. Third, ClassDojo shows the highest app use frequency. ClassTing shows a waning curve of app use frequency while ClassDojo and AppleTree show ascending use. Fourth, the numbers of parents belonging to the collaborative pattern for all three apps show obvious growth in the compromising pattern after the experiment; ClassTing showed the most significant growth in the compromising pattern. This obvious change of teacher-parent interaction patterns might indicate that employing the teacher-parent interaction apps changed parental involvement from positive and direct to positive but indirect. How to develop constructive communications between English teachers and parents remains the crucial issue even after the technological tools are adopted.

Parents' Backgrounds

The survey about parents' occupations were sent to all participating parents prior to the experiment. All the nineteen parents returned valid answers. The results are shown in the following table.

Table 4: Survey results of parents' occupations

Occupation	Government Employees	Businessmen	Blue-Collar Workers	Service Industry	Housekeeping	Other	Total
Father	1 (5.3%)	1 (5.3%)	4 (21%)	0	0	1 (5.3%)	7 (36.9%)
Mother	0	2 (10.5%)	2 (10.5%)	4 (21%)	3 (15.8%)	1 (5.3%)	12 (63.1%)
Total	1 (5.3%)	3 (15.8%)	6 (31.5%)	4 (21%)	3 (15.8%)	2 (10.5%)	19 (100%)

Parents' occupations mostly fall into the categories of blue-collar workers and service industry workers. Most of the families came from the middle or lower SES (socio-economic status classes.

Parents' Internet use Habits and App Use Frequencies

In the fourth week of the study, a question was delivered to the parents to understand their Internet use habits and app use frequencies. All nineteen parents replied. The results are shown as in the following table.

Table 5: Parents' Internet use habits and app use frequency/week

		Every Day	5~6 Days/Week;	3~4 Days/Week;	1~2 Days/Week;	Seldom
AppleTree	Internet use frequency	4 (66.6%)	1 (16.7%)	0	0	1 (16.7%)
	App use frequency	0	1 (16.7%)	1 (16.7%)	2 (33.3%)	2 (33.3%)
ClassDojo	Internet use frequency	6 (100%)	0	0	0	0
	App use frequency	2 (33.3%)	0	1 (16.7%)	2 (33.3%)	1 (16.7%)
ClassTing	Internet use frequency	6 (85.7%)	0	0	1 (14.3%)	0
	App use frequency	0	0	1 (14.3%)	1 (14.3%)	5 (71.4%)

This middle-phased questioning results show that most parents had a common Internet use habit, app use frequencies are all lower than Internet use frequencies, and parents using ClassDojo had the highest app use frequencies. The majority of parents had frequent Internet use habits (AppleTree 66.6% every day and 16.7% 5-6 days/week; ClassDojo 100% every day; ClassTing 85.7% every day). Nevertheless, the use frequencies for the three apps were generally lower than were general Internet use frequencies. ClassDojo had the highest app use frequency (33.3% every day, 16.7% 3-4 days/week, 33.3% 1-2 days/week, and 16.7% seldom). AppleTree was second-highest (16.7% 5-6 days/week, 16.7% 3-4 days/week, 33.3% 1-2 days/week and 33.3% seldom). ClassTing had the lowest frequency (14.3% 3-4 days/week, 14.3% 1-2 days/week and 71.4% seldom).

Number of Likes and App View Frequencies

The following figures show the numbers of likes for a post and the view frequencies for AppleTree, ClassDojo, and ClassTing. ClassDojo and ClassTing can show view frequencies from the teacher's and researcher's accounts, but AppleTree lacks this feature. The results indicate that most parents followed the teacher's posts regularly but did not necessarily like posts initiate online conversations with the teacher. ClassDojo had the highest app use frequency. ClassTing shows a waning curve of app use frequency in contrast to the ascending curves of the other two apps.
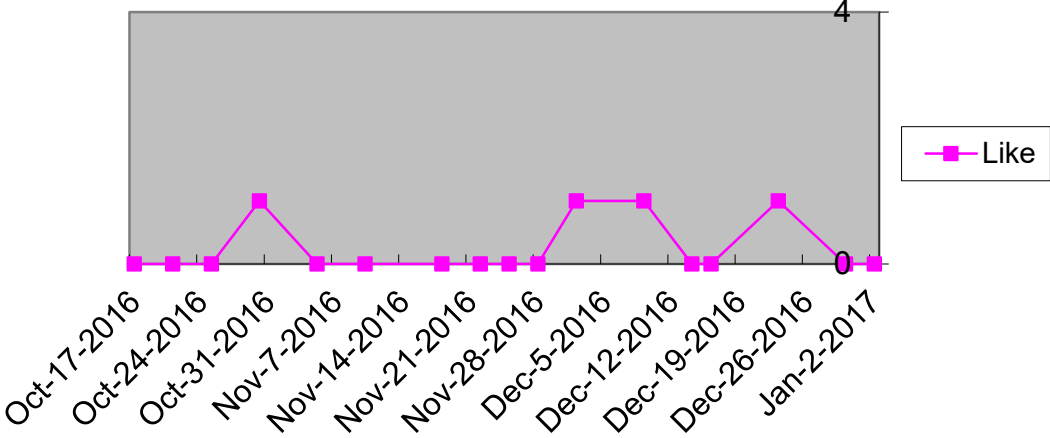

Figure 5. Numbers of *Post like* on AppleTree

In the above figure, only four days received likes (30 October and 2, 9, and 23 December), and all four days featured class photos (see Table 3). This indicates that parents are more responsive when posts include photos. Overall, the like curve on AppleTree increased during the experiment.
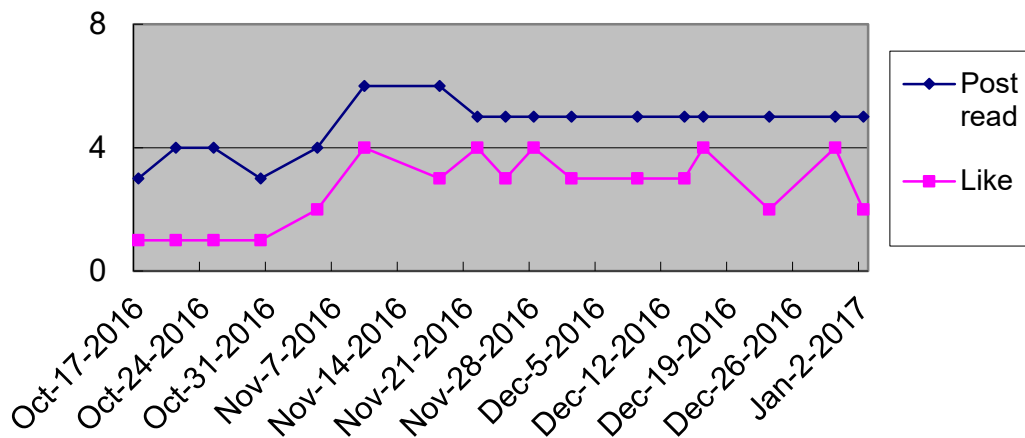

Figure 6. Number of *like* and view frequencies on ClassDojo

ClassDojo shows the number of likes on each post and the number of people who have read each post. In the first several weeks, the numbers of likes and the number of read posts were not high but were rising. This implies that parents went through an adjustment stage when first using the app. The numbers peaked on 10 and 18 November and then were stabilized as five to the end.
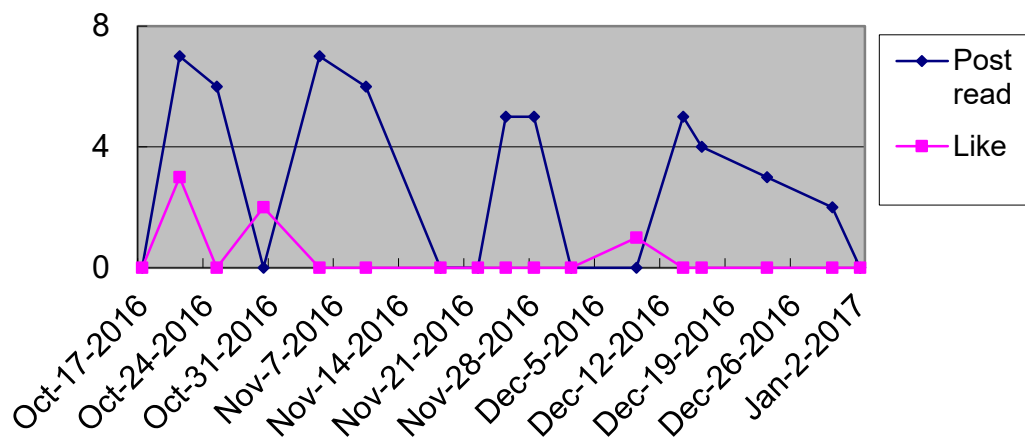

Figure 7. Number of *post read* and *like* on Classting

ClassTing shows the number of likes on every post and the number of people who have read every post. On ClassTing, the numbers of likes and post reads were highest in the initial periods and gradually declined. This decreasing curve was in contrast to the increasing curves of the other apps.

Consistent Changes to Interaction Tendencies

The results of the pre-test and post-test of the teacher-parent interaction patterns show three consistent changes: the number of parents following the collaborative pattern reduced with all three apps, the number of parents following the compromising pattern increased with all three apps, and ClassTing showed the most significant growth for the compromising pattern (from

14.3% to 71.4%). ClassTing was the most influential app in regards to changing teacher-parent interaction patterns, though it did so passively instead of openly or constructively.

Table 6: Results of teacher-parent interaction patterns

App		Compliant	Collaborative	Conflicting	Compromising
AppleTree	Pretest	1 (16.7%)	4 (66.6%)	0	1 (16.7%)
	Posttest	1 (16.7%)	3 (50%)	0	2 (33.3%)
ClassDojo	Pretest	0	5 (83.3%)	0	1 (16.7%)
	Posttest	0	4 (66.6%)	0	2 (33.3%)
ClassTing	Pretest	2 (28.6%)	4 (57.1%)	0	1 (14.3%)
	Posttest	0	2 (28.6%)	0	5 (71.4%)

Conclusion

Both advantages and disadvantages appeared in this study regarding the use of teacher-parent interaction apps. The apps seemed to encourage parents to engage with their children's learning in school. However, technology does not naturally enhance human communication. The patterns of teacher-parent communication have been reshaped and changed from collaboration to compromise. More studies should be conducted to explore what app features can not only catch users' attention but also facilitate constructive human communication.

The Benefits of Using Interaction Apps

The interaction apps generally encouraged parents to watch over and understand how their children were performing in school. AppleTree and ClassDojo showed rising curves of parental use during the experimental period, and only ClassTing showed a declining curve. Furthermore, on AppleTree, parents showed a sudden increase in view frequency on the days when activity photos were posted. This indicates that using interaction apps are most effective in encouraging parents to participate in their children's learning in school when visual aids are used to reinforce technological attractions.

The Downsides of Using Interaction Apps

However, there are also significant downsides to using interaction apps, as shown in this study. For example, for all three apps, collaborative (positive and direct) teacher-parent interaction patterns were all reduced at the post-test, and compromising patterns (positive and indirect) increased at the post-test. The increase of the compromising pattern of teacher-parent interaction is most obvious on ClassTing.

All three apps changed teacher-parent interactions from the constructive collaborative pattern to the less constructive compromising pattern. There must have been some app features discouraging parents from expressing their opinions freely and stopping them from participating openly in children's school learning. This study was not designed to pinpoint the specific discouraging factors, but this suggests a direction for future research on interaction app design.

ClassTing produced the most obvious example of this change when compared with the other two apps. There is one unique feature of ClassTing: This app was designed by Koreans, while the other two apps were designed by Americans. The Korean culture is generally regarded as more authoritative, hierarchical, and demanding of obedience from subordinates. How the culture of the designers may have influenced the app's design and how users' interactions or usage patterns are influenced by the app designs are interesting research directions for the future.

The Crucial Factor: Co-Constructing Positive Online Communication

Parental supports and home supports have long been recognized as important factors for children's language learning. For English teachers in elementary schools, it is natural and

necessary to exploit different resources and technology to facilitate parental involvement as well as to enhance teacher-parent interaction since matched school-home language environments are important to successful English learning. However, as in the field of computer-assisted language learning, several researchers (O'Dowd, 2011; O'Dowd & Eberbach, 2004; O'Dowd, 2007) found that online communication tools do not naturally or inherently make cross-cultural learners create meaningful cultural learning. Likewise, interaction apps do not naturally increase parents' openness, facilitate their involvement, or contribute to positive teacher-parent interactions simply because the technology has been employed. The key to facilitating parental involvement and enhancing teacher-parent interaction patterns relies on how teachers and parents use technological tools and whether they co-construct positive online communication. App designers should be more aware of which features will contribute to positive communications between teachers and parents instead of focusing only on app functions.

In general, interaction apps encourage parents to be involved in their children's learning in school. However, the app itself does not facilitate teacher-parent communications in a constructive direction. Which app features encourage parents to construct meaningful and positive dialogues with teachers remains to be explored.

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Appendix 1

國小家長使用聯絡簿行動應用程式進行親師溝通調查問卷

基本資□（請在適當的選項□內打勾ˇ）

您的孩子是四年甲班 姓名：_____ 座號：_____

您的姓名：_____，您是□爸爸 □媽媽 □其他_____

您的□齡：

　　　　□ 未滿30 歲 □30-未滿40 歲 □40-未滿50 歲 □滿50 歲以上

您的教育程□：

　□國民小學 □國中 □高中或高職 □大學及專科學校 □研究所以上

您的職業：

　　　　□軍公教 □商 □工 □服務業 □家管 □其他：_____

您每週使用電腦、平板或智慧型手機上網的頻率為何？

　□每天 □6~5天 □4~3天 □2~1天 □很少使用

Appendix 2

親師互動現況 **(請在適當的選項□內打勾ˇ)**

1. 當您和英語老師意□□ 一致時，您會怎麼做？

　　　□ 我通常會忍下□ 。

　　　□ 我會試著整合自己與家長的想法共同作成決定。

　　　□ 我會運用各種方法□ 贏得優勢。

　　　□ 我會試著以折衷的方式解決

2. 當您對於英語課業要求不認同時，您會怎麼做？

　　　□我會以自己的教育□□□□ 服老師接受我的決定。

　　　□我會將自己和老師□ 同的意□ 藏在心底。

　　　□我會請第三者居中協調與老師之間觀□ 的差□ 。

　　　□ 我會與老師深入交換意□ 以□ 找出問題癥結。

3. 當您對於英語課之經營和管教有不同理念時，您會怎麼做？

　　　□我會與老師商討可以滿足彼此期望的解決之道。

　　　□我會以各退一步的方式與老師達到協議。

　　　□我會捨棄自己的意□ ，採納老師的意□ 。

　　　□我會堅持自己的理念，維護自己的立場。