Eğitim Teknolojisi

kuram ve uygulama

Yaz 2021
Cilt 11
Sayı 2

Summer 2021
Volume 11
Issue 2

Educational Technology

theory and practice

ISSN: 2147-1908

EĞİTİM TEKNOLOJİSİ KURAM VE UYGULAMA / EDUCATIONAL TECHNOLOGY THEORY AND PRACTICE

Cilt 11, Sayı 2, Yaz 2021
Volume 11, Issue 2, Summer 2021

Kurucu / Founder: **Dr. Halil İbrahim YALIN**
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Dizinlenmektedir / Indexed in: **ULAKBİM Sosyal ve Beşerî Bilimler Veritabanı (TR-Dizin), Türk Eğitim İndeksi**
ETKU Dergisi **2011 yılından itibaren yılda iki defa** düzenli olarak yayınlanmaktadır.
Educational Technology Theory and Practice Journal is published regularly **twice a year since 2011.**

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EĞİTİM TEKNOLOJİSİ Kuram ve Uygulama
Cilt:11 Sayı:2 Yıl:2021

Makale Geçmişi / Article History
Alındı/Received: 29.01.2021
Düzeltme Alındı/Received in revised form: 23.06.2021
Kabul edildi/Accepted: 25.06.2021

TAKING IMAGES OF NOTES BY SMARTPHONE (TIN-S): A COMPARATIVE STUDY

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Bilimsel Araştırma Makalesi

Abstract

It has been observed that rather than taking notes in a lecture traditionally (pen-and-paper method – longhand), university students tend to take a photo of the notes on the white/smart board. The purpose of this study is to investigate to what extent English for Specific Purposes (ESP) university students prefer taking images of notes by smartphone (TIN-S) to traditional note-taking (TNT), what strategies they employ in using these notes academically and whether the TIN-S has a positive effect on their test performance. The study includes two phases. In Phase 1, an exploratory qualitative approach was used, where ten participants were interviewed about their preferences, strategies and reasons for using their notes. In Phase 2, a quasi-experimental design was employed. The experimental group (N=21) used the TIN-S only while the control group (N=20) used the TNT only for a period of 4 weeks. The comparison of the test scores showed significant gains for the TIN-S group.

Keywords: note-taking; smartphone; traditional note-taking (TNT); taking images of notes by smartphone (TIN-S)

DERS NOTLARININ AKILLI TELEFON KULLANILARAK FOTOĞRAFLANMASI: KARŞILAŞTIRMALI ÇALIŞMA

Öz

Üniversite öğrencilerinin ders esnasında geleneksel (kalem-ve-kağıt yöntemi – el yazısı) bir biçimde not almak yerine beyaz/akıllı tahtadaki notların fotoğraflarını çekmeye eğilim

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Atıf için: Gilanlioglu, I., Ertay, Z. (2021). TAKING IMAGES OF NOTES BY SMARTPHONE (TIN-S): A COMPARATIVE STUDY. Eğitim Teknolojisi Kuram ve Uygulama, 11 (2), 308-337. DOI: 10.17943/etku.870513

gösterdiği gözlemlenmiştir. Bu çalışma yabancı dil olarak Özel Amaçlı İngilizce (ÖAİ) öğrenen üniversite öğrencilerinin ders notlarını akıllı telefonla foroğraflamayı (ATG) geleneksel not alma yöntemine (GNA) göre ne kadar tercih ettiğini, öğrencilerin bu notları akademik olarak kullanırken hangi stratejileri sergilediklerini ve ATG'nin öğrencilerin sınav performansı üzerinde etkisi olup olmadığını araştırmıştır. Çalışma iki evreden oluşmaktadır. Evre 1'de, keşfedici nitel yöntem kullanılarak 10 katılımcıyla özel tercihleri, kullandıkları stratejiler ve notlarını kullanım amaçları hakkında yarı-yapılandırılmış mülakat yapılmıştır. Evre 2'de yarı-deneysel desen uygulanmıştır. Dört hafta boyunca deney grubu (N=21) sadece ATG'yi kullanırken kontrol grubu da sadece GNA yöntemini kullanmıştır. İki grubun sınav sonuçları karşılaştırıldığında ATG grubunun anlamlı kazanımlar elde ettiği görülmüştür.

Anahtar Kelimeler: not alma; akıllı telefon; geleneksel not alma (GNA); akıllı telefonla görüntüleme (ATG).

Geniş Özet

Ders esnasında not almanın önemli bir akademik beceri olduğu birçok çalışma tarafından saptanmıştır (e.g. Allen & Reeson, 2008 cited in Haghverdi et al., 2010; Stahl et al., 1991). Ayrıca not alma becerisinin akademik başarı üzerindeki olumlu etkisi de gösterilmiştir (e.g., Kiewra and Benton, 1988; Peverly vd., 2014). Fakat bu çalışmaların çoğu not almayı geleneksel anlamda, yani kağıt-kalem kullanarak, ele almıştır. Bilgisayar teknolojisindeki gelişmeler sonucunda ortaya çıkan akıllı telefonlar halihazırda çok yaygın duruma gelmiştir. Akıllı telefonlar üniversite öğrencileri tarafından da yaygın olarak kullanılmaktadır. Bu telefonlar iletişime ek olarak birçok işlem gerçekleştirmek için kullanılmaktadır. Bunlardan birisi de dersteki notları görüntülemek suretiyle kaydetmektir. Söz konusu not alma yönteminin çalışmanın gerçekleştirildiği kurumda Özel Amaçlı İngilizce (ÖAİ) dersi alan üniversite öğrencileri tarafından da yaygın bir şekilde kullanıldığı gözlemlenmiştir.

Bu çalışma ÖAİ lisans öğrencilerinin kara/beyaz/akıllı tahtadaki ders notlarının fotoğrafını akıllı telefonla çekerek görüntülemeyi (ATG) geleneksel not almaya (GNA) göre ne ölçüde tercih ettiklerini, bu notları akademik çalışmalarında kullanırken hangi stratejileri kullandıklarını ve ATG yönteminin öğrencilerin sınav performansı üzerindeki etkisini araştırmayı amaçlamıştır. Çalışmanın araştırma soruları şunlardır: (1) Özel Amaçlı İngilizce (ÖAİ) sınıfında akıllı telefonla tahtadaki notların fotoğrafını çekmek (ATG) geleneksel not alma (GNA) yöntemine göre ne derece tercih edilmektedir?; (2) Öğrenciler akıllı telefon vasıtasıyla elde etmiş oldukları fotoğraflardaki ders notlarını hangi stratejileri kullanarak akademik olarak kullanmaktadır?; ve (3) ATG yönteminin öğrencilerin BAİ dersindeki başarılarına olan etkisi nedir? Bu çalışmaya Kuzey Kıbrıs'taki uluslararası bir üniversitede öğrenim gören toplam elli (50) Hukuk Fakültesi öğrencisi katılmıştır. Katılımcılar ikinci yılın ilk döneminde Özel Amaçlı İngilizce ve Hukuk İngilizcesi derslerini alıyorlardı.

Bu çalışmada çoklu-yöntem yaklaşımı kullanılmıştır (Brown, 2014)). Çalışma iki aşama içermektedir. Her iki evrede de tüm katılımcılara yaş, cinsiyet, milliyet gibi bilgileri toplamak ve daha önce not tutma eğitimi alıp almadıklarını belirlemek için arkaplan bilgi anketi (bkz. Ek A) verilmiştir. Evre 1'de keşif amaçlı nitel yöntem kullanılmıştır. ÖAİ öğrencilerinin ATG'yi GNA yöntemine kıyasla ne ölçüde tercih ettiklerini, ders notlarını kullanırken başvurdukları stratejiler ve bu stratejileri kullanma sebeplerini irdelemek için on (10) öğrenciyle (7 kadın ve 3 erkek) mülakat yapılmıştır (bkz. Ek B).

İkinci evrede, yarı deneysel desen kullanılmıştır. Deneysel grup (N=21) 18 kadın ve 3 erkek katılımcıdan oluşmuştur ve 4 hafta boyunca gönüllü olarak sadece ATG yöntemini kullanmıştır. Kontrol grubu (N=20) ise 8 kadın ve 12 erkek katılımcıdan ibaret olup benzer bir biçimde sadece GNA yöntemini kullanmıştır. Öğrencilerin aldıkları notlardan hangi stratejileri kullanarak çalışmalarında yararlandıklarını ve bu notları bireysel çalışmalarında ne ölçüde faydalı bulduklarını saptamak için deneysel gruptan 10 katılımcıyla (8 kadın ve 2 erkek) mülakat (bkz. Ek C) yapılmıştır. Benzer bir biçimde, kontrol grubundan da 10 katılımcıyla (6 kadın ve 4 erkek) mülakat yoluyla geleneksel kağıt-kalem yöntemi (GNA) kullanılırken hangi stratejilerin hayata geçirildiği ve başka not alma yöntemlerinin tercih edip edilmediği irdelenmiştir.

ATG yönteminin öğrencilerin akademik başarılarının üzerindeki etkisini sorgulamak amacıyla Sınav 2 ve Final Sınav'ı üzerinde bağımsız grup t-testi (parametrik test) uygulanırken Sınav 3 üzerinde de Mann Whitney U testi (parametrik olmayan test) uygulanmıştır.

Birinci araştırma sorusu dikkate alındığında, nitel verilerden elde edilen sonuçlara göre BAİ sınıfındaki öğrencilerin çoğunun GNA yöntemini ATG yöntemine tercih ettikleri görülmüştür. İkinci araştırma sorusuna cevaben de GNA ve ATG gruplarındaki öğrenciler almış oldukları notları benzer stratejiler kullanarak işlediklerini bildirmişlerdir. Bu stratejiler şöyle özetlenebilir: okuma ve seçici tekrar yazma; okuma ve (seçici olmayan) tekrar yazma; ve sadece okuma. Üçüncü araştırma sorusu bağlamında hem bağımsız grup t-testi hem de Mann Whitney U testi sonuçları ATG grubunun GNA grubuna ortalama değerler bazında kıyasla her üç ölçümde de daha üstün bir performans sergilediği görülmüştür.

Sonuçların geneli itibarıyla ATG yöntemi GNA yöntemine kıyasla öğrencilerin akademik başarılarına daha çok katkıda bulunmuştur. ATG'nin bu çalışmada saptanan yararları dikkate alındığında öğretim elemanlarının akıllı telefonların not almayı kolaylaştırıcı araçlar olarak kullanımına imkan tanımaları yerinde olacaktır. Bu çalışma ATG yönteminin üniversite öğrencileri tarafından kullanımına odaklanmıştır. Gelecek çalışmalar öğretim elemanlarının ATG yönteminin kullanımıyla ilgili bakış açılarına yönlenebilir. Hatta öğrenci ve öğretim elemanlarının ATG yöntemiyle ilgili tutumları karşılaştırılabilir.

Introduction

Note-taking plays an important role in learners' acquisition of information (e.g., Baker & Lombardi, 1985; Hartley & Marshall, 1974) and hence in their success in learning a language (e.g., Kiewra, 1985; Kiewra and Benton, 1988; Peverly et al., 2014). Given that taking notes using pen and paper, i.e. the traditional note-taking (TNT) method, has been the most common method used among university students (e.g. Reimer et al., 2009), we consider taking photos of the board (i.e. black/white or smartboard) by smartphone – henceforth referred to as taking images of notes by smartphone (TIN-S) – a new method of note-taking, particularly in the EFL language classroom. Our main motivation to investigate this method stemmed from our repeated observation that during lectures an increasing number of students prefer taking a photo of the notes by smartphone (TIN-S) to taking notes by hand (TNT).

A number of studies have been conducted on various aspects of TNT: the effects of note-taking in science education through the mind mapping technique on students' attitudes, academic achievement and concept learning (Akinoglu & Yasar, 2007); the importance of hand-writing speed and selective attention to note-taking (Peverly, Garner & Vekaria, 2014);

students' note-taking challenges in the twenty-first century (van deer Meer, 2012); and the cognitive costs and benefits of note-taking (Jansen, Lakens & IJsslesteijn, 2017), among others. Although the benefits of TNT are well-established in the literature, the topic continues to attract researchers' interest. Such a renewed interest has been mainly triggered by the use of various technological devices in academic contexts. Stacy and Cain (2015) argue that the way students take notes, consume and process information in class has changed with the introduction of tablet computers, note-taking applications (apps), and other education technology. Therefore, recent research has concentrated more on digital note-taking which covers the use of technological devices such as laptops in taking notes (e.g., Fried, 2008; Jansen et al., 2017; Lauricella and Kay 2010;), or other mobile computing devices such as the tablet, the iPod Touch or iPhone (e.g., Karjo, 2018; Kim, Turner and Perez-Quinones, 2009; Williams and Pence, 2011). However, best to our knowledge, no research has been conducted on taking images of notes by smartphone (TIN-S) for note-taking purposes. The current research aims to fill this gap by investigating (a) how frequently the ESP learners in a university context use the TIN-S method as compared to the TNT method; (b) how the ESP learners use these notes in their academic studies; and (c) whether the TIN-S has an effect on leaners' academic performance.

Literature Review

Note-taking

Carrier, Williams and Dalgaard (1988) express that note-taking is common among students. It is necessary for university students to understand the course content in lectures and take notes effectively. However, it has been confirmed by numerous studies (e.g. Baker & Lombardi, 1985; Hartley & Cameron, 1967; Hartley & Marshall, 1974; Kiewra, 1985) that the students may face difficulties in taking notes unless they have had previous training or experience (Crawford et al., 2016).

Note-taking has proved to be beneficial for students (e.g., Barnett, Di Vesta & Rogozinski, 1981; Hartley & Marshall, 1974). Students take notes on different occasions: during reading coursebooks, studying from books or materials (hard copy or online), or during lectures in order to organize, categorize, or summarize their ideas for the purpose of learning the subject matter better or refer back to this information easily when needed. DiVesta and Gray (1972) argue that note-taking has two functions: encoding and external storage functions. The former refers to learners' enciphering the notes they take into their long-term memory, which allows deep-level processing. The latter is concerned with learners' referring back to a set of notes (materials) for review and revision and the effect of these notes on learners' achievement. This study involves both of these functions and aims to investigate how effective the TIN-S method is in students' success in an ESP course.

Taking images of notes by smartphone (TIN-S)

We define 'TIN-S' as a method of using any digital device, such as the smartphone or iPad, for taking photos or video-recording for the purpose of note-taking in the classroom, which involves taking a one-to-one image of the notes on the board/screen provided by the class instructor. However, in this study, 'TIN-S' method refers to 'taking photos of the whiteboard' due to the participants' lack of other digital devices. Not all the participants in the TIN-S group had i-Pads or laptops, therefore it would not be fair to allow some of the participants to use

various digital tools for note-taking. For example, the participants who had i-Pads would be able to draw images or diagrams quickly with their pens or fingers while others without the device would not be able to do so. The 'TIN-S' method differs from the TNT or digital note-taking. It should be noted that the image obtained by using the smartphone is the full representation of the available notes which may contain words as well as visual materials such as graphs, charts and tables.

Several studies examined the use of mobile/cell/smart phones in English language teaching from different angles. Some studies focused on the effect of using mobile phones in language learning (e.g. Al Fawareh, & Jusoh, 2017; Farrah, & Abu-Dawood, 2018; Hashemi, & Ghasemi, 2011; Nalliveettil & Alenazi, 2016; Oriogu, Ejemezu, & Ogbuiyi, 2018; Ozer, & Kılıç, 2018). For instance, Nalliveettil and Alenazi (2016) investigated the effect of the use of mobile phones on fifty-two undergraduate male English language and literature students' English language learning through self-reports and teacher questionnaires. Similarly, Oriogu, Ejemezu, and Ogbuiyi (2018) investigated the use of mobile devices (i.e. Android phones, iPhone and iPad) in learning foreign languages through using a structured questionnaire. The reserach findings indicated that students used Android phones, iPhone and iPad in learning foreign languages such as Chinese, French and English languages, and that the use of mobile devices had a considerable influence on their learning of foreign languages. Another aspect that was commonly investigated is the attitudes of language learners (e.g. Aamri & Suleiman, 2011; Ababneh, 2017; Alhafeez Ali Ta'amneh, 2021; Yurdagül & Öz, 2018) in using smart phones in class. For example, Aamri and Suleiman (2011) analyzed the behavior and attitudes of 100 fresmen students in the Intensive English for Science Programme in Sultan Qaboos University towards using cell phones in class, and the problems they experienced while using their cell phones in class. They found out that the students' use of mobiles in the classroom was limited and they were discouraged from using their mobiles during the lesson by their teachers because the use of mobiles was seen as a source of distraction for students. Ababneh (2017) also examined the attitudes of 101 EFL students towards the use of their mobile phones in learning English in the English Language Teaching Department in Jordan. The results of the study revealed that students' frequently used mobile phones in learning English and that they had positive attitudes towards using them in class.

It has been indicated that verbatim note-taking (either pen-and-paper or digital note-taking) links to shallow cognitive processing (Craig & Lockhart, 1972; Kiewra, 1985) in which learners only copy the prewritten text or images on the board. Stacy and Cai (2015) argue that learners do not include their own definitions or elaborate on the written text on the board while transferring these notes into their notebooks, iPad or other electronic devices. Similarly, Mueller and Oppenheimer (2014) put forward that verbatim notetaking is non-generative, and learners do not seem to do summarizing, paraphrasing or concept mapping. Therefore, they are not engaged in deep-level processing (DiVesta & Gray, 1973, Kiewra, 1985). However, although TIN-S appears to be a verbatim note-taking method, in this study, the verbatim image was used as the basis for deeper-processing. The students engaged in deep-level processing through different ways of cognitive engagement such as classifying and summarizing after the lecture over an extended period of time and free of pressure while revising. They reported that they had used the photos for study purposes through rewriting, summarizing and organizing these notes as lists, tables, mind-maps or spidergrams The study notes of volunteering students were collected and analyzed as evidence of using the photos for studying as indicated in Figures 1, 2 and 3 under the 'Results' section. Although the

researchers based their findings on the semi-structured interviews and narrative inquiries of the students and on some of the students' study notes, they cannot be totally sure whether all the students used the photos for deep-level processing (e.g. mind-mapping) even though they expressed in the interviews and in the narrative inquiries that they had done so.

Although digital note-taking appears to be increasingly fashionable among students, related studies (e.g. Kay & Lauricella, 2011; Yamamoto, 2007) have also shown that it can be distracting for learning. While learners are taking notes on any technological device, they can also be tempted to play games, watch movies, text messages, or surf the web, which may lead to distraction from the lesson. On the other hand, it has also been found out that learners using technological devices experience some advantages such as speed and searchability (Kim, Turner and Perez-Quinones, 2009), "collaboration, increased focus, improved organization and efficiency, and addressing special needs" (Kay& Lauricella, 2011, p. 1).

When students use the TIN-S method for note-taking, they may enjoy some advantages in learning the subject matter as a consequence of 'selective attention' (McLeod, 2018) and 'noticing' (Schmidt, 2001). During class, they do not need to select what to take note of from the writings on the board. Therefore, they have the opportunity to follow the lecture more closely. After the class, students will have an extended period of time to examine the images of the notes and to pay attention to the most important points (perhaps to choose the important ones and rewrite them) and thus engage in selected attention. Through selective attention, they will notice salient features of the lecture and thus acquire the subject matter better (Schmidt, 2001). The reviewing of notes involves 'information processing' (Miller, 1956) – in which students can do 'chunking' and 'planning' for their learning. Additionally, the TIN-S method allows students to revisit the notes in their own convenience for revision, which fosters 'task repetition' (Bygate, 2001) and 'repeated exposure' (Joe, 2010; Nation, 2001). When students have the verbatim image of the notes, they have the original full records that they can always refer back to if need arises.

In the present study, it was hypothesized that the TIN-S method would have a liberating and beneficial effect. It was predicted that those using the TIN-S method would enjoy the convenience of not having to choose what is important and what is not among the notes on the whiteboard in real time Moreover, the students need efficient time in order to understand the content, summarize, paraphrase, and do concept mapping (Mueller & Oppenheimer, 2014). The TIN-S method could offer the students a chance to have a full access to lecture notes. Therefore, the students could spend more time after the lecture on making sense of the notes, and perhaps sorting them out in their own time. In addition, the students would have an opportunity to revise everything written on the whiteboard; thus, they can remember some of the details later either consciously or unconsciously. Such practice contains both the encoding and external storage functions (DiVesta and Gray, 1972) mentioned above.

Research Questions

The research questions were the following:

1. To what extent is taking images of notes by smartphone (TIN-S) preferred to traditional note-taking (TNT) in the ESP classroom?
2. What strategies do students employ in using the notes from the images of notes taken by smartphone academically?

3. What kind of effect does the TIN-S method have on students' achievement in the ESP course?

Method

Participants

A total of fifty-one Turkish university students aged 18-21 participated in the present study. They were second year, first semester students studying at the Faculty of Law, which offers Turkish-medium instruction, at a university in Northern Cyprus. All the participants were taking ESP - Legal English course which involves legal terminology, vocabulary, collocations and reading comprehension tasks. In the Legal English course, the students are required to familiarize themselves with legal terms and phrases, to be able to use them in certain contexts both orally and in writing, and also to be able to read and comprehend texts in Legal English. All these targets are clearly stated in the course description (see App. A)

Research design and data collection

This study employs a multi-method approach (Brown, 2014) which involves two phases. In both phases, all the participants were given a background information questionnaire (see Appendix B) in order to collect data about the age, gender, nationality and if they had previous training in note-taking, and were interviewed using semi-structured interviews (see Appendices C, D, and E).

In phase one, ten volunteering students (7 females and 3 males) taking Legal English I course in other groups (neither in the experimental nor in the control group in phase 2) were interviewed (see Appendix C) in order to investigate to what extent the TIN-S is preferred to TNT. These students did not participate in the later phase of the study.

In phase two, a quasi-experimental design was employed. The class that was assigned as the experimental group initially included 21 (18 females and 3 males) students while the control group included 20 (8 females and 12 males) students. However, the number and distribution of the participants slightly varied in the study (see Tables 5 and 6).

The groups were not formed by the researchers using random assignment but chosen out of the conveniently available volunteering groups (five in total) taking the Legal English I course already formed randomly by the administration using computerized random assignment. All the students taking Legal English I course had to complete the pre-requisite General English course (B2 level according to the CERF – Common European Framework of Reference for Languages). To ensure uniformity in both groups, the same course pack and the same methodology were used. The instructors, one of whom was one of the researchers, were qualified ESP teachers with over 20 years of teaching experience. The course instructors and the students were provided with a detailed course description and an outline (see App. A) at the beginning of the semester. Thus, the teachers followed the outline for topics to be delivered weekly. Before each lesson, the course instructors held mini team meetings and planned how to deliver the lessons, including a common methodology, the allocated time for each task and what points to focus on. The teachers in both groups presented the same vocabulary and collocations to the students. In addition, the students in both groups were assigned to do the same tasks during each lesson. After each block (two contact hours) of classes, the two teachers held a short meeting again in order to check the pace of their lessons

in order to ensure synchronization. The experimental group was allowed to use the TIN-S method only while the control group was allowed to use the TNT method only for a period of 4 weeks. Ten students (8 females and 2 males) from the experimental group were interviewed (see Appendix D) in order to investigate what kind of strategies they employed in using the notes for their studies and how useful they found those notes during self-study. Similarly, another ten students (6 females and 4 males) from the control group were interviewed (see Appendix E) in order to find out the strategies they employed in using the notes they had taken using pen and paper and if they preferred any other method of note-taking.

Data analysis

Data collected from both phases in the study were analyzed qualitatively and/or quantitatively as appropriate. A thematic analysis (Braun & Clarke, 2006) was used to analyze the qualitative data. Experimental data (collected in Phase 2) were statistically analyzed by using normality tests such as Kolmogorov-Smirnov test and Shapiro-Wilk test, the independent samples t-test and Mann Whitney U test. For these analyses, SPSS Version 22 was used.

Results

Phase 1

In phase one, the participants were randomly chosen from other groups of Legal English course and did not take part in either the experimental or the control group. Ten students were interviewed (see Appendix C) in order to find out to what extent they preferred the TIN-S to the TNT method. All the participants stated that they mostly used the TNT method during their Legal English classes. However, only two of the participants admitted that although they mostly used the TNT method in class, they preferred using the TIN-S method when they did not have time to transfer everything on the whiteboard into their notebooks – especially at the end of the class when they had to rush for another class. One of the students stated that she sometimes used the TIN-S method because of her poor eyesight.

Phase 2

Background Questionnaire

The background information questionnaire produced demographic information (reported above) and evidence of previous training in note-taking. Eighty per cent (80%) of the students started taking notes in elementary school while 10% of the students started taking notes in secondary school and interestingly 10% of the students started taking notes in high school. The great majority of the students (90%) had not had any such training before. Only one student received note-taking training when she was in secondary school.

What to take note/photo of

In phase two, ten participants from each group – both the experimental (see Appendix D) and the control group – were interviewed (see Appendix E). The teachers explained that they had agreed on how to present and teach legal terminology (vocabulary and collocations) in their classes in the pre-lesson meetings they had had before each lesson block. In addition, they said that it had not been unlikely to teach or focus on different things because they had to

follow course objectives which were clearly stated in the course outline (see App.1). Both teachers also expressed that they had also agreed to write almost all the comments they would make in class on the board in order to have a fair lesson presentation in both groups.

Table 1. Things on the whiteboard students reported they had taken photos/notes of

Experimental Group (TIN-S)	Control Group (TNT)
80% took the photo of everything	50% wrote everything in their note/course books
20% took the photo of collocations and definitions of words	50% wrote collocations, definitions of words, word chains

When asked which things on the whiteboard the students took photos of for note-taking, the majority of the participants (80%) in the TIN-S group stated that they had taken the photo of everything written on the whiteboard. Twenty per cent (20%) of the participants reported that they had taken the photo of the collocations and the definitions of the words on the whiteboard. On the other hand, half of the participants in the TNT group stated that they had written everything on the board as notes in either their notebooks or coursebooks while the other half preferred to write collocations and definitions of the words or word chains as notes in their notebooks/coursebooks.

Revisiting the notes

Concerning the question whether the participants used the photos/notes after class, interestingly all the students in the TIN-S group reported that they had used the photos after class. Similarly, almost all the participants in the TNT group stated that they had used their notes for exam preparation. Only one participant stated that she had not used her notes because she had not had time to study efficiently for the exam due to having two exams on the same day.

When we consider the question how frequently the participants used their notes, the majority of the participants (70%) in the TIN-S group pointed out that they had used the photos only before the quiz or the final exam in order to prepare for the assessment. They seemed to have exam-oriented goals, so they were extrinsically motivated. However, 30% of the participants said that they had used the photos twice or more, not only for the purpose of studying for the exam but also for revision. When the same question was asked to the TNT group, interestingly almost all of the participants (90%) mentioned that they had used their notes to study for exams once or twice. Only one participant stated that she had not used her notes for any purposes because she stated that due to other exams, she had not had time to study for the Legal English exam.

Reported strategies in using notes (TIN-S vs TNT)

The participants were asked what strategies they employed in using the notes from the TIN-S and the TNT academically. The strategies used by the participants were varied and illustrated in Table 2 below:

Table 2. Reported Strategies in Using Notes (TIN-S vs TNT)

TIN-S Group		TNT Group	
Strategies	Results	Strategies	Results
60% reading, selecting and rewriting	- understanding the lecture better - understanding the meaning and use of vocabulary better - greater success in reading comprehension questions	90% reading and rewriting	- understanding the lecture better - understanding the meaning and use of vocabulary better
20% reading and transferring everything	- understanding the lecture and the meaning of vocabulary (terminology, e.g. collocations) better		
20% only reading	- understanding the meaning of vocabulary better	10% only reading	- understanding the use of vocabulary better

In the TIN-S group, 60% of the participants highlighted that they had studied the notes (see Fig. 1 & 2) by reading and selecting the most important points in the notes in the photos and rewritten them in their notebooks and revised them while 20% of the participants stated that they read the notes in the photos and transferred everything in the photos into their notebooks. On the other hand, 90% of the participants in the TNT group reported that they had read and rewritten their notes to study for the lesson later on. Interestingly, 20% of the students in the TIN-S group and 10% of the participants in the TNT group expressed that they had studied the notes directly from the source, i.e. photos or hand-written notes, without attempting to rewrite or select the most important points to study.

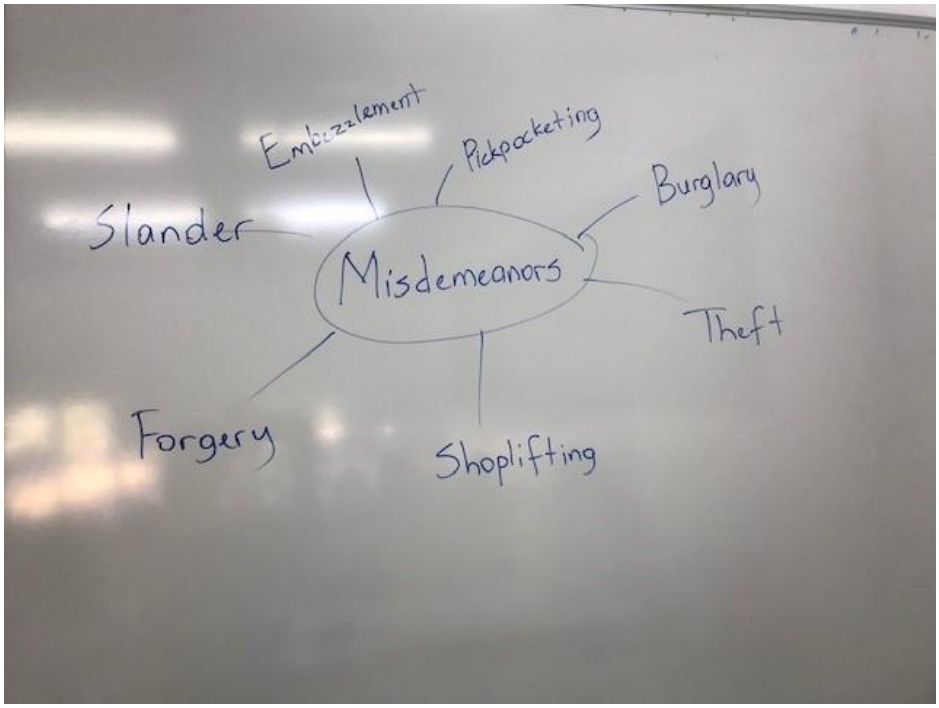

Figure 1. Photo of the whiteboard – categorizing 'misdemeanors'

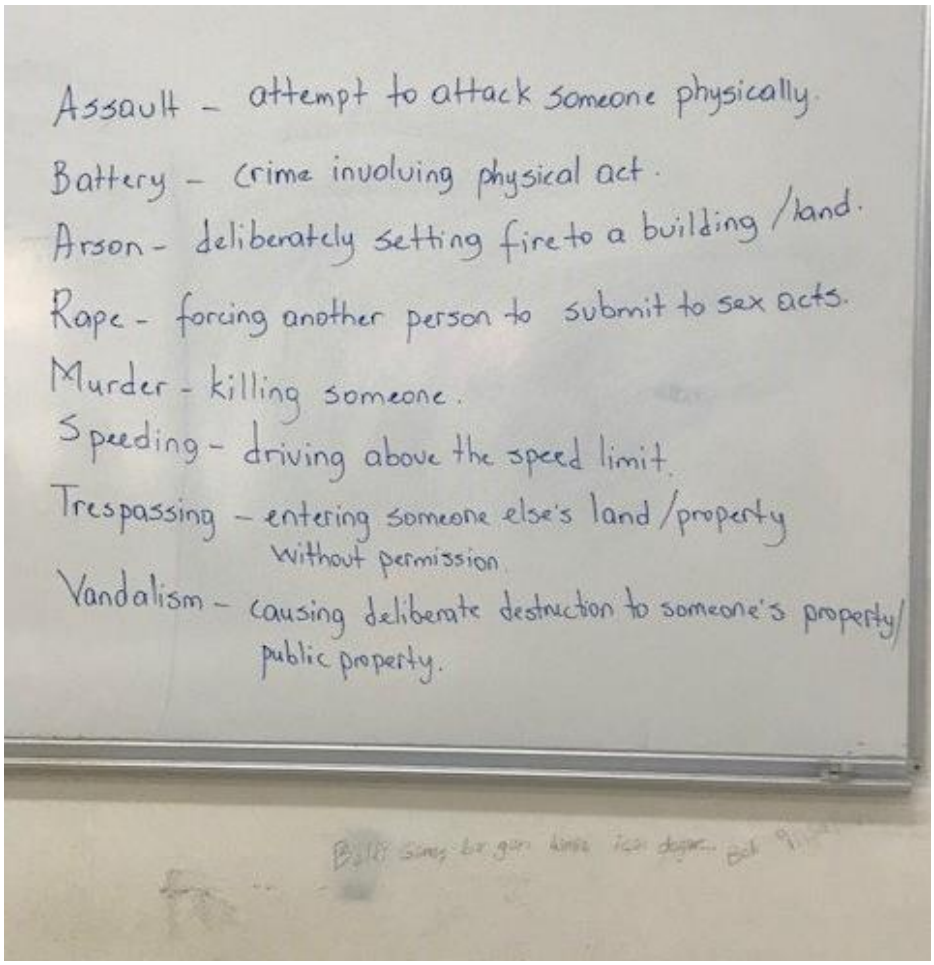

Figure 2. Photo of the whiteboard – descriptions of 'crime'- related vocabulary

The analysis of the students' notebooks revealed further support for students' processing the notes in the photos by using various strategies such as *rewriting*, *listing*, *categorizing*, *colour coding*, *L1 translation*, and *dictionary definition*. Three examples of student work are presented below (see Figures 3, 4 and 5).

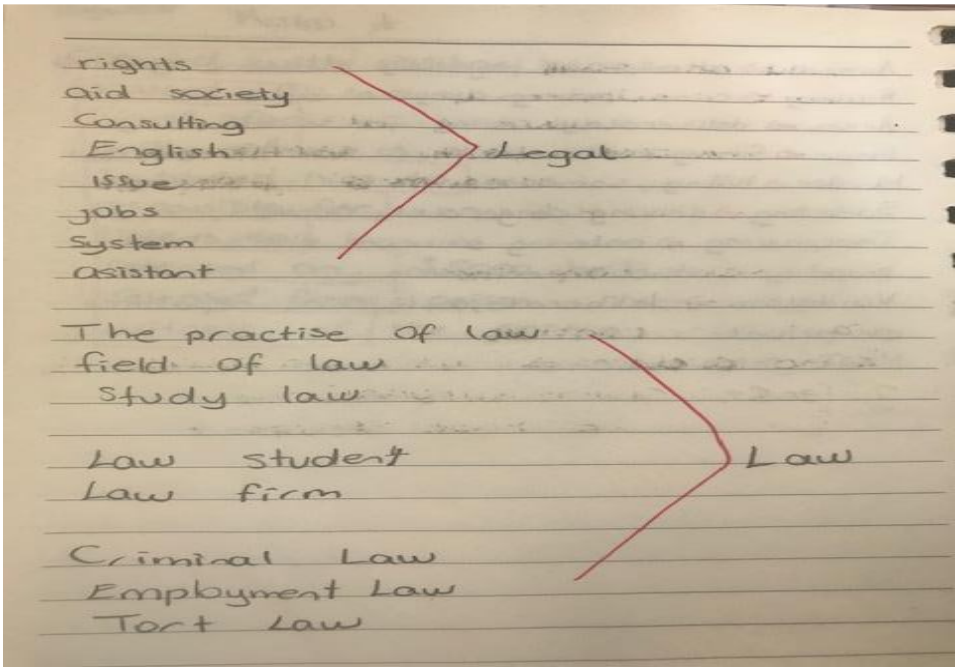

Figure 3. Categorizing collocations including 'legal' and 'law' words

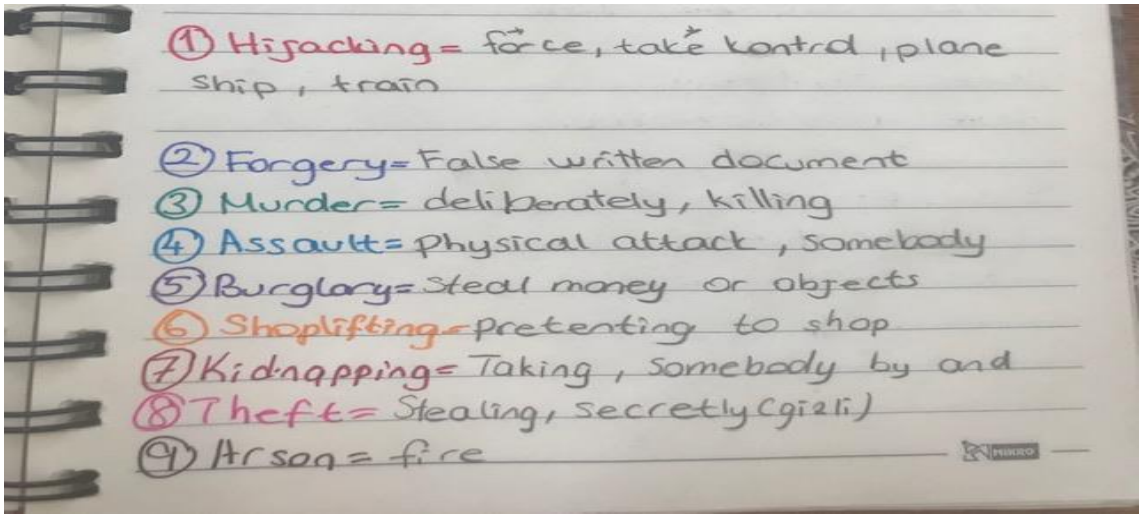

Figure 4. Vocabulary definition using colour coding

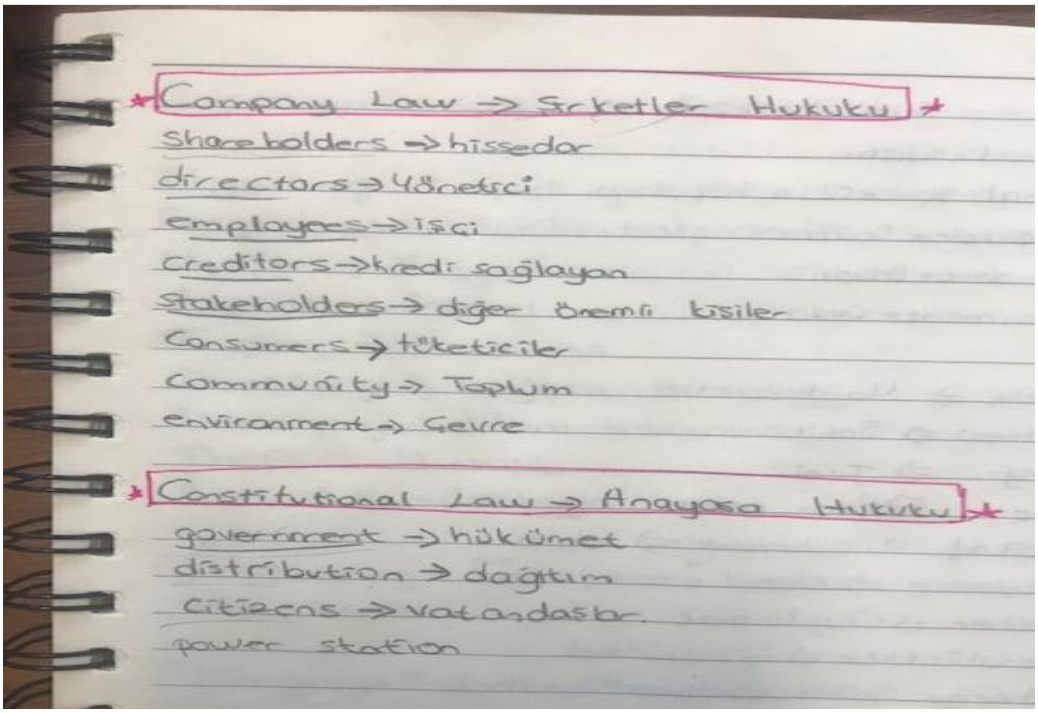

Figure 5. Vocabulary study using listing and translating

In Figure 5, the student put collocations into categories according to whether they include 'law' and 'legal' words. This kind of categorizing seems to help students to distinguish between the use of 'law' and 'legal' words in collocations. Figure 4 presents the use of colour coding strategy in matching the target words with their definitions assigning a different color to individual crimes. As for Figure 5, the student both listed and categorized the target vocabulary which belongs to a particular field of law (i.e. company law and constitutional law). In addition, the student used the L1 translation strategy.

Usefulness of modes of note-taking (*TIN-S *vs. TNT)

When asked if the participants found the TIN-S method useful for their studies, they all responded that they had found it useful although some of the participants stated that they had preferred the traditional note-taking method.

Table 3. Reported usefulness of modes of note-taking (TIN-S vs. TNT)

	TIN-S Group	TNT Group
How useful the students find the note-taking method	100% found the TIN-S method useful	100% found the TNT method useful
Which method students prefer	70% prefer the TIN-S method 30% prefer the TNT method	100% prefer the TNT method

The main reasons why the participants found the TIN-S by smartphone method useful appeared as follows: possessing all the information on the whiteboard, having plenty of time to read, analyzing and sorting out the information in the notes in photos, and rewriting those

notes in the photos. The great majority of the participants stated that they mostly studied collocations and vocabulary from the notes as photos.

When asked if the participants found the TNT method useful for the course studies, all the participants responded that they had found this method very useful and they were happy with the method. They did not prefer any other method instead of this method. They said that they could learn better when they wrote things by hand.

Statistical analyses

Before any statistical analysis was performed, visual representations of data (graphics) were examined to check the distribution of data (Larson-Hall, 2010). Further, two tests of normality were run – Kolmogorov-Smirnov and Shapiro-Wilk tests. The results of both tests for all three measures are presented below:

Table 4. Tests of Normality

	Kolmogorov-Smirnov[a]			Saphiro-Wilk		
	Statistics	df	Sig.	Statistics	df	Sig.
Quiz 2	.149	27	.129	.953	27	.251
Quiz 3	.154	30	.067	.911	30	.016
Final Exam	.070	36	.200*	.976	36	.607

* . This is a lower bound of the true significance.
a. Lilliefors Significance Correction

While the results of Kolmogorov-Smirnov test indicated non-significance on all measures and therefore confirmed the null hypothesis that the data was normally distributed, the Shapiro-Wilk test, which is viewed as "one of the most powerful normality tests, especially for small samples" (Ricci, 2005, p. 20), failed to show non-significance (*p* value is less than .05) on only one measure, that is, Quiz 3, which meant that the null hypothesis was rejected and "the alternative hypothesis that the data are *not* normally distributed" (Larson-Hall, 2010, p. 85) was accepted. As a result, an independent samples t-test (a parametric test) was run on Quiz 2 and Final Exam whereas the Mann Whitney U test (non-parametric test) was performed on Quiz 3.

Table 5 below illustrates the descriptive and inferential statistics belonging to Quiz 2 and Final Exam. The independent samples t-test results indicated that there was no statistically significant difference between the scores of the experimental (M = 6.4, SD = 1.4) and those of the control group (M = 5.4, SD = 1.6), *t* (1.55) as measured by Quiz 2 (*p* = .161); however, the magnitude of the difference in the means was between moderate and large (*d* = .67) (Cohen, 1988). On the other hand, there was a statistically highly significant difference between the scores of the experimental group (M = 25.18, SD = 5.01) and the control group (M = 19.3, SD = 5.05), *t* (3.33) as measured by Final Exam (*p* = .002). The magnitude of the difference, Cohen's *d* (*d* = 4.67), (an indicator of effect size) appears to be very large, which means above 0.8 (Cohen, 1988).

Table 5. Descriptive & inferential statistics: between-group comparison on scores of Quiz 2 and Final Exam

Measures	Quiz 2								Final Exam							
Groups compared	Experimental (N = 18)		Control (N = 9)						Experimental (N = 21)		Control (N = 15)					
	M	*SD*	*M*	*SD*	*df*	*t*	*p*	*d*	*M*	*SD*	*M*	*SD*	*df*	*t*	*p*	*d*
	6.39	1.43	5.44	1.63	25	1.55	.14	.67	25.18	5.01	19.3	5.5	34	3.33	.002*	4.67**

Note. **p* (2-tailed) ≤ .05; **Cohen's *d* (effect size)

Parallel to the Final Exam scores favouring the TIN-S group, Quiz 3 scores in the TIN-S group were statistically significantly higher than those in the TNT group (U = 26.0, p = .000, η^2 = 0.40) as found through the Mann Whitney U test shown below (Table 6). As shown by the eta squared (η^2) value (an indicator of effect size), the magnitude of the difference is very large.

Table 6. The results of Mann Whitney U test for Quiz 3

Groups	*N*	*Mean Rank*	*Sum of Ranks*	*Z*	*U*	*p*	η^2
Experimental	19	19.63	373.00	-3.41	26.0	.001*	.40
Control	11	8.36	92.00				

*p ≤ .05

Consequently, the TIN-S group performed better than the TNT group on all three measurements as compared in terms of means; however, no statistical significance was reached for Quiz 2. There might be several reasons for the non-significant difference between the TIN-S and TNT group as measured by Quiz 2.

Discussion

The study aimed to explore whether the students taking ESP (Legal English) course preferred taking images of notes by smartphone (TIN-S) by smartphone to traditional note-taking (TNT) in their studies, the strategies they employed in making use of these notes, and the possible effects of the TIN-S on students' achievement in the course.

In research question one, the students were asked to what extent they preferred taking images of notes by smartphone (TIN-S) to traditional note-taking (TNT) in ESP classroom. According to the qualitative data collected, the great majority of the participants preferred traditional note-taking (TNT) in ESP classroom since they were not used to the TIN-S because most lecturers in the faculty would discourage them from using the smartphone in class. Some also believed that taking notes by hand in class would help them learn the subject matter better.

In research question two, the students were asked what strategies they employed in using the notes from the TIN-S academically. The main strategies reported by the participants were: reading and selective rewriting (60%); reading and non-selective rewriting (transferring everything in the photo) (20%); and reading only (20%). With respect to the effectiveness of using the TIN-S method, the participants (60%) who read and selected the most important points in the photos and rewrote them in their notebooks stated that they had understood the lecture, and the meaning and use of vocabulary (e.g. terminology, collocations) better and had become able to use the vocabulary in an appropriate way and thus, had become more successful in doing the reading comprehension questions. Similarly, the students (20%) who read the notes in the photos and transferred everything in the photos into their notebooks stated that they had understood the lecture and the meaning of vocabulary (terminology, e.g.

collocations) better. When compared to the TIN-S group, a great majority of the participants (90%) in the TNT group stated that they had read and rewritten their notes and thus, they had been able to understand the lectures and the meaning and use of vocabulary better. In the TIN-S group, the students (20%) who only read the notes in the photos said that they had understood the meaning of vocabulary better. Similarly, one participant in the TNT group who only read her notes explained that she had understood the use of vocabulary better.

In comparison to related previous studies, the current study produced a few similar but mostly different results. Strategies such as 'selecting the most important information from the whiteboard', and 'revising strategies' like *concept mapping*, *making diagrams* or *spidegrams* (e.g. Karjo, 2018) were found to be common whereas students' success rates in using pen and paper method (e.g. Karjo, 2018), and the outcomes of using pen and paper method (Luo et al., 2018) were found to be different. In her quasi-experimental study, Karjo (2018) investigated whether note-taking by using ICT devices (e.g. laptops, smartphones, and tablets) had an effect on the English Department students' comprehension. The students in both experimental and control groups watched videos from TED talks related to their field. While watching the videos, the control group took notes by hand, while the experimental group took notes using their ICT devices. All the participants took a comprehension test on those TED videos. The results indicated that students taking notes by hand performed better in the comprehension test than students who took notes using their ICT devices. Karjo (2018) stated that the participants using ICT devices typed more verbatim like notes (verbatim copying). On the contrary, the students taking notes using pen and paper selected the most important information because they could not write everything they heard as verbatim. In addition, they were able to draw concept mapping or make diagrams. Similarly, in the present study, the students in the control (TNT) group selected the most important information on the white board and while studying, they drew spidegrams and created categories of vocabulary. On the other hand, test results reported in Karjo's (2018) study are different from those in the current study. The test results of students using the pen and paper method are much higher than the test results of students using the same method in Karjo's study.

Another study focusing on the effect of using digital tools versus longhand for note-taking on learners' achievement is Luo et al.'s (2018) study. In their study, the effect of note-taking medium (laptop, longhand) on learners' achievement was analyzed. The results of the study revealed that participants using a laptop for note-taking recorded more notes (e.g. words) than the participants using longhand. It was also found that participants using the longhand method recorded and reviewed their notes. Although similar strategies were used by the students using pen and paper, some differences in the outcomes were identified. The students who used the pen and paper method and rewrote their notes in Luo et al.'s (2018) study were better at text-related learning and image-related learning according to achievement results whereas the students using the TNT (pen and paper) method in the current study understood the lectures and the meaning of vocabulary significantly better when they rewrote their notes for studying.

The use of the strategies by the Legal English students mentioned above involved several important processes. Once students go back to their notes using any of these strategies they engage in some form of 'task repetition' (Bygate, 2001). Bygate (2001, p. 29) defines task repetition as "the kind experienced by learners when they find themselves repeatedly in highly similar communication situations and with the opportunity to build on their previous attempt

at completing the task". The students in the study repeated the tasks written on the whiteboard in the photos through rewriting them into their notebooks and also through reading, reviewing and revising them. One participant reported that she engaged in 'task repetition' through rewriting the notes in the photo:

> *I studied them on my smartphone. Then, I wrote the most important ones in my notebook. Later I found some of the sentences in the course book which include some of the important vocabulary and collocations. Then, I also wrote those sentences into my notebook. Sometime later, I write my own sentences which include those words, so I understood how to use them in a sentence and also their meanings better*.

As the participants were engaged with 'task repetition' through strategy use as stated above, they also received some degree of 'repeated exposure' (Joe, 2010; Nation, 2001) to target language features. Bisson et al. (2014) found that even few exposures to multimodal stimuli led to incidental vocabulary learning and that repeated exposure to stimuli had a bigger effect on vocabulary acquisition, especially during the initial few exposures. Repeated exposure appears to be facilitative in learning both receptive and productive knowledge of a word (Nation, 2001). The results of the present study provide further support for this previous research finding. More precisely, the students in the TIN-S group scored higher on the tests, particularly Quiz 3 and Final Exam which were composed of mostly vocabulary items. When asked about how the students used the photos they took after class, one student reported that she repeated the words and collocations by rewriting them into her notebook:

> *I usually repeat what we did in class by looking at the photos I take and rewrite the words and collocations into my notebook. Moreover, I sometimes put the words into categories as verbs and nouns to understand them better. I also write the words that go together such as 'commit a crime/a tort'.*

The third research question was on the possible effects of the TIN-S method on students' achievement in the ESP course. According to the qualitative data collected from semi-structured interviews and the quantitative data obtained from statistical analyses, the TIN-S method had a great impact on students' success in the course. The positive effect of the TIN-S can be explained from the perspective of 'information processing' (Miller, 1956). Engagement in 'selective attention' (McLeod, 2018) which might lead to students' 'noticing' of target language features (Schmidt, 2001), 'chunking' and 'planning' are key cognitive processes in the theory of 'information processing' (Miller, 1956).

According to the information processing theory the human brain receives and processes the information it receives in the manner of a computer. Miller (1956) proposes that learning occurs when the mind receives the stimulus, processes it, stores it, locates it, and then responds to it. In this theory, the information taken in by the human brain is stored as sensory storage, then it is transferred to the short-term or working memory, and finally it is either forgotten or transferred to the long-term memory as semantic memories (concepts and general information), or procedural memories (processes), or images. The TIN-S group had ample time to go through the stages of information processing. Besides, they had the chance to focus their attention on different aspects each time they revisited their notes. In other words, when the participants read the notes in the photos after class, they had virtually unlimited time to selectively focus their attention on the most important aspects and transfer them to the short-term memory. This process can be described as 'chunking' (Sockett & Kusyk,

2015) – the short-term memory could only hold 5-9 chunks of information (seven plus or minus 2) – where a chunk is any meaningful unit (Miller, 1956). Similarly, the students can also transfer the information to the long-term memory. Here, the students have a chance for 'planning' in the form of TOTE (Test-Operate-Test-Exit) units (Miller, Galanter & Pribram, 1960). Planning is a fundamental cognitive process for learning. In a TOTE unit, the students test to see if they have achieved their goal. They repeat this test-operate cycle until they achieve their goal or abandon it. The TOTE has been effective in producing new things or solving problems. In the extract below, one student expressed that she studied the collocations in the notes as photos and then used them in sentences to understand their usage better and to memorize them easily. Therefore, student B made 'planning' in the form of TOTE units and tested her knowledge through practicing. Another student stated that she categorized some of the words for better understanding. Categorizing is also a stage of TOTE units (Miller, Galanter, & Pribram, 1960).

Learning as an outcome of information processing requires attention; unattended learning is unlikely to happen (Schmidt, 2001). Learning takes place when the learner attends to and notices target linguistic items. However, the human's attentional capacity is limited, therefore there is a limit to what one can attend to (de Bot, 1996; Schmidt, 2001). As Iwanka and Takatsuka (2006) put it, "noticing arises when learners allocate attentional resources to a certain aspect of language. If a learner pays selective attention to a form, for example, it is likely that noticing a form occurs" (p. 22). And the process of noticing facilitates the conversion of input into intake (Schmidt, 2001). "Selective attention is the process of directing our awareness to relevant stimuli while ignoring irrelevant stimuli in the environment" (McLeod, 2018). As students select the things to attend to, they notice certain salient features of the language. According to the 'noticing hypothesis', input only becomes intake for language learning if it is noticed, in other words, consciously registered (Schmidt, 2001). In the study, the participants in the experimental (TIN-S) group showed better improvement than those in the control (TNT) group. In the TNT method, the students had to listen to the teacher and at the same time pay attention to the things the teacher wrote on the whiteboard. Because of limited attentional resources, the students had difficulty in following what the teacher was saying and at the same time selecting the important points on the board to transfer into their notebooks. Therefore, they could not fully concentrate on the lesson and perform note-taking successfully at the same time. For this reason, there is bound to be a trade-off: either participating more actively in the lesson at the cost of missing some of the important information or not being successful in selecting the most important things to take note of, or rather keeping silent and paying more attention to note-taking for fuller notes. On the other hand, the students using the TIN-S by smartphone method did not experience such problems. Since the students did not spend their time on note-taking by hand, they had the opportunity of 'selective attention'. In the extract below, one student highlighted how she attended to and noticed certain language features while the teacher was lecturing:

> *I did not have to transfer the things on the whiteboard into my book. Thus, I had adequate time to listen to the teacher carefully and make meaning of what she said. Also, I had time to read the things on the board and associate them with what the teacher was saying. Therefore, I think that I had a better understanding of the subjects. Later when I read the notes in the photos I took; they became more logical to me.*

As can be seen from the discussion above, this study helped to identify a number of crucial strategies used in digital note-taking by smartphone (TIN-S). Although the participants in Phase 1 and those in Phase 2 initially preferred traditional note-taking, the quantitative results indicated that the TIN-S group performed better than the TNT group. The majority of the TIN-S group further confirmed in the interviews that they benefited from the TIN-S method.

Conclusion

The overall results of both quantitative and qualitative analyses clearly showed that the TIN-S by smartphone method was far more effective than the TNT method. Considered together with the suggested strategies, the TIN-S method can help students to exploit their notes academically. The fact that the TIN-S method appears superior to the TNT method implies that instructors should welcome the use of the smartphone for note-taking purposes in class, but also guide the students in how to make use of this technology more effectively. Preferably, both students and instructors should receive proper training in using the smartphone for note-taking. In the absence of the smartboard, the instructors may also use the TIN-S method by smartphone to keep record of what has been covered in class for future reference. For example, the instructors may check the notes later and make up for any missing information in the next session. They can also benefit from these photos while preparing tests and other teaching materials.

Limitations of the study and recommendations for further research

The present study investigated the use of the TIN-S method by university students. Further studies may focus on the use of TIN-S method by instructors as well as on the comparison of the attitudes of students and teachers towards the TIN-S method. In addition, similar research may reveal different strategies in using the TIN-S method in different subjects, contexts and age groups.

Although the TIN-S method clearly benefitted students in learning Legal English in this study, other individual differences might also have played a role in the success of the students. Cognitive, affective and social factors may be relevant to the TIN-S method; thus, future lines of research may focus on a set of such factors, and more importantly, on the interaction among them. Specifically, cognitive factors (e.g. language aptitude, learning styles and strategies, multiple intelligences, long-term memory capacity), affective factors (e.g. motivation, attitude, anxiety), and social factors (e.g. age, gender, personality, identity, learner beliefs, social distance, cultural beliefs) may constitute interesting topics to be investigated in this area. Besides individual differences, the impact of external factors such as learning differences, prior knowledge, revising after class and the frequency of revision on notes taken (either using pen and paper method or using digital devices) might be investigated. This study focused mainly on the strategies used by the students while and after note-taking.

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Appendices

Appendix A:

ENGL255 LEGAL ENGLISH I COURSE DESCRIPTION

2018-19 ACADEMIC YEAR

FALL SEMESTER

COURSE CODE: ENGL255

COURSE LEVEL: 2ND Semester / 2nd Year

COURSE TITLE: Legal English I

COURSE TYPE: University Core

CREDIT VALUE: (4,0,0) 4

PRE-REQUISITES: ENGL156/ENGL158

CO-REQUISITES: None

DURATION OF COURSE: One Semester

COURSE DESCRIPTION

ENGL 255 is a sophomore legal English course for the students in the Faculty of Law. It is designed to help students improve the level of their English partially to B1 level, as specified in the CEFR. Contact hours are 4 hours per week. The main focus of the course is on the development of reading, writing, listening and speaking skills in legal English as well as legal jargon.

AIMS, OBJECTIVES AND LEARNING OUTCOMES

The aims of the ENGL 255 course are:

- to equip students with skills, structures and lexicon essential for the legal profession.
- to highlight the use of English in the legal environment.
- to equip students with effective speaking, reading, listening and writing skills in legal contexts.
- to enable students use basic level Legal English required in the work being carried out in law offices, postgraduate studies abroad and in the global market.
- to help students develop a positive attitude towards Legal English

The objectives of the ENGL 255 course are:

- to familiarize students with specific legal contexts
- to help students recognize the importance of Legal English as a means of

achievement in the Legal Profession
- to introduce the legal terminology related with The Legal Profession, Criminal Law and Law of Tort
- to provide regular opportunities for students to use the structures and the terminology while expressing themselves in legal contexts
- to help students understand and differentiate the main ideas and the detailed information in a legal text
- to help students understand legal documents
- to provide students with comprehension tasks while reading the legal texts
- to provide students with subject specific topics and authentic texts
- to provide students with clear and original models at legal documentation
- to provide students with clear and memorable presentation of new legal terminology and structures
- to provide students with a number of regular and varied practice of legal vocabulary
- to expose students to high frequency legal words and collocations
- to create opportunities for students to use new vocabulary in personalized legal contexts
- to provide students with the opportunity of speaking about legal profession, crime and punishment and types of tort.

The learning outcomes of ENGL255 course are:

The students will be able to:

- recognize and comprehend the legal vocabulary regarding the Legal Profession, Criminal Law and Law of Tort in reading texts
- comprehend and categorize the legal vocabulary related with the Legal Profession, Criminal Law and Law of Tort in reading texts
- comprehend informative legal texts, letters and case reports about the Legal Profession, Criminal Law and Law of Tort
- identify the format and order the paragraphs of a legal text
- analyze and recognize the specific structures and legal vocabulary in a legal text, letter or a case report
- identify and categorize the subject specific words under the appropriate headings
- identify and use different parts of speech of the subject specific vocabulary
- recognize and use subject specific collocations
- identify and comprehend appropriate use of prepositions in specific topics
- comprehend and use the language for negotiation
- identify the main ideas of the paragraphs of a legal text by matching the headings with the paragraphs
- comprehend telephone conversations between lawyers and their clients

- ask questions and give opinions on the focused topics

CONTENT & SCHEDULE

Weeks	Dates	Content	Assessment
1	24 – 28 September	• Introduction to the course and the assessment system.	
2	1 – 5 October	UNIT 1 • The legal profession • What do they do? • Collocations	
3	8 – 12 October	UNIT 1 • Reading 1: The Practice of Law • Prepositions • Reading 2: Solicitors and Barristers • Types of Legal Areas	
4	15 – 19 October	UNIT 1 • Reading 3: Sanjay Pritam • Vocabulary Practice: Law vs. Legal • Identifying mistakes • Reading 4: Working with a Lawyer • Writing Exercise	
5	22 – 26 October	UNIT 2 • Lead in • Speaking & Vocabulary: Crime-related Words • Vocabulary Practice: Crime Types • Vocabulary Practice: Matching crimes with descriptions.	
6	29 October – 2 November	UNIT 2 • Passive Voice: Introduction • A Crime Story • Legal System in the US • Active vs. Passive • Identifying mistakes	**Quiz 1 (10%)**
7	5 – 9 November	UNIT 2 • Reading 1: Two Kinds of Law • A Criminal or Civil Matter • Prepositions	
8	12--16 November 15 November- National holiday	REVISION	

9	19 – 23 November	Mid-term examination Period	**Mid-term Exam (35%)**
10	26 -30 November 1 December-religious holiday	Mid-term examination Period	**Mid-term Exam (35%)**
11	3 – 7 December	Unit 2 • Speaking: A Serious Assault Case • Reading 2: Felonies and Misdemeanors • Sentence Types	**Quiz 2 (10%)**
12	10-14 December	Unit 3 • Lead in – Definition of Tort • Vocabulary Building • Types of Torts	
13	17-21 December	Unit 3 • Reading 1 : What is Tort Law? • Reading 2: Tort Law • Reading: Three Types of Torts	**Quiz 3 (10%)**
14	24 – 28 December	Unit 3 Unit 3 Revision Materials	
15	3-16 January	**Final exam period**	**Final Exam (35%)**

Appendix B: Background Questionnaire (Phase 1 & 2)

Instructions: In this questionnaire, we aimed to collect data about your background and if you had any training in note-taking before. Please answer the following questions.

1. Age: (Please circle the correct answer.)

a) 18-22 b) 23-27 c) 28-32 d) 33 and above

2. Gender: (Please tick (☒) the appropriate box.)

☐ Male ☐ Female ☐ Other

3. Nationality: _____

4. When did you first start taking notes? (Please circle the correct answer.)

a) Before primary school
b) In primary school
c) In secondary school
d) In high school
e) At the university

5. Have you had any training in taking notes before? (Please check (☒) the appropriate box.)

☐ Yes ☐ No

If your answer is 'Yes', please specify when and where you had training in note-taking:

_____

_____

Appendix C: Semi-structured interview (Phase 1)

Instructions: In this interview, we aim to get your opinions about note-taking in class. Please answer the following questions.

1. Do you take notes in class?
2. What do you take as notes?
3. When do you think it is necessary to take notes?
4. How often do you take notes?
5. How do you take notes?
6. What is the best method of taking notes for you?
7. What do you do with the notes you take? How do you use them?

Appendix D: Semi-structured interview (for TIN-S group) (Phase 2)

1. Which things on the whiteboard did you take photos of as note-taking?
2. Did you use them after class?
3. If your answer is 'Yes', for what purposes did you use them after class?
4. How frequently did you use them after class?
5. How did you use them?
6. Do you find this method (taking photos as note-taking) useful for your course studies? If your answer is 'Yes', how?

Appendix E: Semi-structured interview (for TNT group) (Phase 2)

1. Which things on the whiteboard did you take down as notes?
2. Did you use them after class?
3. If your answer is 'Yes', for what purposes did you use them after class?
4. How frequently did you use them after class?
5. How did you use them?
6. Do you find this method (taking notes by pencil and paper) useful for your course studies? If your answer is 'Yes', how?
7. Would you prefer any other methods for note-taking in class?