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Research and innovation in teaching and learning are prime topics for the *Journal of Instructional Technology and Distance Learning* (ISSN 1550-6908). The Journal was initiated in January 2004 to facilitate communication and collaboration among researchers, innovators, practitioners, and administrators of education and training involving innovative technologies and/or distance learning.

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Editorial

Relevance and Accountability

Donald G. Perrin

In the late 1950s, Sputnik stimulated Federal Funding for curriculum reforms in the United States. The Physical Sciences Study Committee (PSSC) and the Biological Sciences Study Committee (BSSC) were representative of programs to rethink and refocus K-12 and higher education to meet future needs in science, technology, and mathematics. Half a century later there is a shortage of scientists, engineers, technicians and health-care professionals at a time when there is a surplus of persons for other jobs and high unemployment. Outsourcing and offshoring are often blamed for these problems, but government and educational policies and programs are also at fault.

National Education Policy

K-12 Schools are controlled locally, and institutions of higher education are independently governed. Federal intrusion has been resisted except funding for research and development and special programs. In the early 1960s, the National Defense and Education Act stimulated research and innovation through curriculum and technology projects. They demonstrated that a simple machine could teach a 1000 word vocabulary to a three year old. Behavioral and cognitive sciences studied alternative methods of learning. New structures such as the Bloom Taxonomies were implemented to design and structure learning. Design tools such as Mager's *Behavioral Objectives* and Kemp's *Instructional Design* expanded the science of teaching and learning. Group learning was complemented by individualized learning that was self-paced and interactive. Computers were used in teaching and learning. Egg-crate classrooms became open spaces, and students were taught to actively manage their own learning.

Termination of funding caused successful innovative programs to return to traditional methods. Technologies and materials were beyond the budgets of most schools. Personal computers were tried in the 1980s, and significant growth occurred in the late 1990s when government and local funds provided computers, software and networks to prepare the workforce of the future.

Institutions of Higher Learning

Universities are slow to make internal changes. The job market demanded more scientists and engineers, yet faculty opposed changes that would diminish the classical arts and sciences. National policy did not dictate or finance expansion in needed areas so, for the most part, universities followed their traditional model. Even in the 1980's when increasing numbers of students were seeking a job on graduation, academia was slow to respond. Schools of Education had a predominance of senior tenured faculty in need of retraining, and schools of Science, Mathematics, Business and Engineering found recruiting difficult because industry paid much higher salaries.

Accountability for placing graduates in their area of expertise is a problem. For example, a school for Radio, Television and Film close to Hollywood, CA place only 3% of its graduates in those industries. The case is reversed in Schools of Medicine and Nursing. For many years the American Medical Association limited the number of graduates to prevent oversupply. In many states, schools of Nursing do not have the capacity to meet demand. The result is employment of medical practitioners from foreign countries that can meet local credentialing requirements.

Relevant Educational Programs

Another problem is getting the specific training required by many industries. The Silicon Valley requires creative skills beyond the capacity of most school programs. Business, Industry and Government must work together to have a coherent and relevant national policy and funding.

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Editor's Note: In distance learning, authentication of student identity is a significant issue. Technology provides a number of solutions discussed in this paper.

Biometric Authentication to Prevent e-Cheating

Qinghai Gao

USA

Abstract

In recent years, distance learning has been steadily gaining popularity. More and more courses are being taught online. Due to the nature of virtual presence, authenticating students becomes a challenging issue. The traditional password-based method of authentication is inadequate because passwords can be shared easily. Naturally, biometrics is proposed as an alternative authentication mechanism for the reason that biometrics is part of us and can't be shared easily. In this paper, we will briefly survey commonly used methods to prevent e-cheating and look at existing techniques that can help to achieve this goal. In particular, we focus on how the biometrics system works, what biometrics have been incorporated into commercial e-proctors to detect e-cheating, and potential barriers that could affect the adoption of biometric technology in distance learning. Then we propose a new approach to developing a privacy-enhancing biometric system to authenticate remote students' credibility for online education and avoid issuing college degrees to students who did not honestly take the required courses.

Keywords: Biometrics, authentication, e-Cheating, fingerprint, sub-template, security, privacy

Introduction

As high speed Internet becomes available and all types of information can be found on the web, traditional methods of acquiring knowledge by reading a book or discussing with an instructor have been challenged by the new method: search the Internet. Along with this trend, Distance Learning has been steadily gaining popularity. In *Ambient Insight* (Carter, 2011) reported that the number of college students taking only-online courses is expected to triple by 2015. The Babson Survey Research Group reported (Allen & Seaman, 2010) that

“Sixty-three percent of all reporting institutions said that online learning was a critical part of their institution's long term strategy; Over 5.6 million students were taking at least one online course during the fall 2009 term; The 21% growth rate for online enrollments far exceeds the less than 2% growth of the overall higher education student population (2010); Nearly 30% of higher education students now take at least one course online; Sixty-six percent of academic leaders rated the learning outcomes in online education as the same or superior to those in face-to-face.”

Another study (Boghikian-Whitby & Mortagy, 2008) showed that online sessions for traditional undergraduate are just as effective as F2F (face-to-face) sessions, and that non-traditional (adult) students benefit more from taking online courses than traditional students.

To meet this need and to attract remote students, many colleges and universities have gone beyond their ordinary boundaries and established e-campuses all over the world. They offer online courses as replacements or as supplements to the traditional classroom based F2F teaching. A significant portion of the US students take online courses.

However, online teaching makes it extremely difficult to deal with one problem: student dishonesty in assessment (Rogers, 2006). Apampa et al. (2010) pointed out that assessment is the most important issue in education. Although there is a report (Grijalva et al., 2006) indicating that

there are no significant differences in cheating rates for online and F2F courses, more studies found that cheating rates are higher for online courses. Chapman et al. (2004) reported that

“37% of the students stated they would give answers to someone on a test, 63% would use a ‘stolen’ copy of an exam to study for a test, 42% would participate in a group involved in e-cheating, and 14% would participate in a group involved in e-cheating when the instructor warned of electronic surveillance and word-of-mouth corroborated the instructor’s statement. It is noteworthy that the percentages dropped substantially (to 8%, 40%, 14% and 4% respectively) if the scenario involved an acquaintance rather than a friend.”

King et al. (2009) reported that

“the majority of the students held the belief that more cheating occurs in online courses. In fact, about three-fourths (73.6%) of the respondents have the perception that it is easier to cheat in an online versus a traditional course.”

Lanier (2006) reports 41% of the students admitted to cheating during online courses while only about 4.4% of students admitted to cheating during traditional lecture courses. Kennedy et al. (2000) found that

“64% of faculty and 57% of students reported that it would be easier to cheat online than face-to-face, although note that teaching or taking an online class reduces this perception.”

Harmon et al. (2010) reported that students are more like to cheat taking unproctored multiple choice exams for online courses than for equivalent F2F courses. To reduce the risk, they suggest instructors to proctor some exams and aggressively use question shuffling tactics. Spaulding (2009) indicated that

“While maintaining academic integrity is of utmost importance in any course of study, it often proves to be an even greater challenge within the online format. Online instructors are continually searching for various means to ensure that academic integrity is addressed and adhered to by all students in all courses.”

All of these reports illustrate that cheating for e-exams is a serious problem. Different methods have been proposed (Apampa et al., 2010; Christe, 2003; Rowe, 2004; Levy & Ramin, 2007) to solve the problem and alleviate the concern of online instructors, such as:

- Design open-book exams
- Use discussions, essay, and other written projects
- Reduce the percentages of exams on final grades
- Use a large pool of questions to randomly generate exams for each student
- Require students to take important exams on site
- Abandon the offering of e-learning courses

These methods are helpful but inadequate. For example, in a typical e-exam, a student is only required to provide credentials (username and password) in the very beginning. Once signed in, he is authenticated for the duration of the entire session. Therefore, a student can have somebody else take the exam for him simply by sharing his credentials.

Another proposed solution to the problem is to use biometrics for students’ authentication. Commonly used user authentication methods include the following three categories: something the user knows (knowledge); something the user has (token); and something the user is (biometrics). McGinity (2005) pointed out that *“biometrics will increasingly be part of our everyday life”*. Basu and Muylle (2003) listed seventeen authentication mechanisms, including

biometrics. As Rodwell et al. (2007) pointed out, “*no single method can be applicable to all authentication contexts, adequate and effective user authentication remains an ongoing research problem*”.

We believe that even though more research needs to be done to make biometrics a more robust verification technology, biometrics-based multifactor authentication is the ultimate solution to the e-cheating problem.

The rest of the paper is organized as the following. Section 2 will introduce how biometrics system works and survey literature proposals on using biometrics for e-learning. Section 3 introduces three biometrics-enabled commercial products designed for proctoring e-exams. Section 4 describes the two main barriers that could affect the acceptance of biometric systems for user authentication. In section 5 we propose a solution to alleviate the privacy concerns of biometric users. Lastly, section 6 will summarize the paper and propose future research direction.

Biometrics Authentication

Biometrics is defined as the identification of an individual based on physiological and *behavioral* characteristics. Commonly used physiological characteristics include face (2D/3D facial images, facial IR thermogram), hand (fingerprint, hand geometry, palmprint, hand IR thermogram), eye (iris and retina), ear, skin, odor, dental, and DNA. Commonly used behavioral characteristics include voice, gait, keystroke, signature, mouse movement, and pulse. And two or more of the aforementioned biometrics can be combined in a system to improve the recognition accuracy. In addition, some soft biometric traits like gender, age, height, weight, ethnicity, and eye color can also be used to assist in identification.

Generally a biometric system is designed to solve a matching problem through the live measurements of these characteristics. It operates with two stages. First, a person must register a biometric in a system in which biometric templates will be stored. Second, the person must provide the same biometric for new measurements upon identification. The output of the new measurements will be processed with the same algorithms as those used at registration to generate a new template, which will be compared to the registered template. If the similarity is greater than a system defined threshold, the verification is successful; otherwise it will be considered unsuccessful. Due to the fuzzy measurements of biometrics, some error-correction coding is needed. Table 1 lists a few biometrics and their features for identification and/or authentication.

Recently a couple of proposals on using biometrics for user authentication deserve attention. Rodwell et al. (2007) proposed an acoustic biometric authentication system, in which voice signals are generated by the larynx, propagated internally through the physiological structures of human head, detected in the ear and around the mouth separately, and finally filtered at 25 pre-selected spot-frequencies to produce an absorption template. This method is language-independent and can be utilized to perform continuous user authentication beyond point-of-entry. However, significant amounts of training are needed for good recognition performance. As Nazar et al. (2008) pointed out that one limitation of most biometric system is the reliance on special hardware for biometric data collection. They designed a mouse dynamics based biometric authentication system that can overcome this restriction because mice are readily available to the majority of computer systems. The mouse dynamics collect information on the types of mouse actions, including mouse-move, drag-and-drop, point-and-click, and silence, the traveled distance (in pixels), the elapsed time (in seconds), and the movement direction,

Table 1
Biometric features for authentication

Biometrics	Identifying Features	Error Correction	Ref.
Keystroke	Duration, latency: a computer user's typing patterns consist of durations for each letter typed and latencies between keystrokes	Discretization	Monrose et al., 1999
Voice	Text-dependent or text-independent speaker utterance units	Discretization	Monrose et al., 2001
Signature	Dynamic signature features, such as pen-down time, max forward V_x (Velocity in x direction), max backward V_y (velocity in y direction), time when the last peak of V_x or V_y occurs, pressure, height-to-width ratio, and so on.	Averaging	Hao et al., 2002
Face	Facial features: positions, sizes, Angles, etc	RS code	Chen & Chandran, 2007
Iris	Digital representation of iris image processed with Gabor wavelet	RS code Hadamard	Hao et al., 2006
Fingerprint	Minutiae points: ridge ending and ridge bifurcation	Quantization	Uludag et al., 2005
Palmprint	Unique and stable features such as principal lines, wrinkles, minutiae, delta points, area/size of palm	RS code	Kumar & Kumar, 2008
Head	Acoustic signals modulated by physiological structures of human head	Neural-network	Rodwell et al., 2007
Mouse	Types of mouse actions, such as mouse-move, drag-and-drop, point-and-click, and silence; traveled distance (in pixels); elapsed time (in seconds); and movement direction	Neural-network	Nazar et al., 2008

Four other factors, such as desktop resolution, mouse cursor speed, mouse button configuration, and hardware characteristics, which could degrade the identification accuracy, have to be taken into consideration. The authors (Nazar et al., 2008) indicated, “*Unlike traditional biometric systems, Mouse Dynamics biometrics might not be appropriate for static authentication at the beginning of a session (e.g. login) since the data capturing process could take some time. However, it can be used to track reliably and continuously legitimate and illegitimate users throughout computing sessions*”. We believe that the head acoustic signals and the mouse dynamics are promising biometrics for remote user authentication.

In fact, a few proposals on biometric authentication have been developed in the context of e-learning. Levy and Ramin (2007) proposed an approach to incorporating a random fingerprint for user authentication. Flior and Kowalski (2010) presented a method for providing continuous user authentication in online examinations via keystroke dynamics. Pentead and Marana (2009) proposed using face images captured on-line by a webcam to confirm the presence of users throughout the course attendance. Alotaibi (2010) also proposed using fingerprints for E-exams. Rabuzin et al. (2006) and Asha et al. (2008) proposed combining several different biometric traits in the field of e-learning. In all these proposals a webcam is required to monitor the real-time activities of an exam-taking student a solution to the password sharing problem. Another solution to the credential sharing problem is to ask students to re-authenticate themselves with their live biometrics for a few times for the duration of an e-exam, in case webcam is not available.

Not only biometrics is being proposed as the required authentication methods for college students, many online certification programs also start using biometrics for authentication. For example, the defensive driving course provided by American Safety Council requires course taker to choose one of two traits for authentication during the training: voice or keyboard typing biometrics. To register the chosen biometric a training session is conducted before the course starts. If voice is selected, the taker needs to read a sentence; if the keyboard typing is selected, the taker needs to type a sentence a few times. During the training session, the software will ask the taker to read or type the same sentence at random times (<http://www.americansafetycouncil.com/>) during the course.

As a rule of thumb, it is necessary to ask students to provide two or more biometrics multiple times for the duration of an e-exam, even though it may cause some inconvenience. Behavioral biometrics, such as keystroke and mouse dynamics, can provide continued authentication without introducing extra work to a user. Another advantage of behavioral biometrics is that they are much more difficult to steal by an impostor. However, false authentication rates can be very high for behavioral biometrics if a user makes sudden behavior changes. On the contrary, physiological biometrics, such as fingerprint, face, and iris, easier to be stolen, are immune to behavioral changes and offer more reliable authentication with some extra collaboration from a user.

In sum, a good authentication system should include one physiological biometrics and one behavioral biometrics in addition to the traditional account information (username and password). Some commercial products offer this combination, as shown in the following section.

Commercial biometric products for proctoring E-exams

Recently commercial products of using biometrics to proctor e-exams remotely are becoming available. At least three products (Lardinois, 2008) have been adopted by some colleges and universities for their online courses. The first one is named Secureexam, a remote proctor made by Software Secure. The second one is named Webassessor, made by Kryterion. The third one is named ProctorU, made by Axicom. A brief description for each product is given below.

- **Secureexam Remote Proctor**, Software Secure Inc. (<http://www.softwaresecure.com/>)

Secureexam Remote Proctor, a small device which features a fingerprint scanner, microphone, and a video camera with a 360 degree view. To start an exam, students need to provide their fingerprints for identification. During the exam, the microphone and video look out for anything suspicious like an unknown voice or movement on the camera.

College example: Troy University, New York University

Price: \$150 per student

- **Webassessor**, Kryterion Inc. (<http://www.kryteriononline.com/>)

Kryterion's Webassessor uses face image captured by webcams, and keystroke biometrics (typing styles) captured by software to authenticate the test taker and alerts the proctors if there is a change when somebody else has taken over.

College example: Penn State University

Cost: \$50 ~ \$80 per student

- **ProctorU**, Axicom Corp. (<http://www.proctoru.com/>)

The system gathers some personal data from a variety of databases, including criminal files and property records, and uses the data to ask students a few questions,

such as address, employers, etc. Students need to answer the questions correctly before they can start the exams. In order to use ProctorU, each student also needs to reserve a time slot for an exam and has a webcam ready that can monitor the exam environment. With a webcam a human proctor would remotely guide a student in the process of starting an exam.

College example: National American University

Cost: \$10 per student

Overall, these products provide instructor with technological solutions to prevent e-cheating by combining both conventional password-based authentication with modern biometrics-based authentication. However, there are fundamental problems that could potentially affect their acceptance, as discussed in the following section.

Privacy-enhanced biometric system

Biometrics is part of human body and can't be changed or modified easily. Biometric applications often raise a series of issues that can prevent its wide acceptance. Among them the security and privacy concerns of biometric information are regarded as more important than other issues. Particularly, there are two main barriers that prevent the wide application of biometric systems.

The first barrier is technical: biometric measurements are non-exactly reproducible. Typically two measurements of a same biometric will give two similar but different results. To alleviate the problem, a practical biometric system has to be designed to tolerate various amounts of errors, depending on the security requirements.

The second barrier is the privacy issue. In biometric systems, biometric data has to be saved in a centralized database or distributed on smart cards. Potential users of biometrics are unwilling to give out their biometric data because they are concerned how their biometric data will be used, for what purpose, and whether their biometric data will be protected sufficiently. The conclusion to this concern is that biometric data needs to be protected with cryptography. However, due to the non-exact reproducibility biometric data cannot be protected with one-way hash function like SHA-1. Other effective algorithms to protect biometric templates have yet to be discovered. Typically, there are two goals in securing biometric data. The first goal is to achieve the one-way transformation from raw image to template: it should be computationally difficult to regenerate a raw image from a template. The second goal is to generate multiple independent biometric templates from one image in order to reuse the biometric.

Currently, the aforementioned commercial products for proctoring e-exams have some technical capability to deal with the non-exactly reproducibility problem. However, they do not have built-in functionality to protect the privacy of user's biometrics. In this paper, we propose using randomized fingerprint minutiae (points at ridge ending and ridge bifurcation) subtemplate to authenticate user.

The idea for this proposal is based on the observation that the majority of human fingerprints contain large number of minutiae points and not all of them are needed for verification. That is to say, a subset of the minutiae points is adequate for successful authentication. And utilizing a randomly selected subset of minutiae points protects the privacy of the original fingerprint.

Fig. 1 gives one example of a fingerprint image, its original minutiae template, and its subtemplates with 25 and 50 minutiae points.

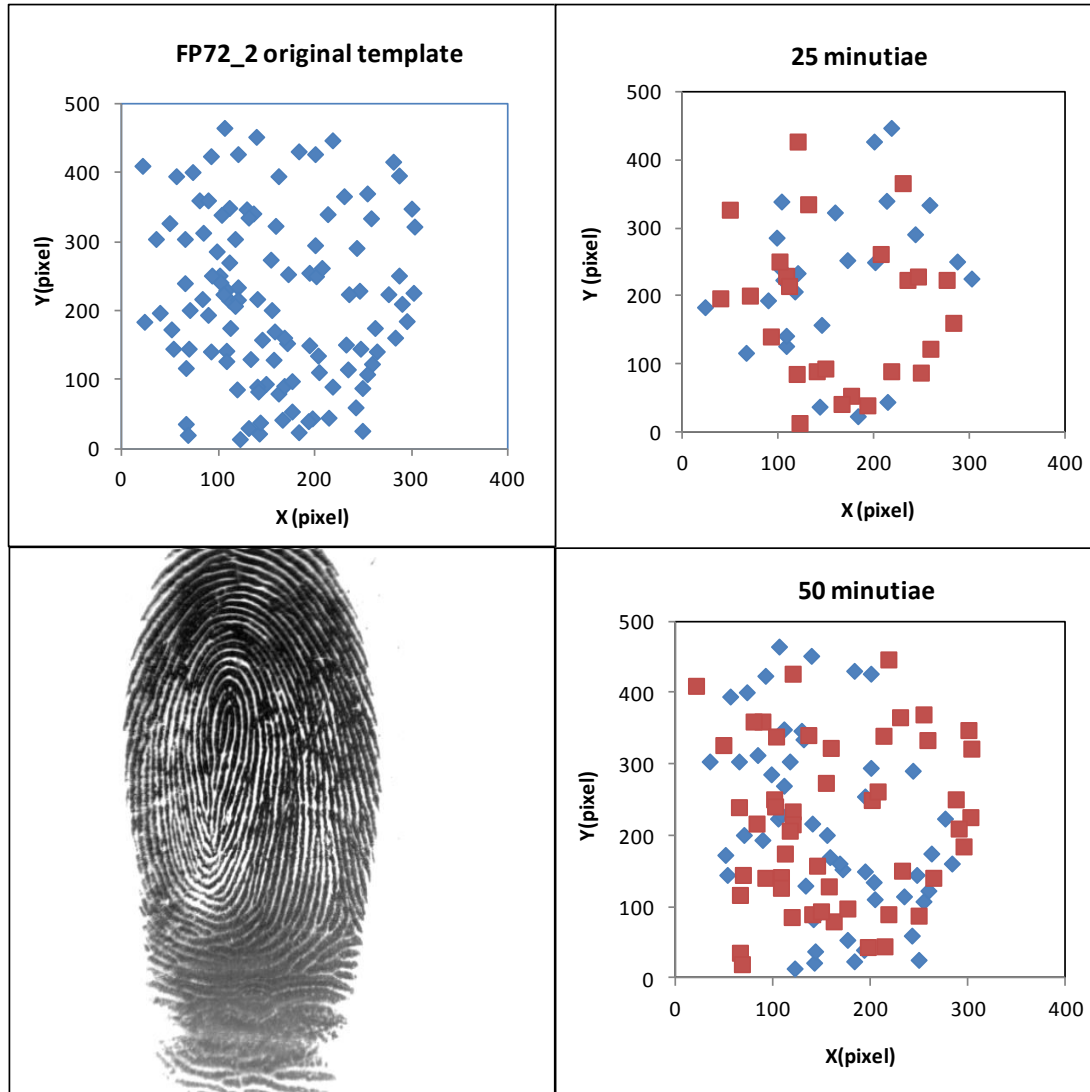


Fig. 1 Fingerprint 72_2 and its subtemplates

The fingerprint image in Fig. 1 is obtained from DB1 of FVC2004 (<http://bias.csr.unibo.it/>). The original minutiae template was extracted from the image with NIST fingerprint software (<http://fingerprint.nist.gov/>). The subtemplates were obtained by randomly selected 25 or 50 minutiae from the original template. Each plot for the two graphs on the right-hand side in Fig. 1 actually contains two different subtemplates, marked with blue diamond and red square, respectively.

Fig. 2 shows the minutiae distribution for all the fingerprints in DB1 of FVC2004 (containing 880 fingerprints). Now the question is that how many minutiae points are needed for successful authentication. To answer this question we randomly selected a number of minutiae points from the original fingerprint template and construct a subtemplate with them. Then we match the newly constructed subtemplate with the original full template to obtain a match score. We repeated the experiment 50 times with varying numbers of minutiae points in the subtemplates. The results are given in Fig. 3 and Table 1.

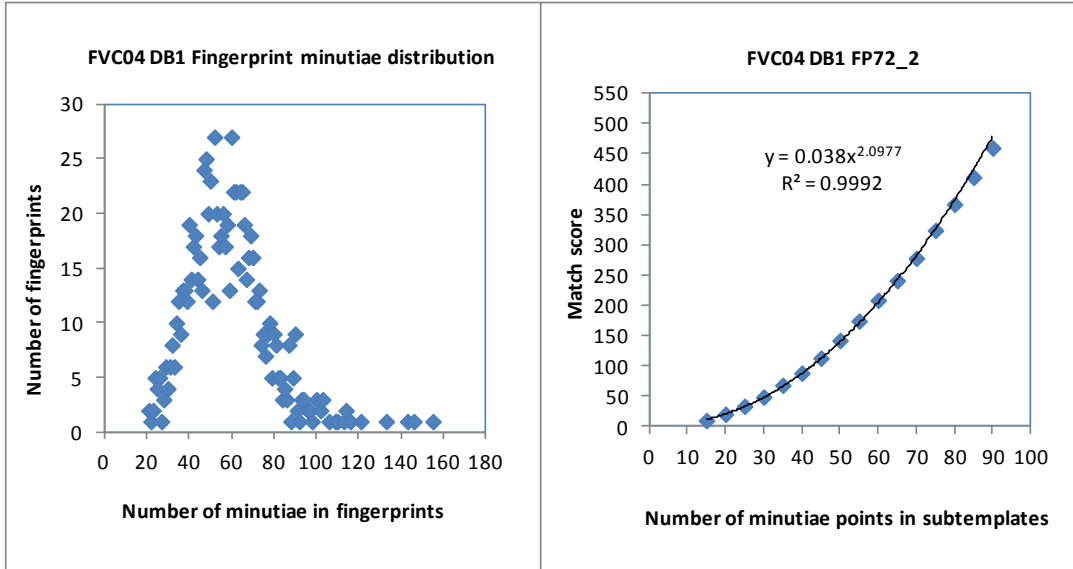


Fig. 2 Minutiae distribution

Fig. 3 Effects of minutiae count on match

**Table 1
Effects of the number of minutiae on match score**

# Minutiae	Average score (x)	Standard deviation(σ)	x-3σ	x+3σ
15	10.18	4.62	-3.68	24.04
20	20.53	6.22	1.87	39.19
25	33.67	7.76	10.39	56.95
30	48.95	8.27	24.14	73.76
35	68.41	10.82	35.95	100.87
40	88.37	12.8	49.97	126.77
45	113.1	13.83	71.61	154.59
50	142.3	13.25	102.55	182.05
55	174.4	17.15	122.95	225.85
60	208.7	17.57	155.99	261.41
65	241.1	19.57	182.39	299.81
70	278	18.66	222.02	333.98
75	324	22.73	255.81	392.19
80	367	21.34	302.98	431.02
85	411.6	17.41	359.37	463.83
90	460	21.94	394.18	525.82

According to the NIST fingerprint software (<http://fingerprint.nist.gov/>), the threshold for successful matching is equal to 40. As can be seen from Fig. 3, only about 30 minutiae points are required to obtain such a matching score. If the standard deviation is taken into account (as shown in Table 1), a template with 40 minutiae points can guarantee a successful match. Therefore, a fingerprint with more than 40 minutiae contains some redundancy.

However, another problem can be found by looking at the Fig. 2. That is, some fingerprints contain less than 40 minutiae points. In fact, this problem can be solved by asking a user to provide multiple fingerprints upon registration, the minutiae points in all of which will be combined to meet the 40-minutiae requirement.

In summary, the proposed new fingerprint authentication system will only store a subtemplate of a user's fingerprint(s) containing about 40 minutiae points. Since the subtemplate is a random selection of its original template and it only contains partial information about a user's fingerprint, it protects the user's privacy. Compromise of the enrolled subtemplate does not render the entire fingerprint(s) unusable.

Conclusion and Future Research

In this paper we reviewed the commonly used methods to prevent e-cheating and attempted to answer the question whether they have helped to achieve the goal of eliminating student dishonesty in distance learning. In particular we looked at how biometrics can provide an effective solution to the problem and briefly surveyed the existing proposals of using biometrics to authenticate remote students. We looked into three commercially available products that have been tested by some universities to proctor e-exams. And we proposed a privacy-enhancing fingerprint authentication scheme to protect user's privacy. Future research will be conducted on combining public-key cryptography and existing secure web technology with the e-proctors to design secure and privacy-enhanced remote proctor system.

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Editor's Note: It is a fact of life that, given the opportunity, some students will "cheat" to enhance their test scores. In some instances, cheating may actually contribute to learning. But who is cheating and how much is difficult to assess as this study shows. Perhaps we should explore performance testing, simulations and creative activities that involve higher levels of learning – analysis, synthesis, and problem solving – instead of designing tests where there is only one correct answer to each question.

Online Exam Cheating: A Natural Experiment

**Thomas Brothen and Gail Peterson
USA**

Abstract

In this article, we first review research that is unsettled as to whether online test cheating actually is a problem. This research base is somewhat thin because studies of the issue are not simple to conduct. Although the current state of research on the topic is far from definitive, our hypothesis derived from it was that given an opportunity to gain points, students will cheat. Second, we report a test of this hypothesis with a quasi-experiment afforded by a computer system crash during a proctored online exam. We allowed students affected by the crash to take their exams unproctored and their scores were higher than those of other students. However, several other data indicated that a conclusion of "cheating" might not be justified. Finally, we suggest that a correction factor might be useful for instructors administering online exams and review other ways to ameliorate concerns about online cheating.

Keywords: online, computer, exam, test, unproctored, proctored, cheating, cheating research, natural experiment, quasi-experiment,

Online exam cheating: A natural experiment

Trenholm (2007) reviewed the literature on students' cheating as they take online tests and suggested that although cheating behavior appears to be increasing, the research in this area is thin. The increase in cheating has occurred, he asserted, because students find the temptation to cheat in online courses too great to resist. He also asserted that with the burgeoning growth in online courses, more research is needed to assess their integrity. Our review of recent research suggests there is less agreement than one might expect about the issue of online exam cheating. For example, Spaulding (2009) surveyed online and face-to-face students in his own courses and found no differences between these two methods in students' perceptions of academic integrity. He concluded that perceptions of academic dishonesty in online courses may be overblown. Similarly, a study by Yates and Beaudrie (2009) of a large number of courses taught in a community college's online math program compared grades and found no differences between those sections delivering proctored exams and those that did not. Englander, Fask, and Wang (2011), in turn, critiqued Yates and Beaudrie's study for possible selection bias because the courses and students were not randomly assigned to condition.

Support for the contention that online exam cheating is a problem comes from Harmon and Lambrinos' (2008) regression modeling study of courses taught using proctored or non-proctored testing conditions. Their correlational study indicated that cheating was very likely to have occurred in their non-proctored condition because important educational variables such as GPA and class year predicted exam performance better in the proctored condition. They contended that the variable of cheating accounted for a disproportionate amount of the variance (i.e. overshadowed the effects of GPA, etc.) in scores for unproctored students, whereas it could not affect scores of students in the proctored condition.

On the other hand, some researchers suggest that instructors have been looking at the wrong issue when asking whether students will “cheat” on online exams. For example, Wellman’s (2005) findings complicate the matter by introducing the issue of differential learning that occurs when students know they will have proctored vs. unproctored exams. He randomly assigned pharmacy students to either online proctored or unproctored quizzes for two course units. Whereas he did not find performance differences on the quizzes so delivered, an ungraded posttest revealed a significant amount of increased learning for the proctored students. He concluded that the proctored students studied more or better and that led to better learning. This suggests that his unproctored students learned less and thus needed to cheat to perform as well as proctored students. Nevertheless, the resulting score similarity between groups provides no direct support for a contention that cheating occurred. Taking another differential learning approach, Rakes (2008) argued that if online students typically use their books to take online tests, they should be taught how to do that effectively. However, she found that the effects of her tutoring program to help students better take an open-book online midsemester exam dissipated by the time of the final exam. Rakes concluded that given students’ low ability to take open book tests effectively, using their books while taking online exams may not be any easier for students than if they followed an honor code that proscribed using their books (i.e., cheating). This suggests that the development of effective honor codes as a solution to the “problem” of cheating (e.g., Mitchell, 2009) may not even be relevant to all forms of it.

In summary, the issue as to whether students are cheating on online tests, and raising their grades as a result, has not been settled—at least as far as the studies reviewed here can attest. A recent study by Mastin, Peszka, and Lilly (2009) suggests a working hypothesis worth considering. Mastin et al. randomly assigned students to two groups—one took an honor pledge against cheating and the other did not. Then, both groups engaged in a test-like computerized numerical “research” task. They could easily cheat on it to receive bonus points but, unknown to them, their cheating behavior was monitored and recorded. The honor code did not affect cheating and, importantly for our purposes here, both groups cheated on the task. Although the Mastin et al. study did not involve an actual course exam, we believe it is reasonable to hypothesize that given an opportunity to gain points on an unproctored online exam, students will cheat.

We report here the results of a natural experiment that allowed a quasi-experimental test of the above hypothesis. A computer system crash presented us with the opportunity to gather data as to whether students would “cheat” on a final exam. We hypothesized that, given findings in the literature, the students so affected would engage in behavior that increased their exam scores beyond what they would have been in the proctored environment.

Method

The second author of this paper taught a hybrid online/live Theories of Learning course during the Fall Semester 2011 at a large Mid-Western university. Specifically, students attended class one day each week and did online activities for the rest of their assignments. The live class period consisted of the instructor presenting a preview of the week’s assignments and conducting a question/answer class discussion. Students also had a textbook reading assignment and a 1 hr online lecture to watch on their own schedules. After reading their textbooks and watching the lecture, students had to complete two online quizzes by weekly deadlines. These quizzes randomly drew items from large item pools and differed on each administration. The first, a 20 minute mastery quiz (Bloom, 1976) about major concepts and figures in that week’s assignment, consisted of 10 fill-in-the-blank questions worth .2 course points each. Once students achieved 80% mastery on this, they could take a 10 item multiple choice (MC) chapter quiz worth 10 points. They could take it up to 3 times and their best score counted. Finally, they could do an extra credit matching quiz up to 3 times that covered major concepts and learning theorists and

was worth 3 points. At the end of the semester, they signed up to take an 82 MC item final exam in a computer testing center on campus. The center accommodated 50 students at a time and possible exam times extended from an early final on Friday through Thursday of the following week. The instructor told students that the final exam items would be randomly selected from the same large item pools that the weekly final quizzes were drawn from so there would be no great surprises on the exam. Students also had online materials consisting of flashcards, practice quizzes, and a study guide to use in their studying.

About 30 min after the early final exam began on Friday, 25 students were working when the WebVista computer system stopped recording answers. Calls to the tech office finally revealed after another 30 min that an identification file had been corrupted and a fix was unlikely anytime soon. Several students said they couldn't reschedule because they were leaving town for the holidays and that was the reason they had signed up for the early final. The course instructor subsequently announced to the students that he would make available to them an identical version of the final exam that they could complete at home before the end of final exam week as a replacement for the exam. He instructed them to take it as if they were actually in the exam room under regular exam conditions and that a time limit of 90 min would be imposed consistent with the minutes/item time limits on the unit quizzes. This group of 25 students comprises the experimental group in the natural experiment described in this article. The control group consists of all other students signed up for subsequent times during the exam period who took the exam in the normal proctored environment.

Results and Discussion

All 25 students in the experimental group finished the exam as did 173 control group students. The mean exam score for all students was 48.61 ($sd = 9.38$). Just over half the experimental students took the exam the same day as their scheduled exam (Friday) and the rest spread their exam completion over the remaining exam period.

Consistent with the hypothesis, the 25 experimental group students had higher mean final exam scores than the 173 other students and this difference was statistically significant by *t*-test for independent samples (53.76, $sd = 8.93$ vs. 47.86, $sd = 9.23$, $t=3.00$, $p<.01$). The 5.9 point difference is 13.6% of the mean score on the exam for all students (7.2% of the entire 82 item exam). As we didn't ask students later what they did to complete the exam, we can only speculate as to how they scored higher. However, they took an average of 25 min more to take the exam than the control students and this difference was statistically significant by *t*-test (76 min, $sd = 14$ vs. 51 min, $sd = 19$, $t=5.97$, $p<.001$). On the other hand, test taking time did not correlate with exam score for the entire class ($r = .03$). And although it was not statistically significant, the correlation was negative for the experimental group ($r = -.24$, $p = .247$) suggesting, if anything, that students with poorer knowledge of the material took longer on the exam but to no advantage.

Mindful of the possibility that students opting for an early final exam might be different in some way from the control group students, as Englander et al. (2011) pointed out in their critique of the Yates and Beaudrie (2009) results, we checked to see if their scores differed on course assignments. All differences were minimal and statistically non-significant. For example, on the key variable of total chapter quiz points (they correlated significantly with final exam score for all students: $r = .42$, $p < .001$), experimental group students scored slightly higher than control students but the difference was not significant by *t*-test (105.16, $sd = 16.68$ vs. 102.20, $sd = 18.13$, $t=.77$, $p = .44$). In addition, several students, as noted above, said they could not reschedule because they were leaving town for the holidays. There was no correlation for the experimental group students between final exam score and day they took the exam ($r = -.003$) suggesting the difference was not a matter of early final students having crammed furiously for the exam and thus scoring higher on Friday or late takers benefiting from an extra week of study time.

Following the general logic of Harmon and Lambrinos' (2008) regression modeling study, we examined whether a key course component predicted exam score differentially for experimental and control group students. We did not use multiple regression because of the small sample size in the experimental group but rather compared correlations between total quiz points and final exam score for both groups. The correlation for the control students was $r = .38$ ($p < .001$) and $r = .72$ ($p < .001$) for the experimental students. These results are the reverse of what Harmon and Lambrinos found—the quizzes (an indicator of students' preparation for the final exam) better predicted the experimental students' scores on the final exam. Harmon and Lambrinos' logic would suggest the high predictive power of the quizzes indicated the experimental students didn't cheat on the final exam. On the other hand, one could also argue that the experimental students performed more similarly on the final exam and the quizzes because they "cheated" on both whereas for the control students, taking a proctored exam meant they were not able to "cheat" as they did on the quizzes. Of course, other factors could easily be involved such as the experimental students performing better because their more relaxed home environment resulted in less text anxiety, etc.

Another way to gauge whether experimental group students' ultimate scores were a true measure of their knowledge is to estimate what their scores would have been if they had been able to finish the exam at their originally scheduled time. The WebVista CMS keeps track of saved answers and this record remained despite the system crash. We looked at the unfinished exams and counted those items attempted and those correct. We then calculated the percentage correct for each student on the partially done original exam and compared it with their percentage correct on the completed exam. Experimental group students had a significantly lower mean percentage correct on their completed exam than on their unfinished original exam (65% vs. 73%) as indicated by a t -test for dependent samples ($t=2.40$, $p<.03$). This relationship is not accounted for by students hunting for and answering those items they knew the answers to. Students had answered from 9-41 items in the half hour before the system halted (some students started late). Ten students skipped around the exam but 14 answered all the ones they attempted in sequence from the first item (all answers in one student's exam had been deleted—probably because he hadn't saved before the system crash). The consecutive answerers actually had higher percentages correct than the item skippers but the differences were not statistically significant (74.2% vs. 71.3%, $t<1$, n.s.). However, these data suggest that the students signing up for the early exam may have been different in some way. On their first attempt, experimental students were heading for a mean of 73% on the exam whereas the control students achieved a mean of 58% on their first attempt. This also suggests that the experimental students may have benefitted from a practice effect by seeing the exam and knowing what to look for on their second attempt. On the other hand, the correlation between the number of items they completed on the first attempt did not correlate with their scores on the second attempt ($r = -.03$), suggesting they were not more familiar and there was no practice effect.

Where, then, do our data take us? At first glance, it appears that some form of "cheating" may have occurred and that resulted in better scores for the experimental group. But other data shake our confidence in drawing that conclusion. Based on the data from this quasi-experiment, and our several years' experience in online course development and delivery, we have two suggestions for online instructors. First, it is good practice to create a course that integrates testing into a mastery model learning process. When doing that, the best way to structure tests is to create realistic time limits (Brothen & Wambach, 2004) so that students quickly realize they must know the material and cannot simply open their books for the first time and eventually make their way through the test. Second, it is reasonable to recognize that some sort of "correction factor" may be necessary in assessing students for grading purposes. Our data suggest that it should be in the 10-15% range. This can be done by adjusting the item difficulty instead of requiring higher percentages for grades. Overall, students' scores in this study were not high on the exam because the items

were very challenging. During the semester and on the final course evaluation, students didn't complain about that because quizzes were characterized as part of a formative evaluation learning process. Communicating to students that testing in the course is partly a formative process reduces the "instructor vs. students" nature of tests with concomitant cheating emerging as a defensive measure by students.

Obviously, a fully randomized controlled study would be the best way to determine the answer that we have sought in this paper. However, this is not easily done in the regular flow of academic life in colleges and universities. Clearly, more creative and informative research needs to be done, and we trust this paper will help move the process along.

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Editor's Note: For many students, distance learning resolves institutional constraints of space, time, and distance. Brick and mortar universities are impacted when there is rapid growth in demand. Distance learning is scalable. Work hours and distance make it difficult for many students to attend, and fixed class schedules further limit access. Distance learning provides flexibility for learners to use available times in a productive manner to obtain university certificates and degrees.

An Exploration of Distance Learning in Saudi Arabian Universities: Current Practices and Future Possibilities

Abdulaziz Aljabre
Saudi Arabia

Abstract

Distance learning is a growing topic in education. Studies have reported both benefits and drawbacks to the use of distance learning. Many higher education institutes have recognized the benefits that distance learning provides to its students and developed successful distance learning courses. The universities in Saudi Arabia have also recognized these benefits and have since begun implementing distance learning programs. Despite the implementation of distance learning programs in Saudi universities, a void still exists. The growing number of women joining new programs and the growing number of students denied admission due to overcrowding show that there is room for growth. This paper analyzes the current distance learning programs in three Saudi universities, as well as the need for the expansion of distance learning. Finally, the future possibilities of distance learning in Saudi Arabia are explored.

Keywords: distance learning, e-learning, higher education, Saudi Arabia, Blackboard system, educational technology, women in education

Introduction

Distance learning is not a new topic of discussion or feature in education. Distance learning is, however, an emerging educational tool in Saudi Arabia. The Kingdom of Saudi Arabia has recently spent hundreds of millions of dollars improving the nation's educational system, specifically higher education. These improvements include the construction of new state-of-the-art universities, which rival top institutions around the world. The new institutions have come with curriculum development and changes and the introduction of technology for educational purposes. Such improvements have helped the Arab nation to tap into and cultivate previously neglected areas of study and bring education to non-traditional students. Distance learning is a tool that when utilized properly has the ability to do just that.

Distance learning opens a new mode of education to many who otherwise would have never had access to higher education. Implementation of distance education has come with some resistance and trepidation on both the students and instructors part. Yet, the use of distance education can prove to be beneficial in numerous ways. Its use has the ability to provide students with another learning option that may suit their learning style better than the traditional classroom setting, reach students who otherwise are not able to attend traditional classes, and offer flexibility by reducing the constraints of rigid scheduling. Although the use of distance learning is increasing in Saudi Arabia, there are still many technical and social challenges that the nation face in order to improve distance education. The paper will give insight into how distance learning is carried out in Saudi Arabia. Furthermore, the paper will describe the changes that have occurred as a result of the implementation of distance learning, as well as the benefits of the use of distance learning. Aside from that, the paper offers suggestions to improve distance learning from a technology standpoint.

Distance Learning in Saudi Arabia

Distance learning has been present in higher education in countries like the United States and the United Kingdom for some time. The use of distance learning has created a new realm of education. No more must students trek to the classroom lugging heavy textbooks at a scheduled time. Now, this new realm of education is delivered to students via the Internet in the comfort of their own home and at a more flexible time. The development of telecommunications networks around the world has provided educators and students access to more information than ever before. The dissemination of information has promoted the understanding of worldwide cultures and peoples (McIsaac & Gunawardena, 1996). The benefits of telecommunications are undeniable. Likewise, the benefits of distance education have proven to be beneficial to many, but if implemented on a large scale, can prove to be especially rewarding to students in Saudi Arabia.

The Benefits of Distance Learning

The benefits of distance learning are all inclusive extending to the young and old, the working professional and the stay-at-home parent, and the handicap and disabled. Little is required to make use of distance learning and with limited training even the most unlikely tech savvy person can become a competent user of distance learning tools. Yet still, the digital divide continues to haunt the world on a global level, separating the developing from the developed and on the national level dividing the *haves* from the *have nots*. The digital divide challenges the concept of distance learning attempting to leave students on the wrong side of the boundary in its wake.

One drawback to the use of distance learning is that students do not always have access to a computer and the Internet from home, which is one of the appeals of distance learning; the ability to choose where, and sometimes when, the classes are taken. The Saudi Arabian government offers its citizens free education from primary school through higher education. And while the digital divide impacts Saudi Arabia, the government counters this with monetary stipends that are allotted to students in higher education giving students the opportunity to make the most of their education (Rugh, 2002). This does not, however, end the struggle of retaining students in distance education courses.

An ever-increasing number of students withdraw from distance education courses opting for a traditional classroom setting (Ibrahim, et al., 2007). Many students are reluctant to enroll in and often withdraw from distance learning courses for a variety of reasons. A definitive underlying explanation for this trend is still lacking. However, it has been suggested that the cultural background of the students has a high effect on the students' willingness and ability to participate in distance learning courses. Whereas Western students have a more individualistic learning style that relies on analytical analyses, non-Western students have a more collective learning style that utilizes a holistic approach to analysis (Al-Harhi, 2005). The "absence" of the instructor, who is often viewed as the single source of information, may also explain students' trepidation when faced with distance learning.

Despite student fears, distance learning studies have demonstrated that the amount of information in most cases equals or surpasses that of traditional classes (Al-Harhi, 2005; Altowajry, 2005). Even though the amount of information is equal to or more than the traditional classroom, distance learning requires students to have time management skills beyond that of the traditional classroom. Moreover, the students must be willing to interact with the professor and their fellow classmates both individually and in groups. This point, however, may be to the benefit of students who are reluctant to participate in live classes.

Overall, distance learning does have some drawbacks depending on where it is used and by whom and these drawbacks are said to be ever present in Arab nations. However, if distance education

courses are designed in a way that suits the specific culture in which it is used, there is less of a chance of ambiguity and more opportunity for shared meaning and understanding by the professors and students (Al-Harthi, 2005). The participants in distance learning must be taken into account for the instruction to be effective and comprehensive. Utilizing a generalized practice of distance education that does not suit the needs of the culture in which it will be actualized is to the detriment of the students and is not only ineffective, but deterrent to students.

The educational system in Saudi Arabia has been the topic of many articles ranging from its overt religious nature to the status of women within it. It is the topic of women in education that can be of particular interest in distance learning in Saudi Arabia. Distance learning may be exceptionally appealing to women. Statistics demonstrate that in 2000, the number of females in schools rivaled or surpassed the number of males. Specifically in 2000, the number of Adult women enrolled in educational institutes was 74,000 compared to 34,000 men (Rugh, 2002). The number of women in higher education continues to grow. The growing number of women has created a challenge for Saudi universities as administration attempts to house women in courses that women are taking for the first time as they become available to them.

In an attempt to cater to both men and women, a sort of distance learning has been utilized in Saudi Arabia for women in higher education. This distance learning was used to extend access to courses to women that were traditionally only offered on men's campuses, as women and men classes and campuses are segregated. In these cases, the men's class that is being taught by the instructor is broadcasted to the women's classroom, where the women can participate in the class by being heard, but not seen by their male counterparts (Rugh, 2002).

Women in Saudi Arabia place high value on family and caring for the family. It is the general belief that the role of women is the fundamental base of the family structure and in turn the fundamental to society (Hamdan, 2005). The education of women traditionally prepared women for the role. However, this traditional role is being expanded upon as more and more women opt to work outside of the home and pursue higher levels of education. Distance learning offers women the opportunity to better manage home and education. Women, while maintaining the home, can continue their education via distance learning. Bringing ease to learning and relinquishing some added expenses, such as car services for women to and from universities.

Distance learning has the possibility to resolve many of the issues facing Saudi Arabia's educational system in higher education. The growth in enrollment, the inclusion of women in new programs and courses, and the desire to compete on a global scale by making use of technology make the appeal of distance learning even larger. On a national level the benefits of distance learning are great, but the benefits on the individual level are even more far reaching. Distance learning provides an ease in learning in terms of a more flexible schedule and the ability to self-pace. It also makes access to higher education more available to more people including working professionals and women. Distance learning has all of the components to be a vital element in higher education; however that is, of course, if culture is considered and the most advanced technology is used.

The Need for Distance Learning Expansion

Better use of distance learning in Saudi Arabia is needed in response to a number of factors. The increase in enrollment, as well as specifically the increase in women in new educational programs and courses, validates the need for distance learning programs alongside traditional courses in Saudi Arabian universities. Al-Sultan, as cited by Altowajry (2005, p. 22), demonstrates the increase in enrollment coupled with the number of students who were denied access to higher education. In 1993, the study shows that 70,000 students graduated and 2,000 were unable to proceed to a higher education institute. However, in 2003 more than 200,000 students graduated and more than 12,000 students were unable to find a place in higher education (Altowajry, 2005).

The statistics further show that the gap between the number of students graduating from high school and the number of students admitted to a higher education institute will continue to widen. Clearly, there is room and a need for a solution to provide those students eager to continue their education with access to higher education.

As aforementioned, the digital divide is a factor in Saudi Arabia, as it is in all nations. However, as Saudi Arabia, continues to transition into a technology-driven country, so too do its citizens. Making use of technology in education is merely another manner in which the Arab nation can continue to develop not only technology, but also its educational system. Distance education has the ability to reach students who otherwise were not in a position to either attend higher education or continue their education once they have graduated and begun a profession.

The estimated population of Saudi Arabia is just over 26 million with 65 percent of the population between the ages of 15 and 64 (CIA World Factbook, 2012). According to *Internet World Stats* (2012), the number of Internet users in 2011 was estimated to be 11 million signifying that just less than 50 percent of the population has Internet access. In correlation, the percentage of Internet users in the United States is 50 percent (Internet World Stats, 2012). Furthermore, the results of a study conducted with 205 high school students and 71 workers, who were unable to secure a place in a higher education institution as a result of overcrowding, in Riyadh and Jeddah reveal that 68 percent of the participants agreed that they had basic PC skills and that 80 percent of those same participants have a computer in their home. Importantly, of those participants that stated they did not have basic PC skills, 80 percent said they would be willing to learn how to use a PC (Altowajry, 2005).

What's more is that the Saudi Arabian government, which governs education at all levels, has allocated increasingly large amounts of the nation budget to higher education. The 2010 budget allotted \$36.5 billion to education and vocational training. The government's five year development plan is coursed to increase the spending on higher education institutes and vocational training to \$200 billion by 2014 (Lindsey, 2010). The Saudi Arabian government will continue to increase the budget for education and training as it continues to invest in its own people. In 2011, the budget for education and training increased to \$40 billion, which was 46 percent of the total national budget (US-Saudi Arabian Business Council, 2012). The government has begun to transition the focus of its education and training programs to increase the productivity of its workforce in public sector. In order to do this the government will need to increase the number of students admitted to higher education institutes, but for this to happen the government will be forced to make changes to accommodate the number of students and their needs.

These numbers demonstrate that the participants for distance learning are there. The bulk of the population of Saudi Arabia is the prime age for higher education. The number of students graduating high school continues to increase, as does the number of students who are denied admission due to overcrowding. Yet, despite the statistics that demonstrate the enrollment growth, the number of competent Internet users and the number of students with home access to a computer and the Internet the Saudi Arabian government has not made full use of distance learning throughout higher education. Distance education provides students with another learning option that could potentially allow them to continue their education while still contributing to the national economy while working.

Distance Learning Tools in Saudi Arabia

Currently in Saudi Arabia, the use of distance education is budding. Yet, there is room for improvement and expansion. It is first important to evaluate the status of distance learning as it currently stands before discussing the prospects of distance learning in higher learning in Saudi

Arabia. In this section, the distance learning programs at three major universities in Saudi Arabia will be presented. The three universities, King Saud University in Riyadh, King Abdulaziz University in Jeddah, and King Faisal University in Al-Hasa, are all leading universities in Arab region. While previous forms of distance learning took the form of print materials utilized through standard mail services and the use of print materials still continues in forms of textbooks and the like, this paper will turn its focus to the use of technology to facilitate distance education.

The three universities, King Saud University (KSU), King Abdulaziz University (KAU), and King Faisal University (KFU), though stated in different ways, all share the same mission in delivering distance learning to its students. The mission of the universities' distance learning programs is to utilize, integrate, and train students and faculty with the latest technology in distance learning. The establishment of the Deanships of e-learning and distance learning at each of the respective universities developed at different times with KAU being the first in 2006. In 2010, both KSU and KFU implemented a new *Deanship of e-Learning and Distance Learning* program at their universities. As stated on each university's webpage for the Deanship of e-Learning and Distance Learning, the program is responsible for providing the students with online resource training and access to tools such as virtual classrooms and online lectures and seminars (King Saud University, 2010b; King Abdulaziz University, 2011b; King Faisal University, n.d.).

To ensure that the faculty was able to make full use of the distance learning technology all three universities have stated that they fully train their faculty to meet the needs of students taking distance learning courses. An exemplary example of faculty training can be seen in KSU's efforts. KSU held training sessions during the summer of 2011 during which specific members of the university were given instruction on the management system. As a result of the success of such training sessions, the university reported that it would continue the training program to include all KSU faculty members. To further ensure that the distance learning program at KSU was making full use the technology available in the most efficient and effective way, faculty members at the university participated in the 2011 *Blackboard Exemplary Course Program*. The program, established by *Blackboard, Inc.*, is effectively faculty development in the realm of distance learning. Through the program, faculty members are assisted in developing best practices for distance learning (King Saud University, 2010a).

Currently, King Faisal University (KFU) and King Saud University (KSU) have made strides with the use of distance learning at the institution. As listed on the universities' websites for E-Learning and Distance Education, the e-learning systems that are made available to the students include a Blackboard/Web CT Learning Management System, virtual classroom synchronous system, class capturing/recording system, authoring tool and content management systems, and an online exam system (King Faisal University, n.d.).

The Blackboard system functions as a distance learning management system that serves as a medium through which classes can be held, work can be assessed, and grades can be tracked. Using basic functions, students are able to exchange files, communicate with instructors and classmates through discussion boards, forums, chats, and email. Instructors and students can also utilize authoring tools in multiple formats to present and exchange audio, video, and image files.

The Blackboard system can fully sustain a distance learning course or function as a supplemental site for a traditional course or hybrid course through the use of the virtual or synchronous classroom. Through this system, students can attend live classes and participate in those classes by using the whiteboard, real-time quizzes, recording and playback capabilities, and application sharing. The students experience the live class through real-time synchronous voice over that does not require a minimum Internet connection speed.

To provide a more flexible schedule for students in distance learning, the class capturing/recording system can be utilized. This option affords instructors two different options. Instructors can record the synchronous and upload it for students to review at their leisure. Similarly, instructors can record classes that were not presented synchronously. This gives the students more freedom in their schedule to view the class within the parameters of the course outline.

King Abdulaziz University (KAU) makes use of several different distance learning components that allow the students to engage in classes and collaborate as if they were in a traditional classroom. Like KFUPM and KSU, KAU also makes use of the virtual classroom providing students access to recorded classes at any time from any location with an Internet connection. The virtual classroom also provides students with access to content material such as lesson overviews, tasks, assessments, links to online resources, and downloadable training resources and files (King Abdulaziz University, 2011c).

One system that KAU has plans of introducing that differs from the other two universities is a mobile learning system. This system would be compatible with mobile cellular devices or other devices that make use of cellular data or connect to the Internet such as the iPod, iPad, or other tablet or device (King Abdulaziz University, 2011b). As the university recognizes the increased use of changing technology used by its students, it realizes that learning must also adapt to reach students on their level utilizing technology as students do.

The three aforementioned universities are all leading universities in Saudi Arabia and are beginning to earn recognition on a global scale. The universities have made use of some of the best educational technologies available for distance learning in ways that try to increase student understanding and provide access resources and training. Such technology creates a virtual classroom that in many ways mirrors a traditional classroom. KSU and KAU have been recognized and awarded for their distance learning programs (King Saud University, 2010; King Abdulaziz University, 2011a). Despite these efforts, if Saudi Arabian universities hope to be able to provide education to its growing population, then not only will the universities have to remain current with education technology, as well as increase the number of trained instructors to teach distance learning courses.

The Future of Distance Learning Development

Technology is ever changing and in many changing the lives of people who use it. This has never been truer for students. Educational technology has changed the way that instructors deliver information to students. No example is more palpable than distance learning. Distance learning opens a world of possibilities for higher educational institutes, as is the situation happening in Saudi Arabia. However, when universities introduce distance learning programs, they then have a responsibility to their faculty and students to remain current as educational technology develops in order to provide both faculty and students with the best educational experience possible.

If Saudi Arabia hopes to ensure its future and its future workforce lessening the dependence on foreign workers and strengthening fields in which those workers currently fill, then the nation will have to expand the number of students admitted to universities across the country. There already exists an answer for this dilemma. With the expansion of the distance learning programs at Saudi Arabian universities, more students will have the chance to be given admission to a university. Distance learning will also help give students, not living in one of the major cities where most of the universities are located, the opportunity to receive higher education. The possible benefits of expanding the distance learning programs in Saudi Arabian universities are numerous. What's more is that the benefits can possibly be to the gain of universities worldwide.

Saudi Arabia is sitting on an abundance of wealth, both literally and figuratively. The steadily increasing budget for education, and specifically the budget for higher education and career training programs, puts university administrators in a unique position. While national and state budgets continue to be cut and funding dwindles, education has seen the brunt of this. However, Saudi Arabian universities have the potential to bring innovation and renovation to distance learning. All of the components are present: the funding, the technology, the faculty, and students. The institutions have newly implemented distance learning programs that have not only been acknowledged on a global scale, but also awarded. The growing budget has also allowed the institutions to invest in the latest technology. The training programs for faculty members at the universities have been met with acceptance and an eagerness for more. And the growing population in the country is knocking at the door and eager for education.

Given these components, it is up to the faculty and administration at KSU, KAU, and KFU, as well as other Saudi Arabian universities employing distance learning, to be leaders in the field. If distance learning is to progress in terms of teaching methodology and technology integration for educational purposes, research must continue to be conducted. The large number of students and faculty who would be able to participate in distance learning will be able to provide ample feedback, suggestions, and criticism. Again, Saudi Arabian universities are in the unique position to utilize such information in way that will not only be useful in the development or modification of technology for educational purposes, but also in the pedagogical expansion learner-centered instruction in distance learning.

Conclusion

Distance learning has developed over decades to become what most students know it to be today. The development of technology has undoubtedly spurred the growth of distance learning and afforded students who otherwise might not have the opportunity to receive higher education or continue to postgraduate degrees the chance to do so. Moreover, in countries such as Saudi Arabia, distance learning opens up doors to women that have long been closed. The overall benefits of distance learning are numerous when implications regarding culture and student-centered methodologies are fully considered. Educators in Saudi Arabia realize the benefits that technology brings to learning and thus have implemented it throughout the nation's universities. Yet, there is room for growth. As the number of students denied admission to higher education because of overcrowding continues to grow, educators must respond. Distance learning can serve as a possible solution to this dilemma. With the expansion of the distance learning programs, comes the opportunity to be leaders in distance learning research. If Saudi Arabia so wishes, it has the opportunity to advance teaching and technology methodologies that will have an impact beyond its borders assisting both developing and developed nations make better use of distance learning.

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Editor's Note: This study compares thinking skills for students with different career choice within education, and with different grade point averages (GPAs)

Acquisition Degree of Students' Meta-Cognitive Skills from IT University Courses in Jordan

Hala Al-Shawa
Jordan

Abstract

The aim of this study is to investigate the acquisition degree of students' meta-cognition thinking skills from IT courses at the University of Jordan. The research questions are: what is the acquisition degree of students' meta-cognition thinking skills from IT courses at the University of Jordan? Are there any significant differences in the acquisition degree of students' meta-cognition thinking skills from IT courses at the University of Jordan with respect to the area of specialization (pre-service generalist teachers and pre-service early childhood teachers) and with respect to students' GPA (Low, middle, and high)?

A questionnaire consisted of 30 items was collected from 108 pre-service teachers from the Educational Science College in the University of Jordan, who were enrolled in the practicum course during their last semester in the university.

The sample was distributed as follows: 52 pre-service early childhood teachers and 56 pre-service classroom teachers. The questionnaire consisted of two dimensions with three sub dimension for each. The first dimension is self-appraisal of cognition and consisted of three sub dimensions: declaration knowledge, procedural knowledge, and conditional knowledge. The second dimension is self-management of cognition and consisted of three sub-dimensions: planning, assessment, and arrangement.

The findings indicated the acquisition degree of students' meta-cognition thinking skills from IT courses was overall low. There was no significant difference in the acquisition degree of students' meta-cognition thinking skills with respect to the area of specialization, but, there were significant differences in the acquisition degree of students' meta-cognition thinking skills with respect to students' GPA, students with higher GPA showed higher acquisition level of meta-cognition thinking skills.

Keywords: meta-cognitive skills, IT courses, pre-service teachers, Jordan, early childhood teachers, classroom teachers.

Introduction:

Modern curricula added new tasks to the teacher. The center of teaching-learning operation had shifted from the teacher to the learner. The new mission is to prepare learners to become effective participants and problem solvers. We need teachers to become supervisors and facilitators. To achieve that we need to consider the needs of the learners and the community as well. Also it's important to develop different thinking abilities such as: creative, critical, problem solving, and meta cognition thinking skills.

Meta cognition focuses on learners' automatic awareness of their own knowledge and their ability to understand, control, manipulate, and assess their own cognitive processes. Meta-cognitive skills are essential not only in school, but everywhere. Beyer (2003) mentioned that it is very important that a successful individual be a person who has learned to learn. He goes further and

describes this person as one who knows the phrases in the process of learning and understands his or her own preferred approaches and strategies to learn effectively - a person who can identify and solve learning difficulties and can bring learning from off-the-job learning to on-the-job situations.

Knowledge of factual information and basic skills provides a foundation for developing meta-cognitive skills; and meta-cognitive skills enable students to master information and solve problems more easily. If teachers hope to help low-performing students break out of their intellectual imprisonment, they must find a way to help them develop both an automatic grasp of basic skills and effective meta-cognitive skills to enable self-directed learning (Jarwan, 1999).

Furthermore, Meta-cognitive concentrates on knowing how to control the recent factors for examine some phenomenon (Flavell, 1979), performing a certain task or completing an activity. Meta-cognitive also means knowing the method of manipulating a specific condition or the technique for implementing a task. This may include the procedures we use to do a science experiment, write an essay or solve a mathematical equation. Meta-cognitive is often thought about as certain skills we possess, tasks we can complete or processes we are able to follow (Garner, 1987).

According to many researchers teaching meta-cognitive thinking skills provides educators with solutions for many of the disadvantages of traditional educational styles and approaches. Furthermore, the results of various researches and studies confirmed that connecting education with our lives through teaching for meta-cognitive is one of the greatest and fruitful education (Murray, (2009), McKay, (2006) Facione (2000)).

The Study Questions:

1. What is the acquisition degree of students' meta-cognition thinking skills from IT courses at the University of Jordan?
2. Are there any significant differences in the acquisition degree of students' meta-cognition thinking skills from IT courses at the University of Jordan with respect to the area of specialization (pre-service classroom teachers and pre-service early childhood teachers)?
3. Are there any significant differences in the acquisition degree of students' meta-cognition thinking skills from IT courses at the University of Jordan with respect to students' GPA (Low, middle, and high)?

Statement of the Problem:

Based on the researcher knowledge, there is a lack of research studying the acquisition degree of students' meta-cognition thinking skills from IT courses at universities level, especially in Arab countries. After reviewing related studies, the researcher found few Arabic studies conducted on the effectiveness of computerized curricula on learning life skills. While the researcher couldn't find any study investigating the acquisition degree of students' meta-cognition thinking skills from IT courses at universities in Jordan. In other words, studying the relation between the universities Instructional Technology courses offered for pre-service elementary teachers and pre-service early childhood teachers in one side and their acquisition degree of meta-cognition thinking skills. Furthermore, the researcher discussed those educational issues with different in-service teachers. Many of them mentioned that they don't even know what it means while others were not able to explain what is meant by meta cognition thinking skills or to express its importance in teaching and learning as well.

The Purpose of the Study

The purpose of this study was to identify the acquisition degree of students' meta-cognition thinking skills from IT courses at the University of Jordan with respect to the area of specialization (pre-service generalist teachers and pre-service early childhood teachers) and with respect to students' GPA (Low, middle, and high)

Definitions of Terms:

- Meta-cognition thinking skills: learners' automatic awareness of their own knowledge and their ability to understand, control, manipulate, and assess their own cognitive processes. It has two dimensions with three sub dimensions for each. One dimension is self-appraisal of cognition and it consisted of three sub dimensions. They are: declaration knowledge, procedural knowledge, and conditional knowledge. The other dimension is self-management of cognition and it consisted of three sub dimensions. They are: planning, arrangement, and assessment
- Pre-service early childhood teachers: undergraduate students from Faculty of Educational Sciences at the University of Jordan who are expected to be kindergartner teachers after graduation.
- Pre-service generalist teachers: undergraduate students from Faculty of Educational Sciences at the University of Jordan who are expected to be teachers for the first three grades after graduation.
- Students' GPA: the students Grade Point Average were classified into three groups as follows:
 1. Low group: the students who have GPA less than 2.00
 2. Medium group: the students who have GPA greater than or equal to 2 and less than 2.99
 3. High group: the students who have GPA greater than or equal to 3.00 and less than or equal to 4.00
- Instructional Technology Courses: the courses that is offered by the University of Jordan for pre-service early childhood teachers and pre-service generalist teachers. They are five courses were the students are exposed to essential knowledge of technology and literacy; the role of technology in the learning and teaching process; computer literacy; computer-aided instruction; computer-managed instruction; computer applications in education; operating systems; word processing; spreadsheet; and databases; using computer programs such as Microsoft publisher, Excel, Word and PowerPoint in classroom practices.

In addition to that, those courses Introduce the concepts of instructional materials; definitions; relationship to instructional technology; classification; sources; role of such materials in the instructional process; the impact of perception and communication on designing different kinds of instructional materials such as transparencies, slides, audio cassettes, video tapes, and computer disks; principles of designing, producing and using instructional materials according to the system approach; practical application in designing, producing and using instructional materials in different subject matters.

Furthermore the students discuss child computerized programs (software) for the purposes of instruction, fun, and literacy. Also, they learn the importance of the computerized programs in assessing child creative thinking skills. In addition to that students learn basic skills in designing, producing, analyzing, and evaluating computerized programs and its applications.

Limitations of the Study:

This research was conducted within the following limitations:

1. The courses used: the instructional technology courses which are provided by the University of Jordan.
2. The sample: the sample is the undergraduate students at the faculty of Educational Sciences in the University of Jordan, who passed the Information Technology courses provided by the University of Jordan.
3. Characteristics of the measure used: the results of the study are affected by the validity and reliability of the instrument.

Related Literature Review

Alzbaidy (2010) conducted a study to investigate the effect of using constructive learning and creative problem –solving on meta-cognitive abilities in learning social studies. The sample consisted of 67 8th graders. The participants were divided into two groups: experimental group which consisted of 35 students and a control group which consisted of 32 students. The findings indicated existence of statistically significant difference in the experimental group students' mean score in the Meta-cognitive survey in favor of the experimental group.

Hollenesky (2010) explored the meta-cognitive skills students develop through participating in music course and its effect on their academic achievement. The sample consisted of 48 high school students. The researcher used a Meta-cognitive survey. The findings indicated 71% of the meta-cognitive skills were identified as being obtained by a majority of the students. In addition to that, it showed meta-cognitive skills had the potential to increase high school students' academic achievement.

Mendara (2010) studies the relationship between meta-cognitive learning strategies and academic success of university students. The data was collected from 230 undergraduate university students from different departments with difference specialization areas. The researcher developed a meta-cognitive awareness inventory. The instrument had four components: planning, controlling, organization, and evaluation. The results showed there was no statistically significant difference between the meta-cognitive strategies used by students and their grade level, but there was a statistically significant difference between the meta-cognitive strategies used by students and their department. Students in classroom teacher training department had higher meta cognition knowledge than students in marketing and electricity departments. Furthermore, there was a statistically significant difference between the meta-cognitive strategies used by students and their accumulative academic grades. The deference is in favor of the students who had higher accumulative grades.

Khaleel (2009) examined the impact of using technology in teaching 7th graders in Qatar on developing their Meta cognition knowledge. The sample was 62 participants. The researcher applied a meta cognition knowledge survey. The findings showed statistically significant difference in developing Meta cognition knowledge due to the intervention represented in using technology in teaching.

Yen (2009) conducted a study aimed at investigating learners' characteristics such as their cognitive styles and meta-cognitive knowledge. The researcher developed a Web Based Chemistry unit in chemistry course. The participants were 10 female students from 9th grade. Data were collected through structured individual interviews with students and project reports of students, observations of students studying their Web Based Course, and parents' documents. The findings indicated the level of students' meta-cognitive skills was high.

Sighnal (2009) studied the effect of teaching an introductory physics course on problem solving, reasoning, and meta-cognitive skills of university students. The sample consisted of 53 students. The researcher developed and applied an instrument to measure students' level of understanding and abilities in problem solving, reasoning, and meta-cognitive skills. It measures what the students had learned by solving problems, how they can extend, organize, and assess their meta-cognitive skills. The findings indicated that: there was significant improvement in meta-cognitive skills and there was statistically significant difference with respect to students' academic achievement in favor of students with high grades.

Population and Sample of the Study

The population consisted of all undergraduate students in College of Educational Sciences who passed the Instructional Technology courses provided by the University of Jordan. While the sample consisted of (108) undergraduate students they were selected randomly as follows: (52) early childhood pre-service teachers and (56) generalist pre-service teachers.

The Instrument of the Study:

The researcher developed the instrument based on related research and literature such as Alzbaidy (2010), Hollenesky (2010), Mendara (2010) Yen (2009), Sighnal (2009), and Khaleel (2009). The instrument consisted of 30 positive items, using a 5-point Likert-type scale as follows:

1. Strongly disagree,
2. Disagree;
3. Mildly agree,
4. Agree,
5. Strongly agree.

The items of the questionnaire are distributed into the following two dimensions with three sub dimensions for each dimension. The descriptions of the sub dimension are as follows:

1. Dimension of self-appraisal of cognition: this dimension has three sub dimensions:
 - 1) Declaration knowledge, items (1-5)
 - 2) Procedural knowledge , items (6-10)
 - 3) Conditional Knowledge , items (11-15)
2. Dimension of self-appraisal of cognition: this dimension has three sub dimensions:
 - 1) Planning , items (16-20)
 - 2) Assessment, items (21-25)
 - 3) Arrangement, items (26-30)

The questionnaire is attached in the Appendix.

Validity and Reliability of the Instrument

Content validity was established before conducting the study by distributing the instrument to some experts from the faculty of Educational Sciences at the University of Jordan, Alhashmite University, and Alyarmouk University. The primary version of the instrument consisted of 38 positive items. The instrument judges examined the measure and agreed that it did assess what it was supposed to assess, they modified and rephrased few words to be understood by the participants and they deleted 8 items. Additionally, the researcher assessed the reliability of the instrument by using Cronbach's Alpha, as a measure of consistency coefficient. The instrument was distributed to (34) students from the population and not included in the sample. The reliability coefficient for the measure was (0.87), which means the instrument was reliable.

Variables of the Study

The independent variable is the instrument. The dependent variable is the acquisition degree of students' meta-cognition thinking skills. The classified variables are the specialization area and students' GPA.

Data Analysis

Means, standard deviation, t-test, and One-Way ANOVA were used as the appropriate statistical tools to test the research questions. Based on the research questions, data was analyzed using the Statistical Packages for Social Sciences (SPSS) version 17.0. The (0.05) level of significance was selected to determine if any differences between the groups were statistically significant.

Discussion of the Finding:

The findings of data analysis for the first question indicated that the means were low for each sub dimension and for the overall dimensions. Table (1) displays the means, the standard deviation, and the percentage of importance for the sub dimensions and of the overall measure.

Table 1
The means, the standard deviation,
and the percentage of importance for the sub dimensions

Sub Dimension	Mean (m)	SD	% of Importance
Declaration Knowledge	12.16	2.01	49%
Procedural Knowledge	12.04	2.13	48%
Conditional Knowledge	11.80	3.01	47%
Planning	12.11	2.21	48%
Arrangement	11.75	2.45	47%
Assessment	11.64	2.03	47%
Overall measure	71.50	2.45	48%

Table 1 showed the average responses of the students at the University of Jordan ranged from 11.64 to 12.16 and the percentage of importance ranged from 47% to 49%. The percentage of importance was calculated by dividing the mean for each sub dimension by the maximum point of the items which is $5 \times 5 = 25$, so the mean was divided by 25 to get the percentage of importance for each sub dimension.

In addition to the previous analysis, the researcher described the acquisition degree of students' meta-cognition thinking skills whether it is high, medium, or low. Table (2) provides categories that describe the acquisition degree of students' meta-cognition thinking skills.

Table 2
Categories of the Acquisition Degree of Undergraduate
Students' Meta-Cognition Thinking Skills

Mean range	Category
$1.0 \leq$ Average mean < 2.5	Low
$2.5 \leq$ Average mean ≤ 3.5	Medium
$3.5 <$ Average mean ≤ 5	High

The categories in table (2) were considered based on the opinions of the referee panel and related research and literature, such as: as Alzbaidy (2010), Mendara (2010), and Khaleel (2009). Tables (1) and (2) show that the acquisition degree of undergraduate students' meta-cognition thinking skills of the six sub-dimensions and for the overall dimensions was low since the Average means are higher than 1.0 and less than 2.5, the Average mean was calculated by dividing the mean displayed in table (1) by the number of items in every dimension.

The results of this question differs from the results of the study of Kolinsky(2010), Khaleel(2009), Alzbaidy(2009), and Yen(2009). The explanation could be because the gap is large between what and how the educational faculties' members in the university teach and what he school and society need. Furthermore, this result could be explained with a number of reasons such as: some faculties still use the traditional methods that focus on memorization rather than developing meta cognition knowledge. Another reason could be due the fact that many faculty members don't teach using meta cognition styles.

The findings of data analysis for the second question are displayed in table (3). Table (3) shows the means, standards deviation, and t values for the responses of all the participants on the meta-cognitive skills questionnaire with respect to their specialization area.

Table 3
Scores Analysis of the Six Meta Cognitive Thinking Skills Dimensions
for the Participants with respect to the Specialization Area

Dimension	Early Childhood Pre-Service Teachers		Classroom Pre-Service Teachers		T Value	Sig. Level
	M	SD	M	SD		
Declaration Knowledge	12.11	1.33	12.03	2.51	.804	.351
Procedural knowledge	11.21	2.24	12.44	2.13	1.55	.103
Conditional Knowledge	12.09	1.69	11.66	1.78	.864	.567
Planning	13.16	2.46	12.42	3.64	.834	.367
Arrangement	11.57	2.27	12.12	3.57	1.66	.136
Assessment	13.45	2.38	12.98	2.56	.958	.263
Overall	73.59	4.48	73.65	4.11	.968	.487

Based on table (3), it is clear that there are differences between the acquisition degree of students' meta-cognition thinking skills with respect to the area of specialization. The means for the responses of the classroom pre-service teachers ranged from 11.66 to 12.98 and the means for the responses of the early childhood pre-service teachers ranged from 11.21 to 13.45 in order to decide if those differences are statistically significant, the researcher applied t-test. It is apparent that those differences are not statistically significant because t-values ranged from 0.804 to 1.66.

The results of this question agree with the results of the studies of Mendara(2010). From the researcher experience, the explanation could be due the fact that the Instructional Technology courses that early childhood pre-service teachers and classroom pre-service teachers took are supported by the same faculties and normally taught by the same instructors. Furthermore, another reason could be because the content and the teaching strategies for instructing pre-service early childhood teachers and pre-service classroom teachers are very similar and focus on

conceptual and procedural facts which may lead to non-significant differences between the responses of pre-service early childhood teachers and pre-service classroom teachers.

To answer the third questions, the researcher calculated the means, the standards deviation, and One Way ANOVA for every dimension. Table 4 shows the statistical results.

Table 4
ANOVA for the Responses of the Students with respect to their GPA

Dimension	Resource(A)	Sum of Squares	Degree of Freedom	F-value	Sig
Declarational Knowledge	Between groups	14.19	2	14.65	.000
	Within groups	223.01	105		
	Total		107		
Procedural Knowledge	Between groups	13.11	2	16.05	.001
	Within groups	213.21	105		
	Total		107		
Conditional Knowledge	Between groups	15.12	2	14.32	.000
	Within groups	224.78	105		
	Total		107		
Planning	Between groups	11.99	2	17.21	.002
	Within groups	243.05	105		
	Total		107		
Arrangement		14.46	2	15.35	.001
		257.56	105		
			107		
Assessment		13.58	2	14.76	.002
		267.34	105		
			107		
Overall instrument	Between groups	15.13	2	16.87	.003
	Within groups	244.56	105		
	Total		107		

Table 4 shows significant differences between the responses of students with respect to their GPA. The researcher applied Tukey test to identify which groups ha the difference in its degree of meta cognition thinking skills.

It can be seen from table(5) there are statistically significant differences between the acquisition degree of students' meta-cognition thinking skills respect to students' GPA in favor of students' with higher GPA, students with higher GPA showed higher acquisition level of meta-cognition thinking skills. This result agrees with the results of the study of Mendara(2010). It can be explained by saying that normally students with high GPA don't depend on one method of studying or thinking, but they try different strategies and they reflect on what they study.

Table 5
Tukey Test for the responses of the students with respect to their GPA

Dimension	Group	Mean Difference	STD errors	Sig.
Declaration Knowledge	High x Medium	.24	.09	Sig.
	High x Low	.67	.08	Sig.
	Medium x Low	.07	.02	Sig.
Procedural Knowledge	High x Medium	.18	.06	Sig.
	High x Low	-.29	.01	Sig.
	Medium x Low	-.28	.03	Sig.
Conditional Knowledge	High x Medium	-.02	.06	Sig.
	High x Low	.56	.07	Sig.
	Medium x Low	.45	.02	Sig.
Planning	High x Medium	-.60	.07	Sig.
	High x Low	-.62	.01	Sig.
	Medium x Low	.24	.03	Sig.
Arrangement	High x Medium	.64	.06	Sig.
	High x Low	.64	.03	Sig.
	Medium x Low	.34	.03	Sig.
Assessment	High x Medium	.44	.04	Sig.
	High x Low	.45	.01	Sig.
	Medium x Low	.56	.05	Sig.
Overall	High x Medium	-.50	.06	Sig.
	High x Low	-.06	.02	Sig.
	Medium x Low	-.54	.02	Sig.

Recommendations

Considering the findings of the study, the researcher recommended the following:

1. Identifying meta-cognitive awareness and learning strategies implemented and used by university students.
2. Reviewing universities courses and study plans frequently to make it more applicable and sustainable.
3. Providing guidance by arranging different activities to enhance students' meta-cognitive skills such as meetings, workshops, and conferences.
4. Building the educational study plans and courses plans for pre-service teachers in a way preparing them to be thinkers.
5. Maintaining a high frequent use of students' meta-cognitive learning strategies by inserting those strategies and skills in university courses and actives.
6. Conducting similar studies with different universities courses and variables.

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Appendix The Instrument of Meta-Cognitive Skills

The questionnaire for identifying the acquisition degree of students' meta-cognition thinking skills from Instructional Technology courses at the University of Jordan.

Demographic information: Please check one of the following:

1. pre-service generalist teachers
2. pre-service early childhood teachers

Students' GPA: Please check only one of the following

1. If your GPA is less than 2.00
2. If your GPA is greater than or equal to 2 and less than 2.99
3. If your GPA is greater than or equal to 3.00 and less than or equal to 4.00

Following is the ranking for the scale:

1. Strongly disagree,
2. Disagree;
3. Mildly agree,
4. Agree,
5. Strongly agree.

No	The Items	5	4	3	2	1
After passing the Instructional Technology courses, I think that it helped me to:						
1	Remember the important information needed to solve a specific problem.					
2	Identify what I know and what I don't know.					
3	Identify the needed learning resources.					
4	Connect new knowledge with previous knowledge.					
5	Know what others expect from me.					
6	Ask myself what strategy to follow.					
7	Ask myself if there is an alternative strategy.					
8	Identify the difficulties that face me.					
9	Solve the difficulties successfully.					
10	Ask myself how to reach my goals.					
11	Ask myself when to apply a specific strategy.					
12	Ask myself under what conditions I use a specific strategy.					
No	The Items	5	4	3	2	1
13	Explain to others why I choose a specific strategy.					
14	Justify why a situation is difficult.					
15	Justify why a situation is easy.					
16	Think of a problem deeply.					
17	Approximate the time needed to solve a problem.					
18	List the strategy that I can use.					
19	Identify the tools needed to solve a problem.					
20	Identify my goals.					
21	Correct my mistakes.					
22	Assess my thinking skills.					
23	Compare positively what I did with what others did.					
24	Apologize to others when I do a mistake.					
25	Predict others reactions.					
26	Ask myself if the strategy matches the situation which I try to solve.					
27	Keep track with the effectiveness of the strategy used.					
28	Control the time when dealing with problems.					
29	Ask myself: is this really what I want to do?					
30	Ask myself: do I understand the problem correctly?					

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Editor's Note: This study shows ways in which Reflective Judgment can be developed to enhance learning.

Nurturing Preservice Teachers' Reflective Judgment: Online discussion as a powerful teacher education tool

Debbie Samuels-Peretz

USA

Abstract

A prominent theme in the literature on preparing teachers who can help all children achieve is the central role of teacher reflection. Online discussion can foster teacher reflection through its focus on cooperative learning and the availability of discussion transcripts. This case study uses a mixed-method approach to explore how online discussions may nurture the Reflective Judgment of preservice teachers. Online discussions were found to provide insight into the thinking and reasoning of students so that teacher educators can assess Reflective Judgment and use that data to inform instruction.

Keywords: online teaching, online learning, online discussions, asynchronous discussions, preservice teachers, teacher education, teacher preparation, teacher reflection, reflective judgment

The Role of Reflection in Effective Teaching of All Children

A prominent theme in the literature on preparing teachers who can help all children achieve is the importance of teacher reflection. Reflection is an often-cited quality of effective teachers (Floden & Buchmann, 1993). The National Board for Professional Teaching Standards (2002) includes reflection among its core propositions, stating that effective teachers “think systematically about their practice and learn from experience” and that “accomplished teachers critically examine their practice, seek to expand their repertoire, deepen their knowledge, sharpen their judgment and adapt their teaching to new findings, ideas and theories” (p.4). Reflection is especially important for teachers in under-resourced urban communities. Weiner (2006) argues that reflection is essential for successful urban teaching. Irvine (2003) claims that reflection is critical to teacher preparation because there are no easy answers or guaranteed solutions for preparing teachers of culturally diverse children.

Not all reflection, however, is equally influential. Among models of reflective thinking, critical reflection (Valli, 1997) is considered a deeper form and seems to be the type of reflection most likely to lead to effective teaching for all children. In the literature on culturally relevant practice, critical reflection is an essential part of expanding sociocultural consciousness (Villegas & Lucas, 2002) and teaching for social justice (Irvine, 2001; Nieto, 2000). Nurturing the critical reflection of preservice teachers, therefore, is an important part of preparing teachers to help all students achieve regardless of sociocultural background.

While reflective thinking and practice are goals of many teacher preparation programs, research indicates that these programs have not been completely successful in meeting these goals (Collier, 1999; Floden & Buchmann, 1993; Risko, Vukelich, & Roskos, 2002; Sparks-Langer, Simmons, Pasch, Colton, & Starko, 1990; Valli, 1992; Zeichner & Liston, 1987). Since reflective thinking is a central component of effective teaching for diverse students, it is imperative to find tools and ways to nurture a teacher's ability to think reflectively, beginning with initial teacher preparation programs.

One piece of this puzzle is to focus on the cognitive development of preservice teachers. King and Kitchener's (1994) Reflective Judgment (RJ) model frames reflection in terms of assumptions about the process of knowing and how it is acquired. The RJ model includes seven developmental stages that cover Pre-reflective Judgment (stages 1, 2 and 3), Quasi-reflective

Judgment (stages 4 and 5), and Reflective Judgment (stages 6 and 7). Pre-reflective thinking views knowledge as something received from authority figures or through first-hand observation. Reasoning with Reflective Judgment, on the other hand, acknowledges uncertainty and that “knowledge claims must be evaluated in a relationship to the context in which they were generated to determine their validity” (King & Kitchener, 2002). True RJ is based on epistemic cognition, the ability of an individual to think about the criteria, level of certainty and the boundaries of knowledge. As a developmental construct, only stage 6 and 7 thinking can be considered Reflective Judgment.

The cognitive demands of the type of critical reflection discussed in the literature on teacher education assumes a minimum stage of quasi-Reflective Judgment as conceptualized by King and Kitchener (1994). For example, Irvine (2001) and Villegas & Lucas (2002) calls on teachers to uncover implicit assumptions, suspend judgment, explore an issue from multiple perspectives, challenge authority, and question the bases for knowledge claims. These are actions that are enabled only by higher levels of RJ. Therefore, teacher education programs that espouse a focus on reflective thinking or reflective practice should nurture these aspects of RJ.

Online Discussions

One tool with potential to help teacher educators nurture RJ is the online discussion in which students participate via a website. A question or topic is posted to the discussion and students log in and participate at their convenience. Online discussion is unique because participation is independent of both time and place. Also, a transcript of the discussion is automatically generated allowing teacher educators the opportunity to study student responses and intervene accordingly. The qualities and benefits of online discussions make them ideal tools for promoting reflective thinking since teacher educators can access detailed data regarding student thinking. There are various formats for online discussion including blogs and social networking applications. However, most institutions of higher education rely on learning management systems (LMS) to organize technology mediated learning.

There is evidence that online discussions can have a positive impact on student reflection. Han and Hill (2007) report that students ranked online discussion in small groups as one of the most valuable aspects of a course. Nicholson and Bond (2003) found that the reflective thinking of preservice teachers improved during a 10-week field experience as they participated in online discussions. Hawkes and Romiszowski (2001) argue that online discussions encourage critical reflection. Barnett, Keating, Harwood and Saam (2002) found that preservice teachers began to explore their conceptions of inquiry through their online interactions using the Inquiry Learning Forum. Levin (1999) analyzed the content and purpose of different types of electronic communication among preservice teachers and concluded that web-based discussions “appeared to promote a reflective stance on personal, instructional, and critical issues” (p.148). Friedman and Schoen (2005) found that student teachers who probed in online journals with field supervisors made progress in their Reflective Judgment.

Despite recent findings, it is still unclear to what extent online discussions foster meaningful, higher level reflection among participants, if at all. Several studies that found evidence of reflective thinking in online discussions went on to describe that reflection as being either shallow or at the lower end of an evaluative framework (Garrison, Anderson, & Archer, 2001; Hawkes & Romiszowski, 2001; Whipp, 2003).

One possible explanation for a weakness in higher order reflection, especially critical reflection, is an inattention to the development of Reflective Judgment (RJ). Research has shown that college undergraduate students are typically at pre-Reflective Judgment levels, though they approach quasi-Reflective Judgment by graduation (King & Kitchener, 2002). This is not

necessarily due to a developmental barrier, but rather to the type of learning experiences they have encountered. Kitchener & King (1994) distinguish between an individual's functioning level of RJ and his/her optimal level of RJ. By assessing and nurturing preservice teachers' RJ, teacher preparation programs can help them develop the cognitive thinking skills required of critical reflection. Experiences likely to nurture RJ include discussing controversial, ill-structured topics, analyzing others' points of view, defending their own points of views (King & Kitchener, 2002).

This case study explores the question of how a teacher educator can use online discussions to nurture the Reflective Judgment (RJ) of preservice teachers. In particular, the study focuses on the following questions: To what extent do online discussions show evidence of preservice teachers' levels of RJ? What happens to students' RJ levels over the course of a semester in a class that utilizes online discussions to explore uncertainties of teaching language arts?

Participants

The participants in this study were ten undergraduate students in a teacher preparation program at a private university in the Northeast USA. The 11 students enrolled in the class were invited to participate. All but one student consented to participate. Typical of undergraduate elementary education student demographics at the university, the participants were all White, English speaking women.

Method

In this case study, the researcher was the instructor of the course and, therefore, also a participant in the online discussions. A single case with ten participants allows for in-depth study of student thinking that would not be possible with a larger group. This study investigates ways online discussions can nurture RJ using qualitative and quantitative data analysis methods.

The RJ model is considered one of the best known and extensively studied models of adult cognitive development (Pascarella and Terenzini (1991). The RJ model was developed using the Reflective Judgment Interview (RJI) focusing on ill-structured dilemmas, problems without a single correct answer, such as theory of evolution or the origins of the Egyptian pyramids. Participant responses were probed with questions relating to the process of acquiring knowledge and its justification such "On what do you base your solution? How did you go about deciding? Where do your views come from? What counts as good evidence?" The responses were analyzed according to explicit scoring criteria in both general and specific dimensions to yield the participants RJ level.

Conducting the RJI with participants was not within the scope of this study. Instead, online case discussions were modeled on the RJI to explore to what extent, if at all, discussions can play a role in nurturing the RJ of preservice teachers. The questions used in the RJI regarding the process and justification of knowledge were included in the case discussion assignments.

Data Collection & Procedure

Baseline and ending measures of participants' RJ were assessed using a printed case study distributed to students on the first and last days of class. The case, about a teacher trying to encourage a reluctant student to read, reflected an ill-structured dilemma such as those used by King and Kitchener. Following the case details, students were asked to answer six questions based on those asked in the RJI.

During the semester, the students were required to participate in two online discussions based on cases. All of the cases were selected and adapted to meet the following criteria: They dealt with ill-structured problems of practice typically faced by elementary school teachers; the cases related

to language arts instruction; the cases involved individuals from diverse multicultural backgrounds; the cases each included elements that could be considered controversial in terms of culturally relevant practice, such as a White teacher's assumptions about the educational support provided by parents of color.

The students were divided into two groups for the online case discussion assignments. The groups were purposefully assigned so they would be balanced in terms of the RJ levels of participants. This was done using baseline measures of RJ assessed on the first day of class. One group's online discussions were facilitated by the instructor while the other group's online discussions were self-facilitated. This was done to explore the role of facilitation in online discussions. With the sole exception of instructor facilitation of the small group online discussions, the course assignments and activities were the same for each student.

Each small group online case discussion lasted approximately two weeks. Within this time period, students were required to post their analyses of a case using the learning management system software and then respond to at least two of their peers' posts. The online discussions were guided by the same six questions used in the baseline and ending cases. Students were instructed to analyze differing points of view among the group members and to support and explain their reasoning wherever relevant. The instructor facilitated the discussion for group two in order to explore the influence of instructor facilitation in comparison with the self-facilitated group. The instructor followed the discussions and made minimal posts, depending on the content of the discussions, designed to nurture RJ by attending to concepts related to the three general dimensions such as subjecting knowledge claims to a process of reasoning.

Quantitative analysis.

Pre and post levels of participant RJ were assessed and analyzed using quantitative content analysis (Neuendorf, 2002). Kitchener and King's (1985) scoring criteria from the highly regarded RJI instrument were used to assess the level of RJ evidenced in the data collected. The RJ scoring criteria include three general dimensions and six specific dimensions. The two sets of dimensions are designed to be equivalent, both focusing on the conception of knowledge and the justification of knowledge to yield a final assessment of RJ level. Because the data in this study was static, unlike the dynamic RJI, it was not always possible to assess all six specific dimensions. For this reason, analysis focused on the scoring criteria for the three general dimensions of RJ: Cognitive Complexity, Reasoning Style and Openness. Predetermined codes based on indicators of the seven levels of RJ were used in the coding process. ATLAS.ti was used to support the coding of the data. Indicated RJ levels were then averaged to determine the RJ for each participant at that point in the semester. A numerical value of 1 to 7 was assigned to represent each of the seven RJ levels.

The study used a triangulation strategy as well as inter-rater agreement to ensure the trustworthiness of findings. For the purpose of triangulation of the baseline and ending RJ measures, a second content analysis was performed using each of the six specific dimensions culled from the same RJI Scoring Manual. The six specific dimensions are View of Knowledge, Right vs. Wrong Knowledge, Legitimacy of Differences in Viewpoints, Concept of Justification, Use of Evidence, and Role of Authority in Making Judgments (Kitchener & King, 1985). Since each set of dimensions, specific and general, aim to accurately assess RJ, resulting assessment of RJ levels should be the same regardless of which set of dimensions was used. The written case discussions did not allow the researcher to follow up and ensure that each dimension was in evidence, so not all six dimensions were assessed for each student. In such situations, the missing dimension was removed from the analysis. The average RJ levels assessed using the two sets of dimensions were consistent.

A random sample of half of the baseline and final case evaluations was analyzed by a second rater who is certified by a process approved by Kitchener and King. A percentage of inter-rater agreement was calculated based on a sample of the data that was coded by two raters. Inter-rater agreement was initially 90% and reached 100% after discussion.

Qualitative analysis.

Taking an interpretivist approach (Miles & Huberman, 1994), data were read and reread to acquire a general sense of patterns and themes. During the readings, comments and questions were recorded. All transcripts of the online discussions were coded in an iterative process. A start list of codes culled from the RJ theoretical framework was used initially, and then expanded as new codes emerged during transcript review. Coded data were analyzed with the aim of organizing codes into categories using convergent and divergent thinking. Memos were written throughout the coding and interpretation process aiding in the identification of patterns, regularities and themes.

Results of Quantitative Analysis

Growth in Reflective Judgment (RJ)

Students' beginning and ending scores were compared to ascertain growth in RJ for each participant. RJ level improved for 8 out of 10 participants. Three of the eight students who showed improvement advanced one full level or more. Figures 1.1 and 1.2 show beginning and ending RJ levels for each participant organized by group. When looking at the growth of the students according to their online discussion group averages, shown in Figure 1.3, both groups showed similar levels of growth in RJ. The average Beginning RJ level for Group 1 members was 3.8 and the average for Group 2 members was 3.7. The ending RJ level average for Group 1 was 4.4 and 4.3 for Group 2. This means that each group improved their RJ scores by an average of .6 levels over the course of the semester.

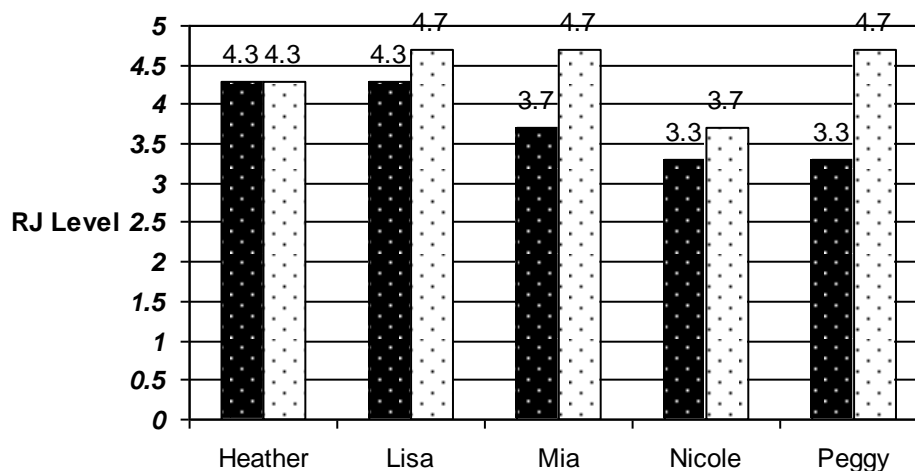


Figure 1.1 Beginning and ending RJ levels for group 1

Results of Qualitative Analysis

Role of Instructor Facilitation in Nurturing RJ

Group 1 had high level discussions without instructor facilitation. However, instructor facilitation was found to be an important factor in Group 2's growth in the RJ dimension of Reasoning Style. At the beginning of the semester, members of Group 1 were .2 levels higher than members of Group 2 in both Cognitive Complexity (CC) and Reasoning Style (RS).

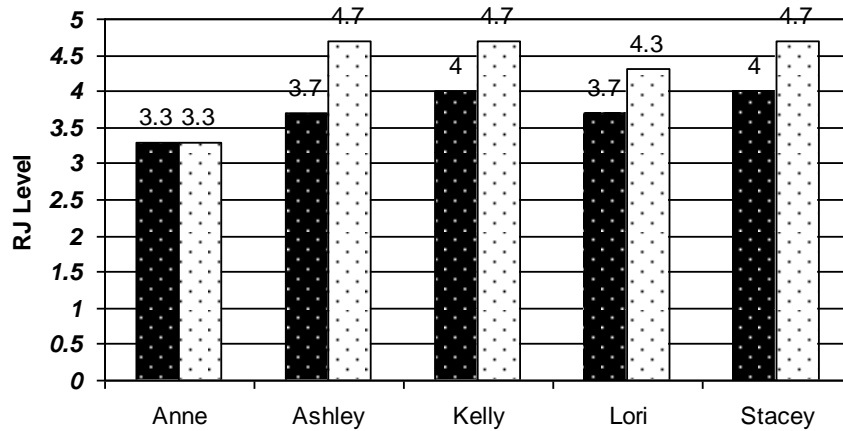


Figure 1.2 Beginning and ending RJ levels for group 2

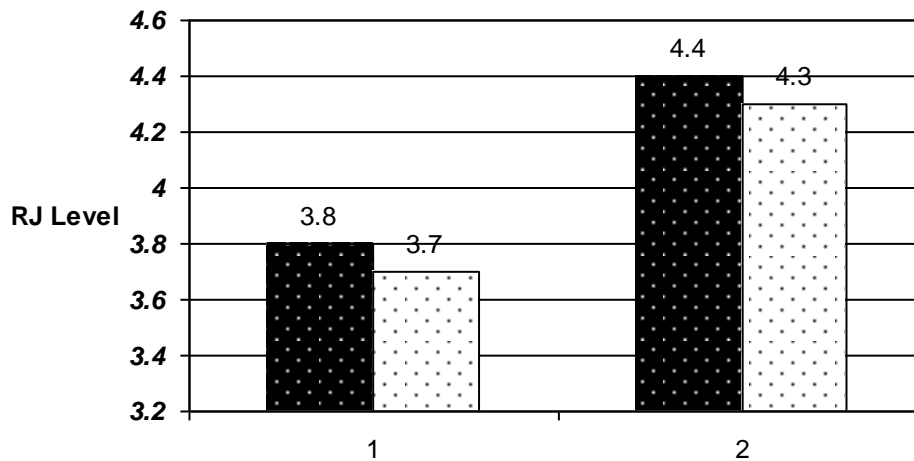


Figure 1.3 Beginning and ending RJ levels by group

An analysis of instructor posts in Group 2’s discussions showed the posts to be focused on Reasoning Style. For example, one instructor post included, “...remember, try to back up your opinions and beliefs with something from the readings and/or from a pre-prac experience.” In this way, instructor facilitation may have contributed to RJ growth.

This growth is best seen in how Group 2 members expressed agreement in the discussions. In the first discussion, their agreement was often subjective and shallow, but by the second discussion they had greatly improved in supporting their reasoning and expanding on one another’s ideas. For example, in the first discussion, Lori enthusiastically embraced Ashley’s idea of collaborating with colleagues, but did not expand or contribute anything to the idea: “Ashley brings up an excellent point that I had not previously thought of. Collaboration with her colleagues is not brought up in the case Lee is presented with, but it could be a huge help.” In the second discussion, however, Kelly first agreed with Anne’s idea of designing activities to boost Suzie’s self-esteem and then expanded on it by exploring two possible justifications for such activities:

I think Anne makes a good point when she suggests that Chris implement activities in her classroom to boost Susie's self-esteem and make her feel more comfortable speaking up. It is entirely possible that Susie is learning the language as quickly as Mary is but does not have the confidence to speak up in front of a teacher and class of native English

speakers so it seems like she is behind. It is also possible that Susie's lack of confidence is not allowing her to practice the English she has learned and this could be hindering her learning.

These examples show how instructor facilitation specifically focused on nurturing students' RJ, in the case the dimension of Reasoning Style, can help students to grow.

Formative Assessment to Inform Instruction

The online discussions served as a useful learning tool with which the instructor was able to probe for deeper reflection. They can also be used as an assessment tool. The automatically generated transcript of each discussion provided formative assessment data that the instructor used to inform instruction. In the first discussion transcript, for example, students were offering subjective opinions instead of practical solutions. One student wrote in the first discussion: "I think Lee will never give up on her student because she seems to be a devoted teacher and a caring person. Lee wants desperately to pass her love for literature onto her students, especially Rhonda." Nor were they explaining their reasoning. The following student's post is full of assumptions that had more to do with stereotypes than facts from the case:

I think that it is important for Lee to continue to work with the family and Mrs. Jackson because, even if they don't see eye-to-eye on the reading issue, it is very important for Lee to know where Rhonda is coming from because her home-environment seems to be playing a major role in how she views academics and reading in particular (Ashley, Discussion 1).

At no point in the case is there any indication that Rhonda's home environment is less supportive of academics than other students'. Clearly, the participant is making unfounded assumptions, possibly based on cultural stereotypes.

Based on the availability of the discussion transcript, the instructor was able to address the concerns presented in both subsequent class sessions as well as in discussion posts. The following excerpt shows the instructor's response to evidence of weak Reasoning Style (one of the general dimensions of RJ) by encouraging students to support and explain their reasoning:

There were a few who suggested that Chris should integrate Thai culture into her curriculum and focus on nurturing Susie's self-esteem. Using ELL strategies was also suggested. Some of you explained where you got your ideas from, other didn't. So I'm wondering...how did you go about deciding? Where do your views come from? What are your suggestions based on? (Instructor post, discussion 2).

In a context where there is no instructor facilitation of the discussion, the assessment data can be used by the instructor to inform other learning activities.

This formative assessment resource can also lead to more accurate student assessment. One of the most vocal students, Ashley, who participated to a much greater extent in face-to-face class discussions than most of the class, actually had one of the lowest RJ levels, 3.7, while two of the quieter students, Lisa and Heather, were found to have the highest levels in the class. Online discussions, therefore, can be used as an additional assessment source to ensure accuracy of student assessment.

Meeting the Needs of Diverse Learners

Other patterns found in the data relate to the individual needs and characteristics of diverse learners. It was discovered, for example, that Cara, a student who rarely spoke in face-to-face class meetings, had one of the highest levels of RJ. This led to a more accurate assessment of her achievement of course goals. It also gave Cara the opportunity to participate in a way that was more clearly more comfortable to her. In addition to helping Cara succeed in the course and

helping the instructor accurately assess her knowledge, Cara's group members benefitted from her thoughtful participation in the online discussions as they socially constructed knowledge together.

Discussion

The apparent large growth in participant RJ found in this semester-long study is somewhat surprising for two reasons. First, participant RJ levels at the end of this study were higher than those found in the literature. King & Kitchener (2002) found that college undergraduates typically moved from Level 3 to Level 4 between their freshman and senior years. Yet, in this study, many participants appeared to be approaching Level 5 RJ by the end of their junior year. The second surprising aspect is that this growth occurred in the short time span of a single semester, when, as previously noted, it had been found that a year was needed before meaningful growth in RJ could be expected (King & Kitchener, 1994; Friedman and Schoen, 2005).

There are several possible explanations for the higher RJ levels found in this study. The use of student work as opposed to the empirically tested RJI, may account for part of the difference in results. Since RJ level was assessed based on indicators evident in the data, the absence of indicators was not taken into account. Using the example of Cognitive Complexity (CC) indicators, a participant was scored at Level 5 CC if she explored aspects of an issue that contributed to complexity. Yet that same participant may not have shown other indicators of Level 5 CC, such as being aware of the limitations of her own experience and of her reliance on subjectively evaluated data. Using the RJI, the interviewer can probe the participant on those indicators that do not surface in her responses and average the three scores to get a more accurate, and in this case perhaps lower, assessment of CC. Since differing levels of RJ are distinguishable, the data can be seen useful in assessing RJ, with the caveat that levels assessed may be not yet have been completely attained.

The literature further states that it is normal for individuals to show a range of RJ levels in their thinking. King, Kitchener, and Wood (1994) describe RJ development as resembling "waves across a mixture of stages" (p. 140). By having a static data source, as opposed to the dynamic RJI, assessed RJ levels may favor higher levels rather than present a clear picture of the "wave" and therefore not be as accurate. Teacher educators who do not have the option of using the RJI should be cautious in their assessments of RJ based on static data sources. While the evidence may not be sufficient to prove attainment of a level, it can be viewed as an indication that a student is approaching a level. Furthermore, the evidence obtained in these static data sources was found to be highly consistent both in terms of inter-rater agreement and when comparing two similar data sources collected at the same time.

Course Based on a Constructivist Approach to Learning

A second possible explanation for the unexpected results could be related to the instructional methods used in the course. The teacher preparation program that provided the context for this study espouses a constructivist approach to teaching and learning. Such an approach is recommended by Friedman (2002) to promote RJ among students. In addition, the course emphasized uncertain dilemmas of practice, encouraged students to use aspects of RJ such as grounding reasoning in evidence, exploring alternative solutions, and being critically open to their peers' suggestions. Course assignments required students to analyze and suggest plans of action for a variety of cases. These activities fit the kinds of activities that King and Kitchener (1994) suggest foster RJ growth, but vary greatly from traditional lecture style instruction that may have been a primary mode of instruction in King and Kitchener's research.

High Student-Student Interaction

The high student-to-student interaction that makes up online discussions could also have influenced the high RJ levels. As reported in the literature review, Levin (1999) found that of four different types of online interaction (student-to-instructor, student-to-peer, student-to-preservice pen pal, peer-to-group), peer-to-group interactions showed the highest level of reflective thinking. Roblyer and Wiencke (2004) also noted that higher rates of interaction are associated with higher student achievement.

Cooperative Learning

In the online discussions, students support one another's learning as they questioned, critiqued, agreed with and expanded on each other's posts. As a pedagogical tool based on cooperative learning, online discussion can lead to the higher achievement and greater productivity associated with research on cooperative learning (Johnson & Johnson, 1999).

The course environment that is the context of this study bears close resemblance to the type of environment that King and Kitchener (1994) argue can move individuals from their functional level to their optimal level of RJ. King and Kitchener claim that movement among levels requires facilitation and nurturing while at the same time, "...most environments do not provide cues or support for high-level performance, especially not about issues of knowing" (p.35). It is true that college learning environments are traditionally lecture-based following a transmission model of learning. The many studies that provide the foundation for King and Kitchener's assessment of typical RJ levels for college students may reflect this type of learning common in college courses. Such environments are likely to lead to lower RJ levels than the constructivist oriented learning environment of this study.

Unique Properties of Online Discussions

Themes found in this study suggest there are unique characteristics of online discussions that are unavailable in face-to-face settings. Hiltz and Goldman (2005) call for research that goes beyond comparing asynchronized learning networks instruction to face-to-face instruction and focus instead on identifying the characteristics of ALN instruction that are unique. Henri (1992) recognized the importance of looking at the content of online discussions 15 years ago. She argues that an "attentive educator, reading between the lines in texts transmitted by CMC, will find information unavailable in any other learning situation" (p.118). In support of Henri's recommendation, the qualitative data analysis of online discussion content found several aspects of ALN learning that contributed to student learning in ways that were different from in-class, face-to-face learning. These include formative assessment data to inform instruction. The automatically generated transcripts of each discussion provided a data source that was concrete and easily available for revisiting and analysis. Having a written record allows those conversations to be plumbed for meaning and patterns. In this way, the instructor was able to use the transcripts to nurture RJ by identifying areas of weakness and intervening accordingly.

Equity.

Online discussions contribute to equity by giving quiet students, who rarely speak up in class, opportunities to be heard and participate in group learning. Students unwilling to speak in discussion-based classes are at a disadvantage in many ways. Integrating online discussions allows shy students to contribute to socially constructed learning in groups as well as provide instructors with more accurate assessment data.

Enhanced assessment.

Instructor assessment of several students' knowledge and thinking was greatly enhanced as a result of their participation in online discussion. This supports research by Harrington (2002) that found ALNs to be an effective tool to better understand student reasoning. She argues that

instructors can use insight gleaned from ALNs to nurture student development, and that accessible information about students' thinking can be "used to support and challenge students' current ways of making meaning" (p. 333).

Limitations of the Study

There are limitations inherent in this study. The small sample size is due to the enrollment of a particular class during a particular semester. Although it is not the goal of this study to generalize to a larger population, the small sample size may limit the perceived relevance of the findings to similar contexts. However, it is important to note that the small number of participants allowed the data to be explored in greater depth. It also allowed comparisons to other examples of student work such as written assignments and in-class discussions. This in-depth analysis encouraged insights that would perhaps not be apparent in larger samples. Case studies usually involve smaller numbers of participants, depending on the nature of the case to be studied. Stake (2005) admits that knowledge transfer in case studies is not yet clearly understood. The reader may find insights in a case study and acknowledge that although it is particular, it is still generalizable, though not in the statistical sense.

Some may consider the fact that the investigator is also the instructor of the course to be an additional limitation. The participatory role and familiarity with the participants undoubtedly influenced the interpretation of data as it was analyzed. Researcher participation had distinct advantages, however, in that a more complete picture of the case as a whole was available. Furthermore, knowledge of the participants may have been helpful to make more detailed and accurate interpretation of the data.

Conclusions

Technology supported student discussions are becoming more and more commonplace. While some instructors include web-based discussion because they are teaching in an online or blended environment, others do so because of administration or student expectations. The literature has many examples of how online discussion can be an effective way to interact and engage with course material. This study adds a new dimension by suggesting that web-based discussion can be used as a tool to nurture student cognitive development and critical reflection to a level that face-to-face course activities still struggle to attain.

Online discussions can provide preservice teachers with the challenge and support needed to move them from their functional level of RJ toward their optimal level of RJ. The emphasis on socially constructed learning as students explore the complexity of ill-structured dilemmas may provide the type of environment preservice teachers need. Instructors can use evidence of student thinking available in discussion transcripts to inform further instruction that targets RJ development.

With some members of our society consistently scoring below others on measures of academic achievement, improving pupil learning for all learners is a national imperative. Statistics repeatedly show that African-American and Hispanic students are left behind White students on academic achievement measures. Since there is general agreement that the teacher is the most critical variable in improving student learning, it is essential that schools of education put effective teaching principles and practices at the center of their teacher preparation programs in order to strive for social justice and equity. Such approaches rely on a high level of Reflective Judgment in order to succeed.

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Editor's Note: This study provides evidence that higher achieving students gain higher proficiency in English as a foreign language. It also shows greater consistency for learners at higher grade levels.

A Closer Look at the Relationship between Academic Achievement and Language Proficiency among Iranian EFL Students

**Rahman Sahragard, Afsaneh Baharloo, Seyyed Mohammad Ali Soozandehfar
Iran**

Abstract

This study intended to find out the relationship between Iranian college students' language proficiency and their academic achievement. To achieve this goal, 151 female and male college students majoring in English Literature at Shiraz University participated in the study. The analysis of the data obtained from the sample revealed that there is a significant positive relationship between language proficiency and academic achievement. Moreover, the results of the independent t-test indicated that male and female participants did not differ significantly with regard to their language proficiency and academic achievement. In addition, one-way ANOVA which was run to determine the impact of academic level on each of the variables under study revealed that seniors outperformed the other levels on their language proficiency. Besides, the findings indicated that juniors significantly differ from the other three groups in terms of their academic achievement.

Keywords: Language proficiency, academic achievement, academic level

Introduction

Learning a foreign language and factors that may affect this process have attracted language researchers' attention for many years. Variables which are related to language learning in an EFL context are studied and their relationships with each other are being sought in order to enhance the learning process. It is obvious that learners are of different language proficiency levels; but, any language researcher may wonder whether proficient language learners are successful students with regard to their academic achievement or not. Maleki and Zangani (2007) believe that many students who major in English language in the Iranian universities have chosen their field of study with little capability to use the language and its components, in other words, when they begin to study, they are not proficient enough in English language use and usage. Maleki and Zangani think that when students have difficulties in understanding the contents and concepts of the course which are presented in the target language, their academic success would be affected in a negative way; in other words, less proficient language learners who have little degree of capability in language use and its components may be weak with regard to their academic achievement too. Therefore, their weakness in general English can cause a drastic impact on their academic success. However, Farhady et al., (1994) believe that though having passed some courses and being graduated, Iranian EFL students in general seem not to be as proficient and qualified in language use as might be expected; in other word, Farhady et al., think that though some Iranian EFL learners seem to be successful in achieving the materials presented in their academic courses, they cannot communicate successfully in real situations. Following the similar line, Savignon (1983) argues that communication does not only occur in the classroom but also in an indefinite variety of situations and success in a particular role depends on one's understanding of the context and on the prior experience of a similar kind (cited in Maleki & Zangani, 2007). A proficient language learner has the sufficient capability to recognize, comprehend, or produce language elements (Farhady et al., 1994).

In order to clarify the issue and find out whether language proficiency and academic achievement are related, this study was conducted to determine the relationship between language proficiency and academic achievement in an EFL context. Accordingly, the following research questions were formulated:

1. Is there a significant relationship between English language proficiency and academic achievement of Iranian EFL college students?
2. Are there significant differences in the students' performances on language proficiency and academic achievement with regard to their years of study?
3. Is there a significant difference between males and females' performances on the language proficiency test and their academic achievement?

Review of Literature

Several studies aimed at investigating the relationship between language proficiency and academic achievement among different groups and in disparate contexts. Some of those studies have yielded positive relationships between proficiency in language use and academic success; while other studies have indicated negative relationships between the two variables under their discussions. The studies regarding the relationship between language proficiency and academic achievement are classified into two groups according to their findings. First, the studies which show a significant relationship between foreign language learners' proficiency and their academic achievement are presented. Then, brief portraits of the studies which do not support the existence of a significant relationship between foreign language learners' proficiency and their academic achievement are provided.

Burgess and Greis (1970), after studying a sample of 17 college students, found that participants' TOEFL scores did correlate significantly with their grade point average, particularly, when grades for courses requiring little English (such as art, music, and math) were deleted from the GPAs (TOEFL with total GPA, $r = .53$; TOEFL with weighted GPA, $r = .56$).

A study done by Gue and Holdway (1973) reached a similar conclusion. They investigated the relationship between academic achievement and language proficiency among 123 Thai education majors who were tested both before and after a summer language program. The correlation between the summer TOEFL scores and GPA was 0.49 and between the fall TOEFL scores and GPA was 0.59, in which both correlations were significant at the .01 level.

In addition, Garcia-Vasquez et al. (1997) compared the academic achievement of Hispanic middle and high school students with measures of their proficiency in English. They found that there is a significantly high correlation between English proficiency and English academic achievement ($r = 0.84$).

In a similar study, Bulter and Castellon-Wellington (2000) aimed at finding the relationship between academic achievement and language proficiency. They compared students' content performance to their concurrent performance on a language proficiency test. Meanwhile they measured students' academic success by means of standardized achievement tests. Their study showed that there is a significant relationship between English Language Proficiency and academic achievement (cited in Maleki & Zangani, 2007).

In order to determine whether language proficiency affects the academic achievement of EFL students, Maleki and Zangani (2007) carried out a piece of research in which a sample of 50 students was studied. 80% of the participants were female and 20% were male. To decide on their overall language proficiency, a standardized TOEFL paper test has been used. Meanwhile students' grade point averages (GPAs) were used as the indicators of learners' academic

achievement. Finally, the result of the correlation revealed a significant relation between English language proficiency and academic achievement (GPA). The correlation coefficient of the two sets of scores was 0.48. This suggests that as English proficiency increases, so does academic success. In other words, there is a positive correlation between the two variables (Maleki & Zangani, 2007, p. 91).

The reason for the outcomes of the aforementioned studies is the idea that when learners are more proficient in language use, they can achieve course materials better and consequently they will get higher scores; therefore, the more language proficient they are, the better they achieve in their classes. Though the previously presented pieces of research highlighted positive significant relationships between foreign language proficiency and academic achievement, the following studies have come into the result that language proficiency and academic achievement do not correlate significantly.

Hwang and Dizney (1970) studied a group of 63 Chinese graduate students at the University of Oregon. They administered a standardized TOEFL test to measure students' language proficiency; and, used their GPAs as the indicators of their academic achievement. The researchers found that there was not a significant correlation between language proficiency and academic success ($r = .19$).

In a similar study, Wilcox (1975) carried out a piece of research in which he studied two groups of foreign undergraduate students to examine the link between their high school GPA and academic success as well as their language proficiency. The study revealed a significant correlation between the high school GPAs and students' academic success ($r = .50$). But, correlations between TOEFL scores and GPAs were considerably different for the groups of students in the sample. For the group from Hong Kong, the correlation between students' language proficiency and their academic achievement was .00; however, for the group from Vietnam, the correlation between TOEFL scores and GPAs was 0.46.

Besides, Odunze (1982) studied 118 Nigerian students in Missouri to seek the kind of relationship that might exist between academic achievement and language proficiency. TOEFL scores were used as measures of student's proficiency in language use, and, their grade point averages (GPAs) were considered as indicators of their academic achievement. The results showed no significant correlation between the TOEFL and students' first year grades ($r = .259$).

Stover (1982) conducted an experiment in which 159 undergraduates and graduates at the University of Arizona participated. TOEFL scores and grades in a preuniversity program were used in the study. The results yielded conflicting outcomes: Both undergraduates and graduates with TOEFL scores of less than 500 were able to achieve at a satisfying level in their first semester. Though, while the TOEFL scores and the GPAs in the preuniversity English program were significantly related to the academic success in the case of the undergraduate students ($r = .21$, $p = .05$), they were not significant in the case of the graduates ($r = .13$).

In addition, Stevens et al. (2000) investigated the relationship between the language and academic success of seven-grade English language learners by means of two tests: a language proficiency test and a standardized achievement test. They stated that since the correspondence between the languages of the two tests was limited, one can not consider a significant correlational relationship between the two variables under discussion.

Bayliss and Raymond (2004) also examined the link between academic success and second language proficiency in the context of two professional programs. They conducted two studies. First, they investigated the link between ESL scores on an advanced ESL test and the grade point average (GPA) which was obtained over two semesters. Second, they investigated the link

between French second language scores on an advanced L2 test; finally, they found that there is not a significant relationship between academic achievement and second language proficiency.

However, Wayne (2006) who was interested in seeking the relationship between language proficiency and academic success came into a different conclusion. His study was investigated in the immigrant population at the general college, university of Minnesota. 57 students enrolled in his study. Participants' English language proficiencies were measured by means of standardized English language proficiency tests; and students' second year GPAs were used as indicators of their academic achievement. The results showed a negative correlation between participants' language proficiency and their academic success. Wayne thought that because of the relatively few academic challenges for graduation, many refugee students graduate from high school and enter colleges and universities with limited proficiency in academic reading and writing, as well as limited content knowledge acquisition.

Methodology

Participants

The participants of the study consisted of a total of 151 Iranian university students majoring in English Language and Literature. They studied English as a foreign language (EFL) at Shiraz University. There were 113 female and 38 male participants; therefore, the majority of them were female. All students were young with an age range of 18 to 28. The subjects were selected through convenient sampling since random sampling was not much practical for this study; thus, all the students who were willing and present in the administration sessions could participate in the study. The following tables indicate how the participants are distributed in different academic levels and sex.

Table 1
Participants distribution in different academic levels.

Academic Level	Frequency	Percent	Cumulative Percent
Freshman	34	22.5	22.5
Sophomore	42	27.8	50.3
Junior	34	22.5	72.8
Senior	41	27.2	100.0
Total	151	100.0	

Table 2
Sex

Sex	Frequency	Percent	Cumulative Percent
Female	113	74.8	74.8
Male	38	25.2	100.0
Total	151	100.0	

1=Female 2=Male

Instruments

A proficiency test which was a truncated version of the Test of English as a Foreign Language (TOEFL) was employed in the present study. This proficiency test included 60 items. The items are multiple choice types. The test consists of 15 structure items, 15 written expression items and 30 reading comprehension items. The test has been used in another study by Rahimi (2004) and the reliability index of the test calculated through KR-21 has been reported as 0.85; the criterion-related validity of this test in relation to a complete TOEFL test is 0.76; therefore, it has been proved that this test is reliable and valid. Rahmani (2007) also applied this test in his study. The reliability of the test Rahmani calculated through KR-21 has been 0.85. In the present study the reliability estimate which was calculated by Kurder-Richardson Formula 21 turned out to be 0.854.

Procedure

The data were collected in the Fall semester of 2007-2008 academic year. The subjects were requested to take the proficiency test during their regular class time and without a time limit. Having collected the prerequisite data the procedure of which was explained above, permission was sought from the Department of Foreign Languages and Linguistics of Shiraz University to use the grade point averages (GPAs) of the subjects under the study in the current semester as the indicator of their academic achievement. In order to achieve the goals of this study in seeking the relationship among variables in this specific context, the data gathered were analyzed by the following statistical methods using SPSS software. First, descriptive statistics were calculated. Then, Kurder-Richardson Formula 21 was used to calculate the reliability estimate for the language proficiency test. In addition, Pearson Product Moment formula was used in order to find the correlation between variables under the study. In addition, T-test and ANOVA were utilized to find the differences among groups.

Results

Utilizing the Statistical Package for Social Sciences (SPSS), the results are provided in this part. Table 3 shows descriptive statistics for students' performances on the language proficiency test.

Table 3
Descriptive statistics for the language proficiency Test

	No. of Participants	Minimum	Maximum	Mean	Std. Deviation
Language Proficiency	151	16.00	58.00	45.96	8.20

The results in the above table show that the scores ranged from a minimum of 16 to a maximum of 58, with an average score of 45.96 and a standard deviation of 8.20.

The scores are classified into four groups according to the participants' academic level. Table 4 shows this classification. According to Table 4 the results indicate that the mean of the freshmen is 41.82 with a standard deviation of 9.14, meanwhile their scores ranged from 16 to 54. The mean of the sophomores is 45.23 with a standard deviation of 8.85 and the range of scores is 25 to 58. The mean of juniors is 44.47 with a standard deviation of 6.99 and the scores vary from 27 to 57. Finally, seniors' average is 51.36 with a standard deviation of 3.98 and their scores range from 43 to 57.

Table 4
Descriptive Statistics for the Participants on the Language Proficiency Test

Academic Level	No. of Participants	Minimum	Maximum	Mean	SD
Freshmen	34	16	54	41.82	9.14
Sophomores	42	25	58	45.23	8.85
Juniors	34	27	57	44.47	6.99
Seniors	41	43	57	51.36	3.98

The results show that the most variability of scores belong to the freshmen (their scores ranged from 16 to 54) and as it was expected the standard deviation related to the freshmen was higher than the other three groups. In addition, the dispersion of the seniors' scores appeared to be less than those of the other three groups (variability of their scores was from 43 to 57) and as a result they have the least standard deviation (SD=3.98). Therefore, it can be concluded that the freshmen were the least homogeneous and the seniors were the most homogenous group with regard to the foreign language proficiency, the sophomores and juniors were almost in the same level of language proficiency.

Table 5
Descriptive Statistics for two sexes on the Language Proficiency Test

Sex	No. of Participants	Minimum	Maximum	Mean	Std. Deviation
Males	38	34	58	49.18	5.68
Females	113	16	58	44.87	8.65

Table 5 reveals the descriptive statistics for the male and female participants on the language proficiency test. The mean score for males is 49.18 with a standard deviation of 5.68; while the average score of females is 44.87 with a standard deviation of 8.65. The variability of scores among females is much more sensible (the scores range from 16 to 58) than the dispersion of scores among males (for whom the scores vary from 34 to 58), and this can be due to the inequality of the number of male and female participants. On the whole it can be concluded that males performed almost better than the females, since the males' average score is 49.18 while the females' mean is 44.87. In order to be sure further inferential analysis will make this clear. Descriptive statistics obtained for the participants' academic achievement manifested by their GPAs utilizing SPSS software are presented in Table 6.

Table 6
Descriptive Statistics for Academic Achievement

	No.	Minimum	Maximum	Mean	Std. Deviation
Academic Achievement	151	13.00	20.00	16.88	1.40

As can be seen in the Table above, the average scores for participants' academic achievement is 16.88 with a standard deviation of 1.40, and the scores range from 13 to 20. Figure 4.8 displays participants' academic achievement.

Table 7 shows the descriptive statistics for different groups of the participants' academic achievement.

Table 7
Descriptive Statistics for Different Groups on GPA Scores

Academic Level	No. of Participants	Minimum	Maximum	Mean	Std. Deviation
Freshmen	34	13.25	19.13	17.13	1.23
Sophomores	42	14.47	19.55	17.37	1.21
Juniors	34	13.00	19.12	15.58	1.42
Seniors	41	15.70	20.00	17.25	1.01

According to the results which appear in Table 7, the mean score of the freshmen is 17.13 with a standard deviation of 1.23, meanwhile their scores range from 13.25 to 19.13. The average score of the sophomores is 17.37 with a standard deviation of 1.21 and their scores vary from 14.47 to 19.55. The mean of juniors' GPAs is 15.58 with a standard deviation of 1.42 and their scores range from 13.00 to 19.12. Finally, seniors' average score appeared to be 17.25 with a standard deviation of 1.01 and their GPAs vary from 15.70 to 20. On the whole, one can notice that the juniors seemed to be weaker than the other three groups with regard to their academic achievement; since the lowest minimum score and the lowest mean belong to this group.

Table 8 reveals the descriptive statistics for males' and females' academic achievement.

Table 8
Descriptive Statistics for Males' and Females' Academic Achievement

Sex	No. of Participants	Minimum	Maximum	Mean	Std. Deviation
Males	38	14.14	20.00	17.15	1.25
Females	113	13.00	19.55	16.79	1.44

According to Table 8 males' average score is 17.15 with a standard deviation of 1.25; besides, males' scores range from 14.14 to 20. The mean of the females' academic achievement is 16.79 with a standard deviation of 1.44 and their scores vary from 13 to 19.55. Therefore, the variability of males' scores tends to be similar to that of females. Figures 4.13 and 4.14 illustrate the exact performance of males and females on the academic achievement.

In order to find out the possible effect of gender on language proficiency and academic achievement scores, two independent t-tests were run and studied.

Table 9 reports the results of independent t-test for the males and females' scores on the language proficiency test.

Table 9
T-test results for the males and females' performance on Language proficiency

Language Proficiency	Levene's Test for Equality of Variances		t-test for Equality of Means					
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	
Equal variances assumed	5.230	.024	-2.865	149	.005	-4.308	1.503	
Equal variances not assumed			-3.503	97.530	.001	-4.308	1.229	

The first section of Table 9 gives the results of Levene's test for equality of variance between the groups. Since the sig. value obtained from the Table is less than .05 ($p=.024$); therefore, the second line of the table which is related to the inequality of variance (equal variances not assumed) provides the information required to determine if the males and females' performance on the language proficiency test significantly differs. In addition, the sig. level in testing the equality of means appeared to be .001 ($p<.05$) which reveals a significant difference in scores for males ($M=49.18$, $SD=5.68$), and females [$M=44.87$, $SD=8.65$; $t(97.53)=-3.50$, $p=.001$]. However, the magnitude of the differences in the means is almost small ($\eta^2=.075$).

Table 10 reports the results of the t-test for the males and females' scores on academic achievement.

Table 10
T-test Results for the Males and Females' Scores on Academic Achievement

Academic Achievement	Levene's Test for Equality of Variances		t-test for Equality of Means					
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	
Equal variances assumed	1.445	.231	-1.363	149	.175	-.357	.262	
Equal variances not assumed			-1.460	72.387	.149	-.357	.244	

The results obtained from Table 10 show a significance level of .231 for testing the equality of variance for males and females' scores and since the sig. value is higher than .05, one can notice that variances are assumed to be equal; therefore, the information related to the equality of variances reveals that there is no significant difference in scores for males ($M=17.15$, $SD=1.25$), and females [$M=16.79$, $SD=1.44$; $t(149)=-1.363$, $p=.175$]. Besides, the magnitude of the differences in the means is small ($\eta^2=.012$).

In order to determine the impact of years of university study (academic level) on the language proficiency and academic achievement two one-way ANOVAs were run separately. Table 11 reports the results of the one-way ANOVA for the language proficiency scores.

Table 11
One-way ANOVA Results for the Language Proficiency scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1877.219	3	625.740	11.179	.000
Within Groups	8228.543	147	55.976		
Total	10105.762	150			

In order to conduct the one-way ANOVA which provided the results of Table 11, academic level was considered as the independent variable and the scores on the language proficiency test as the dependent variable. The results revealed statistically significant differences across the language proficiency of freshmen, sophomores, juniors and seniors ($F=11.179$, $p<0.05$) which show that students' language proficiency tends to increase as a function of years of university study. In order to locate specifically the differences among the four groups, a post hoc (Scheffe) test was run and the results are summarized in Table 12.

Table 12
Scheffe Test on the Language Proficiency Scores

(I) Academic Level	(J) Academic Level	Mean Difference (I-J)	Std. Error	Sig.
Freshman	Sophomore	-3.4146	1.7260	.275
	junior	-2.6471	1.8145	.548
	senior	-9.5423(*)	1.7354	.000
Sophomore	Freshman	3.4146	1.7260	.275
	junior	.7675	1.7260	.978
	senior	-6.1278(*)	1.6425	.004
junior	Freshman	2.6471	1.8145	.548
	Sophomore	-.7675	1.7260	.978
	senior	-6.8953(*)	1.7354	.002
senior	Freshman	9.5423(*)	1.7354	.000
	Sophomore	6.1278(*)	1.6425	.004
	junior	6.8953(*)	1.7354	.002

* The mean difference is significant at the .05 level.

Table 12 clearly reveals that seniors out-performed the other three groups. Post-hoc comparisons indicated that the mean score for seniors ($M=51.36$, $SD=3.98$) significantly differs from that of freshmen ($M=41.82$, $SD=9.14$), sophomores ($M=45.23$, $SD=8.85$) and juniors ($M=44.47$, $SD=6.99$). The effect size calculated using eta squared was 0.185. In addition, the results indicate that sophomores and juniors did rather similarly on the test.

Table 13 presents the results of the one-way ANOVA for the academic achievement.

Table 13
One-way ANOVA Results for the Academic Achievement scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	75.016	3	25.005	16.740	.000
Within Groups	219.580	147	1.494		
Total	294.596	150			

Table 13 highlights statistically significant differences across academic achievement scores of first, second, third and fourth year EFL students ($F=16.740$, $p<0.05$). In order for locating the difference between groups, a post-hoc (Scheffe) test was conducted. The results of this test are reported in Table 14.

Table 14
Scheffe Test on the Academic Achievement Scores

(I) Academic Level	(J) Academic Level	Mean Difference (I-J)	Std. Error	Sig.
Freshman	Sophomore	-.2381	.2819	.870
	junior	1.5462(*)	.2964	.000
	senior	-.1249	.2834	.978
Sophomore	Freshman	.2381	.2819	.870
	junior	1.7843(*)	.2819	.000
	senior	.1132	.2683	.981
junior	Freshman	-1.5462(*)	.2964	.000
	Sophomore	-1.7843(*)	.2819	.000
	senior	-1.6711(*)	.2834	.000
senior	Freshman	.1249	.2834	.978
	Sophomore	-.1132	.2683	.981
	junior	1.6711(*)	.2834	.000

* The mean difference is significant at the .05 level.

Table 14 shows that juniors outperformed the other levels. Post-hoc comparisons revealed that the mean score for juniors ($M=15.58$, $SD=1.42$) significantly differs from that of freshmen ($M=17.13$, $SD=1.23$) sophomores ($M=17.37$, $SD=1.21$), and seniors ($M=17.25$, $SD=1.01$). The effect size calculated using eta squared appeared to be 0.25.

In order to determine any possible relationship between language proficiency and academic achievement and to find out the strength of this relationship, Pearson correlation analysis was carried out. Table 15 displays the results of the correlational analysis.

Table 15
Pearson Correlation between language proficiency and academic achievement

		Language Proficiency	Academic Achievement	Fear of Success	Imposter Phenomenon
Language Proficiency	Pearson Correlation	1	.533(**)	-.033	.100
	Sig. (2-tailed)	.	.000	.685	.223
	N	151	151	151	151
Academic Achievement	Pearson Correlation	.533(**)	1	.000	-.130
	Sig. (2-tailed)	.000	.	.997	.112
	N	151	151	151	151

Table 15 reveals a significant positive correlation between the language proficiency and the academic achievement scores ($r=.53$, $p<0.01$), which highlights the idea that EFL students who are more proficient in English language can achieve better in their classes.

Discussion

Having analyzed the collected data, the research questions can be answered and discussed in this part.

1. Is there a significant relationship between English language proficiency and academic achievement of Iranian EFL college students?

The results reported in Table 15 indicate a significant positive relationship between students' language proficiency scores and their GPAs ($r=.53$, $p<0.05$). The figures show that this relationship is almost strong and its direction is positive. In other words, the more language proficient they are, the better they achieve in their classes. Therefore, the students who scored higher on the language proficiency test had better GPA scores. This finding of the present study is in line with those of the other studies who resulted in the idea that highlights the existence of a significant correlation between students' proficiency in English and their academic achievement. For example, Maleki and Zangani (2007) carried out a piece of research in which a sample of 50 students was studied. To decide their overall language proficiency a standardized TOEFL paper test has been used. Meanwhile students' grade point averages (GPAs) were used as the indicators of learners' academic achievement. Finally, the results of their investigation revealed a significant correlation between English language proficiency and academic achievement (GPA). The correlation coefficient of the two sets of scores was 0.48. Bulter and Castellon-Wellington (2000) who aimed at finding the relationship between academic achievement and language proficiency also found out that there was a significant relationship between English language proficiency and academic achievement. In addition, Garcia-Vasquez et al. (1997) compared the academic achievement of Hispanic middle and high school students with measures of their proficiency in English found that there is a significantly high correlation between English proficiency and English academic achievement ($r = 0.84$). In a similar study, Gue and Holdway (1973) reached a similar conclusion they investigated the relationship between academic

achievement and language proficiency among 123 Thai education majors who were tested both before and after a summer language program. The correlation between the summer TOEFL scores and GPA was 0.49 and between the fall TOEFL scores and GPA was 0.59, which both correlations were significant at the 0.01 level. Besides, Burgess and Greis (1970), after studying a sample of 17 college students, found out that participants' TOEFL scores did correlate significantly with their grade point averages. ($r = .53$). However, the result of the present study contrasts with some other studies in which academic achievement and language proficiency do not have a significant relationship. For example, Bayliss and Raymond (2004) who examined the link between academic success and second language proficiency in the context of two professional programs came to know that there is not a significant relationship between academic achievement and second language proficiency. In addition, Stevens et al. (2000) who investigated the relationship between the language proficiency and academic success of seven-grade English language learners found no significant correlational relationship between the two variables under discussion. Furthermore, after studying 118 Nigerian students in Missouri, Odunze (1982) found no significant correlation between the TOEFL and students' first year grades ($r = .259$). Besides, Hwang and Dizney (1970)'s study of 63 Chinese graduate students at the University of Oregon showed that there was not a significant correlation between language proficiency and academic success ($r = .19$). However, the results of Wilcox (1975)'s study both appears to be similar and contrasted with the finding of this study. Wilcox (1975) carried out a piece of research in which he studied two groups of foreign undergraduate students to examine the link between their high school GPA and their language proficiency. But, correlations between TOEFL scores and GPAs were considerably different for the groups of students in the sample. For the group from Hong Kong, the correlation between students' language proficiency and their academic achievement was .00; however, for the group from Vietnam, the correlation between TOEFL scores and GPAs was 0.46. Finally, regarding the different results obtained in disparate situations, one concludes that the field still needs more investigations.

2. Are there significant differences in the students' performances on language proficiency and academic achievement with regard to their years of study?

The results obtained from the one-way ANOVA reported in Table 11 revealed statistically significant differences across the language proficiency of freshmen, Sophomores, juniors and seniors ($F=11.179$, $p<0.05$). Table 12 indicates that seniors outperformed the other three groups. Post-hoc comparisons showed that the average score for seniors ($M=51.36$, $SD=3.98$) significantly differs from that of freshmen ($M=41.82$, $SD=9.14$), sophomores ($M=45.23$, $SD=8.85$) and juniors ($M=44.47$, $SD=6.99$). The effect size calculated using eta squared was 0.185, which is acceptable. In addition, the results indicated that sophomores and juniors did rather similarly on the test. The findings showed that seniors were more proficient in English than the other three groups, therefore, years of university study affected students' language proficiency significantly. This outcome coincides with the finding of Celce-Murcia (1993)'s study. She also found that students who have been in contact with the language for several years will be more proficient in language. This may be because they have experienced more ways of learning and exposure to language use compared to those who have not had sufficient contact with the language.

Furthermore, the results of the one-way ANOVA run to see if there were any significant differences in the GPA scores of students at different years of study revealed statistically significant differences across academic achievement scores of first, second, third and fourth year EFL students ($F=16.740$, $p<0.05$). The findings reported in Table 13 showed that juniors' academic achievement scores significantly differ from the other levels' GPAs. Post-hoc comparisons revealed that the mean score for juniors ($M=15.58$, $SD=1.42$) significantly differs

from that of freshmen ($M=17.13$, $SD=1.23$) sophomores ($M=17.37$, $SD=1.21$), and seniors ($M=17.25$, $SD=1.01$). The effect size calculated using eta squared appeared to be 0.25. Therefore, juniors were less successful than the other three groups with regard to their academic achievement.

3. Is there a significant difference between males and females' performances on the language proficiency test and their academic achievement?

The results reported in Table 9 revealed a significant difference in the language proficiency scores for males ($M=49.18$, $SD=5.68$) and females ($M=44.87$, $SD=8.65$; $p<0.05$). Therefore, males are more proficient in English than females.

Moreover, the outcomes of the t-test presented in Table 10 revealed that there is no significant difference in scores for males ($M=17.15$, $SD=1.25$), and females ($M=16.79$, $SD=1.44$; $p<0.05$) with regard to their academic achievement. In addition, the magnitude of differences in the average scores for each gender is small (eta squared=0.012). Thus, males and females do not differ in their academic achievement significantly. This finding is consistent with the outcome reported by Halawah (2006). He also found out that difference between males and females on academic achievement was not statistically significant.

Conclusion

The Analysis of the data proves a profound relationship between students' language proficiency and academic achievement which indicates that those who are more proficient in English can achieve academically better. Therefore, it is suggested that more appropriate courses which aim at improving students' proficiency in language be included in the curriculum so that students' academic achievement will be promoted as a result.

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Editor's Note: Many copy-editors would attest that the way information is organized on a page influences ease of reading. This study looks at reading speed and comprehension.

The Relationship between the Arrangement of Constituents and Reading Speed

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Iran

Abstract

The purpose of this study was to investigate the relationship between the arrangement of constituents and reading speed. This study answered this question: “does the arrangement of constituent affect reading speed?” The subjects of the study were 30 female EFL graduate students at Isfahan University. Two forms of a passage were used. One form (form A) with breaks between constituents and one intact form (form “I”). These forms were given to two homogenous groups. To achieve two homogenous groups, Oxford Placement Test 1B1 (Allan, 1985) was administered. Finally, the data of Placement test scores was analyzed through Mann-Whitney test. An Independent sample t-test was used to analyze the data of time of reading comprehension of the two groups. The results of t-test proved that there was significant difference (0.03) between the times of reading comprehension of the two groups. The subjects in the group (I) spent less time in accomplishing the test than that in another group. The main finding of the study was that arrangement of the sentences in a passage may affect reading speed. It was preplanned to write a program to design a type of software to record the exact time of the reading speed and answering the multiple-choice questions but because of lack of time, the participants used stop watches of their cell phones to measure spent time.

Keywords: constituents' arrangement, reading speed, reading, constituent

Introduction

Reading ability is recognized as critical for academic learning. Interest in second language reading research and practice has increased dramatically in the past 15 years. Little attention has been attached to considering the role of constituents' arrangement in speed of reading comprehension. A study by Graf and Torrey (1966) proved that isolated constituents help to comprehend faster. What these researches and findings suggest is that constituents play an important role in reading comprehension speed. This study tries to investigate whether special text arrangement can affect readers' perception speed. Because reading is one of the four skills taught in almost every language, teachers of English may benefit from the results of this study.

Literature Review

One of the most important information processing skills is reading comprehension. Many components of reading are unconscious and process of reading comprehension is highly automatic. William James anticipated the contemporary distinction between working and long-term memory, which he called primary and secondary memory, in his landmark book, principles of psychology (James, 1890/1950).

Short-Term Memory

Short-term memory is the place that new information must remain for a minimum of 20-30 s and after this time, the information will be lost. It is thought that short-term memory is analogous to consciousness and has been described as the “working memory”. Psychologists believe that exact wording is stored for a brief period in short-term memory. Clark and Clark (1977) refer to the

limited capacity of short-term memory and this part of the brain stores only about seven or so unrelated words at a time (Clark and Clark, 1977).

In an early and highly influential article, *The Magical Number Seven, Plus or Minus Two*,^[13] the psychologist George Miller suggested that human short-term memory has a forward memory span of approximately seven items plus or minus two. For example, if the number 833231893 is presented and you are asked to recall it in the same order, individually, you will face difficulty. You can recall them when you divide the numbers into 3-digit numbers (e.g. 833-231-893).

Long-term memory

Alongside working memory, the information stores of long-term memory are also of importance in learning through reading and reading comprehension. Long-term memory in turn effects through its contents and organized structure the ability to understand the applied language and its abstractness as well as pragmatic and other meanings of language. Numminen (2002) found that One major problem with reading comprehension among learners of the Finnish language is thinness of information in long-term memory concerning the studied language. Just & Carpenter (1992) believes that information from the text and information retrieved from long term memory must be temporarily kept in memory to be integrated with newly incoming information while further portions of the text are processed. Ericsson and Kintsch (1995) found that the information is stored in the long term memory during reading.

Reading process and Constituent structure

Phrase structure rules specify the permissible sequences of constituents in a language. The surface structure of a sentence divides up into phrases and sub phrases called constituents. A constituent can be defined as: a group of words that can be replaced by a single word without a change in function and without doing violence to the rest of the sentence” (Clark & Clark 1997 pp.47-48). Hashemi (1988) found that constituents structure of the text make it more difficult or easier to read. Hyona & Pollatsek, (1998); Pollatsek, Hyona, & Bertram (2000) revealed systematic effects of the properties of both the whole words and their constituents, with the effects of the first constituents appearing earlier than those of the whole word or second constituents. McElree (2006) states that sentential constituents (e.g. arguments) should be maximally distinct from one another, so as to avoid interference. McElree (2000) examined what effects interpolated material had on the speed and secondarily the accuracy of processing nonadjacent constituents. No comparable effect was found in the study reported in McElree (2000). McElree (2000) found that the amount of material interpolated between two constituents (e.g., NP and verb) decreased the accuracy of discriminating acceptable from unacceptable relations between the constituents.

Reading and eye movements

During reading, the visual properties of the text are encoded via a series of eye movements (Rayner, 1998), generally from left-to-right across the line of text. Encoding the visual information during fixations typically lasts about 200–250 ms (though the range is from 50 ms to over 500 ms). The movements of the eyes between the fixations, saccades, typically last 20–30 ms; no new information is obtained during these movements. Indeed, vision is suppressed during saccades (Matin, 1974). On average, the eyes move 7–8 letter spaces (though the range is from a single letter space to over 20 spaces) for readers of English and other alphabetic writing systems; letter spaces, rather than visual angle, are the appropriate measure for indexing how far the eyes move during reading (Morrison and Rayner, 1981). On about 10–15% of the saccades, regressions, readers move their eyes backwards in the text to look at material that has received some prior processing. Readers tend to increase fixations durations and regressions when text difficulty increases.

Word space and Reading Comprehension Speed

The spaces between words in English appear to be important in reading because they serve to visually delimit words in the text and, as a result, appear to aid readers (Pollatsek & Rayner, 1982; Rayner & Pollatsek 1996). Epelboim *et al.* (1994) claim that unspaced text is relatively easy to read. In the Spragins *et al.* (1976) study, reading rate decreased by an average of 48% when the text was unspaced. A similar finding was reported by Morris, Rayner and Pollatsek (1990). Pollatsek & Rayner (1982) and Rayner & Pollatsek (1996) agree that elimination of space information interferes with word identification processes.

Method

Participants

This study was conducted with an overall number of 30 female EFL graduate students at Isfahan University. The participants ranged in age from 25-27.

Instruments

To have two groups of learners with different proficiency level, Oxford Placement Test 1B1 which is a standard test including 50 multiple choice items identifying and assessing the learners' level of English Proficiency (Allan, 1985) was administered. The validity and reliability of the questionnaire is taken for granted. In order to conduct a study, the participants were asked to read two forms of a single text. Each text was followed by five multiple-choice questions. The participants used stop watches of their cell phones to record the time spent on reading the passage and answering the multiple-choice questions.

Data Collection Procedure

The scoring of Oxford Placement Test was based on the number of items answer correctly by the students. Each correct answer received one point and the total score of the test was 50. After dividing the participants into two groups, they were given two forms of a single text in which they were required to measure total time of the reading and answering multiple-choice questions. One passage was typed out in two forms: Form "A" consisting of non-broken constituents and Form "P" which was kept intact as the original texts. The experiment was of paper and pencil caliber. It was preplanned to use a type of software to record the time of reading speed and answering the multiple-choice questions but because of the lack of time, the participants used stop watches of their cell phone.

Data Analysis Procedures

After collection, scores of Oxford Placement Test were entered into SPSS for analysis. To have two homogenous groups, Mann-Whitney test was conducted. Differences between the means of the subjects' reading comprehension time were obtained through the independent sample t-test.

Results

The Subjects of the two groups were homogenous and the passage as well as multiple-choice questions was identical. The only factor that distinguishes the groups was the preplanned constituents at the line shifts. The results of mann-whitney test showd that the significance of difference of Oxford Placement Test scores was .539, so participants of this study did not differ in terms of their placement test scores. They are homogenous in

English language proficiency level. The following is the descriptive statistical analysis of Oxford Placement Test scores.

Table 1
The descriptive Statistics of Placement test scores

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Group 1	15	10.00	40.00	50.00	44.6667	3.28778
Group 2	15	11.00	39.00	50.00	45.3333	3.33095

An Independent sample t-test showed a significant main effect ($t=3.64$; $P < 0.05$) of changing constituents arrangement on the reading speed (see Table 2).

Table 2
Summary of mean, standard deviation and significance of reading speed of two groups

Text Form	N	Mean	Std. Deviation	Significance
Spaced	15	1.66	53.59	0.03
Unspaced	15	1.09	28.83	

* $P < 0.05$

Discussion

The main question was asked in this study was whether arrangement of constituent can affect reading comprehension speed. The results of t-test proved that there is significant difference between times of reading comprehension of the two groups. The subjects in the group (I) spent less time in accomplishing the test than that in another group. The principal finding of this study is that arrangement of constituent is an effective factor in decreasing or decreasing reading comprehension speed. This result indicates, in agreement with Rayner et al. (1996), that reading time is slower when arrangement of the constituents was changed. Results of this study is not consistent with Epelboim et al. (1994) who claim that text with changed arrangement is relatively easy to read and it is relatively unimportant for guiding eye movements. The study of reading is one of the oldest topics in experimental psychology; and some of the earliest investigators discovered that it was effective to examine role of eye movements during the reading process. Modern technology must be used in order to examine eye movements. Changing physical arrangement of the constituents can affect fixation time as one of the main contributors to the overall reading rate.

Conclusion and Implications

In conclusion, the role of constituent arrangement on reading speed was considered. In particular, it has been argued that changing constituent arrangement can make reading speed faster and easier. Two forms of a passage were used. One form (form A) with breaks between constituents and one intact form (form "I"). These forms were given to two homogenous groups. The participants used stop watches of their cell phones to record the time spent on reading the passage and answering the multiple-choice questions. The results of this study examined that arrangement of the constituents can make a text easier or more difficult and make a reader reads a text faster or slower. It was revealed that the subjects in the group (I) spent less time in accomplishing the test than that in another group. Recent studies have been described to show that unspaced texts and constituent arrangement of the text can affect reading speed. It was also noted that fixation

duration varies with both the difficulty of the content and the skill of the reader. It should be noted, though, that lack of modern technology can affect study results. It had been planned to use a suitable software to measure the exact time of the reading but the lack of enough time led to use of a chronometer. The lack of capacity to monitor these eye movements to examine the role they may play in reading speed and process can decrease accuracy of the study data. Finally, the findings in this study will be of pedagogical importance. The issue will be of importance to second language teachers of English to familiarize their students with text structures.

Limitations of the study

There are several limitations attached to a study of this kind. The restriction on the sample of participants is the principal limitation of this study. The participants were a small group of EFL graduate learners. Because of the lack of time to prepare a type of software to measure the exact time of the reading, as mentioned, a stop watch of cell phone was used to record the time spent on reading the passage and answering the multiple-choice questions.

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Editor's Note: This study seeks a systematic way to identify and resolve problems in English language pronunciation for Persian students.

How to Improve Pronunciation? An In-Depth Contrastive Investigation of Sound-Spelling Systems in English and Persian

Seyyed Mohammad Ali Soozandehfar

Iran

Abstract

This study is a contrastive investigation between English and Persian sound-spelling systems in which the problematic areas for both English and Persian learners have been identified. Firstly, the researcher has determined the common base between the two languages, i.e. the structural phonology, and has postulated it as the *tertium comparationis* of the study. Then through an in-depth examining of the sound-spelling characteristics of each language, the study has gone through the *description* stage. After that, the comparable features have been identified in the *juxtaposition* stage. Then, in the *comparison* stage, the detailed comparison and contrast of the two languages have been made in terms of the juxtaposed sound-spelling features. Finally, the EFL learners' pronunciation problems have been analyzed for the *prediction* stage. The results have indicated that there are a number of regularities and irregularities which can be problematic for both English and Persian learners, especially for non-native speakers learning English. Moreover, this study has some implications in TEFL for teachers to know and consider such problematic areas and teach the students these inconsistencies so as to reduce such preventative factors in their learning.

Keywords: contrastive analysis, pronunciation, sound, spelling.

Introduction

Pronunciation involves far more than individual sounds. Word stress, sentence stress, intonation, and word linking all influence the sounds of spoken English, not to mention the way we often slur words and phrases together in casual speech. "What are you going to do?" becomes "Waddaya gonna do?" English pronunciation involves too many complexities for EFL learners to strive for a complete elimination of accent, but improving pronunciation will boost self-esteem, facilitate communication, and possibly lead to a better job or at least more respect in the workplace. Effective communication is of greatest importance, so one must choose first to work on problems that significantly hinder communication and then refer to features in terms of accuracy. One should remember that the students also need to learn strategies for dealing with misunderstandings, since native pronunciation is for most an unrealistic goal.

Therefore, the English spelling system has both regularities and irregularities which can be problematic for non-native speakers learning English. But it is possible for the teachers to know them and teach the students the inconsistencies. This paper tends to have a survey on the similarities and differences between English and Persian sound-spelling and identifies the problematic areas for both English and Persian learners.

Objective of the Study

This study is a contrastive investigation between English and Persian sound-spelling systems, in which, first, the sound-spelling system of each language has been described separately, and second, a number of both consistencies and inconsistencies between the Persian and English sound-spelling systems have been explored. Moreover, through this investigation, the study has

analyzed some problematic areas of pronunciation in Iranian EFL learners pronouncing a number of pre-determined vocabularies, containing some inconsistencies in the sound-spelling features, so as to specify the sources of such pronunciation problems, and therefore, to be helpful for both EFL learners and teachers. In particular, the following questions have been answered through the present study:

1. What are the characteristics of the Persian sound-spelling system?
2. What are the characteristics of the English sound-spelling system?
3. What are the consistencies and inconsistencies between the English and Persian sound-spelling systems?
4. What are the sources of pronunciation problems in Iranian EFL learners at the beginner, intermediate, and advanced levels?

Literature Review

Contrastive Analysis and Phonology

In human language, a phoneme (from the Greek: φώνημα, *phōnēma*, "a sound uttered") is the smallest posited linguistically-distinctive unit of sound. Phonemes carry no semantic content themselves. In theoretical terms, phonemes are not the physical segments themselves, but cognitive abstractions or categorizations of them. A morpheme is the smallest structural unit with meaning.

In effect, a phoneme is a group of slightly different sounds which are all perceived to have the same function by speakers of the language in question. An example of a phoneme is the /k/ sound in the words "kit" and "krill." (In transcription, phonemes are placed between slashes, as here.) Even though most native speakers do not notice, in most dialects, the "k" sounds in each of these words are actually pronounced differently: they are different speech sounds, or phones (which, in transcription, are placed in square brackets). In our example, the /k/ in "kit" is aspirated, [k^h], while the /k/ in "krill" is not, [k]. The reason why these different sounds are nonetheless considered to belong to the same phoneme in English is that if an English-speaker used one instead of the other, the meaning of the word would not change: saying [k^h] in "krill" might sound odd, but the word would still be recognized. By contrast, some other sounds could be substituted which would cause a change in meaning, producing words like "frill" (substituting /f/), "grill" (substituting /g/) and "shrill" (substituting /ʃ/). These other sounds (/f/, /g/ and /ʃ/) are, in English, different phonemes. In some languages, however, [k^h] and [k] are different phonemes, and are perceived as such by the speakers of those languages. Thus, in Icelandic, /k^h/ is the first sound of "kátur" meaning "cheerful", while /k/ is the first sound of "gátur" meaning "riddles."

In many languages, each letter in the spelling system represents one phoneme. However, in English spelling there is a very poor match between spelling and phonemes. For example, the two letters "sh" represent the single phoneme /ʃ/, while the letters "k" and "c" can both represent the phoneme /k/ (as in "kit" and "cat"). Phones that belong to the same phoneme, such as [t] and [t^h] for English /t/, are called allophones. A common test to determine whether two phones are allophones or separate phonemes relies on finding minimal pairs: words that differ by only the phones in question. For example, the words "tip" and "dip" illustrate that [t] and [d] are separate phonemes, /t/ and /d/, in English, whereas the lack of such a contrast in Korean (/t^hata/ is pronounced [t^hada], for example) indicates that in this language they are allophones of a phoneme /t/.

In sign languages, the basic elements of gesture and location were formerly called "cheremes" (or cheiremes), but general usage changed to phoneme. Tonic phonemes are sometimes called "tonemes," and timing phonemes "chronemes" (Crystal, 2003). Some linguists, such as Roman Jakobson (1987), Morris Halle (1986), and Noam Chomsky (1991), consider phonemes to be further decomposable into features, such features being the true minimal constituents of language. Features overlap each other in time, as do suprasegmental phonemes in oral language and many phonemes in sign languages. Features could be designated as acoustic (Jakobson, 1987) or articulatory (Halle, 1986; Chomsky, 1991) in nature.

Contrastive Analysis, Orthography, and Phonological Processing Skill

Spelling is the writing of a word or words with all necessary letters and diacritics present in an accepted standard order. It is one of the elements of orthography and a prescriptive element of language. It makes lots of problems even for educated people. Snow et al. (2005) describes the importance of spelling by saying, "Spelling and reading build and rely on the same mental representation of a word. Knowing the spelling of a word makes the representation of sturdy and accessible for fluent reading." Most of the European languages use Latin script and they may differ in pronunciation of some letters such as /r/ and /l/. These differences show themselves more when it comes to non-Roman alphabets such as Japanese, Arabic and Persian. Spelling of the words has an important role in reading and writing and consequently in meaning understanding. In addition, word identification and spelling depends on skills such as orthographic processing and phonological skills.

Phonological processing skill has a great to do with the child's procedural knowledge about grapheme-to-phoneme correspondence rules. They provide the ability to form, store, and access the orthographic representation of words or meaningful parts of words (Stanovich and West, 1989). In reading process, children firstly depend on sound letter correspondence and when there is inconsistency with the letter and its representative sound, it makes difficulty for them, but later on, in the text stages, children learn to use phonological information to read words (Arab Moghaddam and Senechal, 2001).

Hanna et al. (1966) counted the probability of spelling a word correctly if one applies the letter string that most often correspond to the phoneme. When getting repeated exposure to the written word people begin to develop an orthographic representation in memory that contains the words' spelling as a kind of code.

The effect of Orthographic Complexity

The effect of orthographic regularity has been widely studied (Sprenger-Charolles, Siegel, Béchenec, and Serniclaes, 2003; Waters, Bruck, and Seidenberg, 1985). Orthographic regularity refers to the way in which a language associates letters to sounds. To learn how to read and write, the child must acquire detailed orthographic representations of regular and irregular words and access them globally (Frith, 1985, 1986). Regular words have straightforward relationships between graphemes and phonemes, like camera = /kamera/. They can be read and/or written correctly by applying analytic grapho-phonological conversion mechanisms. Irregular words require global processing and can only be read or written by accessing orthographic representations. To acquire irregular words, the child has to be aware of certain spelling peculiarities, e.g. the "e" in "femme" is pronounced /a/ (/fam/) instead of /e/. In the present study, we also investigated whether the processing of these orthographic peculiarities constitutes a cognitive load in handwriting production during written language acquisition. Bloemsaat, Van Galen and Meulenbroek (2003) have shown that orthographic irregularity slows down performance when typewriting Dutch words. There was an increase in preparation time and typing time. In line with this study, we hypothesized that when acquiring irregular words, orthographic irregularities constitute a supplementary processing load that results in an increase

in movement time at the location of the irregularity. In our study, the orthographic irregularity was located at the beginning, middle or end of words acquired early or late. If the child is familiar with the word, he/she can write it down by recovering information from the corresponding orthographic representations. In this case, the processing of irregular and regular words should be the same and yield no duration differences for words acquired early. A different mechanism operates when writing unfamiliar. The child applies a phonological recoding mechanism that works successfully when writing regular words. But, when the child has to write an unfamiliar irregular word, he/she has to memorize the spelling of the whole word and remember the identity and location of the orthographic irregularity. This operation constitutes a supplementary cognitive load that results in an increase in production time. We expected orthographic irregularity to affect first graders more than second graders. Second graders have been more exposed to written language than first graders, so they should have more spelling information stored in memory and therefore recover the spelling of regular and irregular words globally rather than analytically (Share, 1995, 1999).

Error Analysis

Error analysis, offered as an alternative to contrastive analysis, has its value in the classroom research. Whereas contrastive analysis, which may be least predictive at the syntactic level and at early stages of language learning (Brown, 1994), allows for prediction of the difficulties involved in acquiring a second language (Richards, 1974); error analysis emphasizing "the significance of errors in learners' interlanguage system" (Brown, 1994) may be carried out directly for pedagogic purposes (Ellis, 1995; Richards et al., 1993).

Because of the fact that contrastive analysis does not predict all learner difficulties and differences, Corder (1971) and Selinker (1972) considered L2 as a distinct system called "interlanguage." In addition to this, the idea of L1 interference on L2, has given rise to many studies of interlanguage phonology (Jenkins 2000). Brown, Deterding, and Low (2000), for example, investigated a range of differences between Singaporean and British English, including discourse intonation, pitch range, and lexical stress. Hung (2000, 2002) uses a contrastive methodology to specify his phonology of Hong Kong English. Deterding and Poedjosoedarmo (1998) is a research-based reference work for teachers, determining both details of the segmental and suprasegmental features of a wide range of different Southeast Asian languages and English (Jenkins, 2004).

Although there are so many studies on error analysis and interlanguage phonology, such studies are few when it comes to the English used by Persian students. Only a few works are available, such as Yarmohammadi's (2000; 2002) two books: The first one aiming at contrasting the phonological systems of English and Persian for pedagogical purposes (2000), and the second one, which is more complete, investigating the sources of syntactic, lexical, and phonological problems of Iranian English learners through a contrastive analysis of Persian and English (2002). However, the paucity of such research is obvious in an EFL context like Iran where there is no exposure to English native speakers.

Method

Participants

The main participants of the present study were three Iranian speakers of English as a foreign language at the beginner, intermediate, and advanced levels from Navid Institute.

Also, during the investigation of the study, the researcher has consulted two professors at Shiraz University, one instructor at SULC (Shiraz University Language Center), and two instructors at Navid institute. It should be mentioned that the very two professors teach Contrastive Linguistics at Shiraz University and are somewhat experienced in this field. Also, the above-mentioned

instructors are very much familiar with contrastive linguistics and they have passed some courses in this field.

Instruments

Cambridge Advanced Learners' Dictionary (2004);

Oxford Advanced Learners' Dictionary (2005);

A Dictionary of English Affixes and Combining Forms (Badie, 2006);

A corpus-based list of English vocabularies; the types of vocabularies in these lists were selected randomly based on the model of Awedyk (1974); this model is a syntagmatic phonological model of contrastive linguistics which contains the following structures, based on which different types of vocabulary were selected:

- Structures of nuclei
- Structure of the onset
- Structure of the coda
- Structure of the interlude
- Three beginner, intermediate, and advanced short passages.
- A sound-recorder set for recording the pronunciations and interviews of the participants.

Procedures

Data Collection Procedure

The data was collected through an interview with three Iranian EFL learners which consisted of four parts. First the learners were asked to introduce themselves briefly. Then, they were asked to read aloud a number of English words, phrases, and sentences in line with their level of proficiency, chosen randomly from a corpus-based list based on Awedyk's (1974) syntagmatic phonological model. In the next part, they were given a short passage to be read silently in five minutes and to give a summary of that passage. Finally, they were asked to read the passage aloud. Therefore, the sample contains both spontaneous speech and reading aloud pronunciation.

Data Analysis Procedure

First of all, in cross-language comparisons, the choice of *tertium comparationis* is a determining factor in establishing similarities and differences between the phenomena compared (Lipinska, 1975; Fisiak *et al.*, 1978). In terms of phonological and lexical contrastive studies, the type of *tertium comparationis* is substantive insofar as it is connected with the material substance outside language, with which language is joined through its phonological interface, on the one hand, and through its semantic interface, on the other (Hjelmslev, 1961). Therefore, based on this and also on the basis of what Krzeszowski (1990) states, in the case of the present study, acoustic, articulatory, and, in principle, auditory phenomena provide the substantive *tertium comparationis*.

Moreover, the general sketch or the blue print of this study is based on the four classical steps in contrasting two language systems (Yarmohammadi and Rashidi, 2009): description, juxtaposition, comparison, and prediction.

According to Krzeszowski (1990), contrastive studies must be founded on independent descriptions of the relevant items of the languages to be compared in the same theoretical framework. Therefore, the present study has first described the sound-spelling system of the Persian and English languages separately within the descriptive framework of structural phonology, leading to specifications of a number of Persian-specific and English-specific features for juxtaposition, in which some of these features were selected to be compared. Then, in the

comparison stage, the actual comparison and contrast of the sound-spelling systems in Persian and English were performed based on the very features selected in the juxtaposition stage, explicitly illustrating several similarities and differences between Persian and English.

Finally, on the basis of such comparison and contrast, further analyses were performed on the very three EFL learners' pronunciation errors observed in their interviews in order to determine the sources of such errors, so as to reach the last stage of contrastive analysis, i.e. the prediction stage. In this last stage, based on the specified sources, the study has made some predictions in the process of EFL pronunciation learning along with some implications and suggestions for EFL learners and teachers in the form of a trouble-shooting manual, which is actually in line with what Fisiak (1975) stresses regarding the relevance of contrastive studies to pedagogical purposes, i.e. they should be pedagogically oriented. Therefore, the analysis of this study consists of five parts:

1. Persian sound-spelling description;
2. English sound-spelling description;
3. Juxtaposition of Persian and English sound-spelling features;
4. Comparison and contrast of Persian and English sound-spelling juxtaposed features;
5. Analyzing the pronunciation errors of the EFL learners at the three levels of beginner, intermediate, and advanced.

Persian Sound-Spelling System

History and Origins of Persian (Farsi) and Dari-Persian language

Farsi or Persian is spoken today primarily in Iran, Afghanistan and Tajikistan, but was historically a more widely understood language in an area ranging from the Middle East to India. Significant populations of speakers in other Persian Gulf countries include Bahrain, Iraq, Oman, Republic of Yemen, and the United Arab Emirates as well as large communities around the world.

Total numbers of speakers is high: about 55% of Iran's population consists of Persian speakers; about 65% of the Tajikistan's population includes Tajik-Persian speakers; over 25% of the Afghanistan's population refers to Dari-Persian speakers; and about 1% of the population of Pakistan deals with Dari-Persian speakers as well.

Linguistic Affiliation

Persian is a subgroup of West Iranian languages that include the closely related Persian languages of Dari and Tajik; the less closely related languages of Luri, Bakhtiari and Kumzari; and the non-Persian dialects of Fars Province. Other more distantly related languages of this group include Kurdish, spoken in Turkey, Iraq, and Iran; and Baluchi, spoken in Afghanistan, Iran, and Pakistan. Even more distantly related are languages of the East Iranian group, which includes, for example, Pashtu, spoken in Afghanistan; Ossete, spoken in North Ossetian, South Ossetian, and Caucasus of former USSR; and Yaghnobi, spoken in Tajikistan. Other Iranian languages of note are Old Persian and Avestan (the sacred language of the Zoroastrians for which texts exist from the 6th century B.C.).

West and East Iranian comprise the Iranian group of the Indo-Iranian branch of the Indo-European family of languages. Indo-Iranian languages are spoken in a wide area stretching from portions of eastern Turkey and eastern Iraq to western India. The other main division of Indo-Iranian, in addition to Iranian, is the Indo-Aryan languages; a group comprised of many languages of the Indian subcontinent, for example, Sanskrit, Hindi/Urdu, Bengali, Gujerati, Punjabi, and Sindhi.

Linguistic Variation

Scholars recognize three major dialect divisions of Persian: Farsi, or the Persian of Iran, Dari Persian of Afghanistan, and Tajik, a variant spoken in Tajikistan in Central Asia. We treat Tajik as a separate language, however. Farsi and Dari have further dialectal variants, some with names that coincide with provincial names. All are more or less mutually intelligible.

Dari Persian, mainly spoken in Afghanistan, until recently, deferred to the Tehran standard as its model, and although there are clear phonological and morphological contrasts, due partly to the influence of neighbouring Turkic languages, Farsi and Dari Persian remain quite similar. The dialectal variation between Farsi and Dari has been described as analogous to that between European French and Canadian French. Dari is more conservative in maintaining vowel distinctions that have been lost in Farsi.

Luri and Bakhtiari, languages in the southwest part of Iran, are most closely related to Farsi, but these are difficult for a speaker of the Tehran standard to understand. While speakers of Luri regard their speech as a dialect of Persian, speakers of Farsi do not agree. Judaic Persian, written in Hebrew characters and used by Jews throughout Iran, is close to the Persian standard in its written form. However, many Iranians of Jewish descent have left the country and no longer form a significant portion of the population.

Orthography

Persian in Iran and Afghanistan is written in a variety of the Arabic script called Perso-Arabic, which has some innovations to account for Persian phonological differences. This script came into use in Persia after the Islamic conquest in the seventh century. A variety of script forms: Nishki is a print type based closely on Arabic; Talik is a cultivated manuscript, with certain letters having reduced forms and others occasionally elongated in order to produce lines of equal length; and Shekesteh is also a manuscript, allowing for a greater variation of form and exhibiting extreme reduction of some letters.

Linguistic Sketch

The richly inflected morphological system of Old Iranian has been drastically reduced in Persian. The language has no grammatical gender or articles, but person and number distinctions are maintained. Nouns are marked for specificity: there is one marker in the singular and two in the plural. Objects of transitive verbs are marked by a suffix. The morphological features of Arabic words are preserved in loans, thus Persian shows "broken" plural formations, that is, a word may have two different plural forms.

Verbs are formed using one of two basic stems, present and past; aspect is as important as tense: all verbs are marked as perfective and imperfective. The latter is marked by means of prefixation. Both perfective and imperfective verb forms appear in three tenses: present, past and inferential past. The language has an aorist (a type of past tense), and has three moods: indicative, subjunctive, counterfactual. Passive is formed with the verb 'to become', and is not allowed with specified agents. Verbs agree with the subject in person and number. Persian verbs are normally compounds consisting of a noun and a verb.

Word order in Persian is Subject-Object-Verb although modifiers follow the nouns they modify and the language has prepositions. Persian distinguishes short and long vowels. Words are stressed on the last syllable.

Detailed descriptions of Persian orthography can be found in Khanlari (1979) and Baluch (2005). Persian language is transcribed by a modified version of the Semitic Arabic script. There are six spoken vowels in Persian. Three of the vowels are transcribed by actual letters of the alphabet (like English) and in the case of most words, they appear as a fixed part of the word's spelling (rather like English handwriting). The other three vowels are conveyed by diacritics placed above or below the word's spelling (see Figure 1 for examples of Persian words with vowel letter and

with diacritic vowel). Persian, in its fully vowelized spelling in the direction of grapheme-to-phoneme correspondences, is very transparent (similar to Serbo-

Croatian or Italian). Persian children learn to read and spell words in their fully vowelized format only in their first and second year textbooks. In practice, as can be seen in Figure 1, the diacritic vowels are almost always omitted from the word's spelling. Thus, one could identify a significant number of words in written Persian that have a consonantal spelling only. An illustration of this for a reader of English is the word *dig* spelled with *dg*. Of course, contrary to the significant graphic change to the spelling of *dig* without /i/, in the case of Persian, the only noticeable difference is removing a small diacritic from the top of a word's consonantal spelling. This is the situation with a significant number of words in Persian, henceforth referred to as opaque words because there are no vowels. In contrast, words in which the vowel is conveyed by the vowel letter(s) as a fixed part of the word spelling are referred to as transparent words.

An important point to note here is that in the Semitic scripts of Hebrew and Arabic, some vowels may also be omitted from print (see Koriat, 1984). However, contrary to both Hebrew and Arabic in which morphological rules help readers to decide on how the word may be pronounced (see Abu-Rabia, 1997; Koriat, 1984), Persian readers can resort mainly to contextual cues for disambiguation of such words. This is due to the fact that Persian has an affixal morphological system (see e.g., Baluch, 2005; Kashani, 1992). In view of the latter feature, a consonant only spelling in Persian may convey more than one totally unrelated meaning depending on different diacritic assignment. As an analogy, the English consonant string *shp* could be read as *ship* or *shop*. At other times, however, there is only one valid diacritic vowel that would give a correct pronunciation to the consonantal spelling. In the present study, only the latter type of words was used (i.e., consonant words with a unique possible pronunciation and meaning).

English Sound-Spelling System

English spelling should not be confused with the English language. English spelling is our traditional way of representing the English language in written form; there is no necessary connection between the spelling system and the language system. We spell English as we do because of a long history of decisions made by writers and printers. If the history of English-speaking society had been different, its spelling system would be different. The spelling of a sound is used to bring to mind the sound of a word. When <ee> is seen in print in the word *three*, the sound /i/ comes to the mind. Learning to read, in the earliest stages, is the same as learning to associate particular spellings with particular sounds (Note that it was said *particular spellings* rather than *particular letters*; this is because not all sounds are spelled with single letters).

The English spelling system is an **alphabet**. An alphabet is a writing system in which the written symbols represent the phonemes (the word-building sounds) of the language, rather than, say, its syllables. For instance, the symbol <p> in English spelling represents the sound /p/, not a syllable such as /pa/ or /po/ (the main writing system of Japanese uses symbols to represent syllables like 'ma' or 'ko' rather than individual phonemes. Such a system is called a syllabary, not an alphabet.

Every writing system consists of an inventory of **graphemes**. A **grapheme** is a one of the set of symbols used to represent sounds -- it is a **spelling** of a particular sound. Each grapheme of a writing system is used to represent a unit of the language being written. In a syllabary, the graphemes stand for syllables; in an alphabet, the graphemes stand for phonemes. As seen above, English has numerous graphemes for the /i/ sound: *me*, *see*, *seat*, *receive*, *machine*, *people*.

The 26 letters of the English alphabet are the raw material used to create graphemes, which in turn are used to represent the phonemes of the language. For instance, the two letters <s> and <h> are combined into a digraph <sh> to represent a single phoneme, the first sound of *shoe*, the middle sound of *washer*, etc. Letters themselves are not graphemes; they are the raw material for making graphemes. Don't let the fact that many English graphemes consist of one letter mislead

you on this point. English has several grapheme types that go by traditional names in, for example, phonics instruction. These **grapheme types** are:

- Single-letter graphemes:
 - *Vowel letters:* a e i o u, as in *bat, set, fit, pot, nut*
 - *Consonant letters:* b c d f g h j k l m n p q r s t v w x y z as in *ace, kit, moon, home, etc.*
- Double-letter graphemes:
 - *Vowel letters:* ee, oo as in *beet, cool*. a, i, and u are only doubled in names derived from other languages such as *Haas*.
 - *Consonant letters:* all consonants are frequently doubled except h, j, k, q, x, and y. Examples: *apple, summer, toss, dizzy, etc.*

Letter-combination graphemes:

Digraphs: Use of two different letters to spell a single sound, e.g., <th> for the first sound of three; <ch> as in chum, etc. In this case, the two letters make up a single grapheme, since they spell the sound together.

Blends: Two letters that represent two sounds in sequence, as <qu> in *queen* (<q> represents /k/ and <u> represents /w/; <bl> as in *black*, etc. In this case, two graphemes are present: represents the /b/ of *black*, while <l> represents its /l/.

Silent letters, such as the <e> of *time*, the <k> of *knee*, and the <gh> of *sight*, are letters which appear in a word, but do not in themselves represent a sound. Most silent letters were pronounced at an earlier stage of the history of English, but then, though the sound was lost from the word, the spelling did not change. Many critics of English spelling decry the retention of these letters, but they do serve a purpose. In some cases, they differentiate one word from another in spelling, for instance *knot* vs. *not*. Other silent letters participate in what are called *spelling patterns*: they make up for the shortage of vowel symbols we suffer (English has about 16 vowel phonemes, but we use only 5 letters to represent these). This value of silent letters is discussed below.

People often speak of the frustrations and seeming chaos of English spelling, but it is in fact more systematic than meets the eye. English spelling does have many irregularities that are the product of history, but sometimes these help us see the meaning relation between words (as between *sign* and *signature*). The following paragraphs present just a few examples of sub-regularities in English spelling.

<c> represents two sounds: /s/ and /k/ (both are present in <accent>). <c> represents /s/ when it precedes <e>, <i>, or <y>; usually it represents /k/ in other positions, e.g.: <cent>, <city>, <cyst> vs. <cat>, <cut>, <close>, <cream>.

The /k/ sound can be spelled in various ways: <k> as in <kid>, <c> as in <cat>, <ck> as in <back>, <ch> as in <ache>, <q> as in <quite>. One regularity in this variety of spellings is that <ck> cannot be used at the beginning of a word, but only in the middle or at the end. We find words such as <tackle> and <back>, but not *ckat. (The asterisk * means that the word it precedes violates a rule and is impossible within the system.)

A double consonant is most often a cue to the pronunciation of a preceding vowel, especially in words of more than one syllable. Consider the pair <comma>, <coma>. The double <m> in the first word tells you that the <o> is pronounced /a/; the single <m> of the second tells you it is pronounced /o/. The pair <tapping>, <taping> illustrates the same principle, as do <super>, <supper> and <biter>, <bitter>. Also, double consonants preserve the pronunciation of the vowel of a base word when a suffix is added: doubling the <p> of <tap> when *-ing* is added to produce <tapping> preserves the pronunciation /æ/; if <p> were not doubled, we would read <taping>.

One other regularity about double consonants is that, while they often appear in the middle or at the end of a word, they never appear at the beginning; compare staff, bass, tall, hammer, apple with fine, soap, late, must, pole. Spellings such as *mmust or *ppole do not occur.

Single consonants also provide cues to vowel pronunciation when contrasted with the use of a single consonant followed by silent <e>. Consider these pairs:

tap vs. tape
mat vs. mate
pip vs. pipe
grim vs. grime
met vs. mete
mop vs. mope

Although the final <e> is not pronounced and therefore might seem useless, it is actually an important cue that tells us how to pronounce the preceding vowel.

Silent <gh> and <g> also signal how to pronounce the vowel in a word; compare <fit>, <fight>, <mit>, <might>, <sit>, <sight>, <sin>, <sign>.

This is a very brief description of how English spelling works. More can be found in Dechant (1969) and other books on "phonics."

Juxtaposition of Persian and English sound-spelling features

As James (1980) maintains, "the first thing we do [before actual comparison] is to make sure that we are comparing like with the like: this means that the two or more entities to be compared, while differing in some respect, must share certain attributes" (cited in Yarmohammadi and Rashidi, 2009). Therefore, according to what James (1980) alleges and also on the basis of the sound-spelling descriptions above related to each language, i.e. Persian and English, the following features have been juxtaposed based on which the actual comparison and contrast between the sound-spelling of the Persian and English languages have been performed in the next stage, i.e. the comparison proper:

1. Letter-sound correspondence
2. Base word pronunciation
3. Symbols in writing system
4. Spelling as a separative factor
5. Silent letters
6. Different position, different sound
7. Different spelling of the same sound
8. Criteria for spelling
9. Phoneme-grapheme correspondence
10. Sounds are more than letters
11. Spelling style

Now that in this section the juxtaposition has been done, i.e. the specification of "what is to be compared with what," the comparison proper can be performed.

Comparison and contrast of Persian and English sound-spelling systems based on the juxtaposed features

Feature 1: letter-sound correspondence

The first thing we can begin is that English writing system is an alphabetic one, that is, there is a correspondence between letters and individual sounds. But several of letters in English can have

more than one sound value. So there is not always a strict one-to-one correspondence. Some letters are of single value such as (d, p, and m). Some of them can have two or more values like c as in cat and city. Persian writing system also is an alphabetic one and there is a correspondence between letters and individual sounds. However, there are some letters which represent the same sound as "س.ص.ث" which stand just for /s/.

Feature 2: base word pronunciation

In English spelling system, a root or base is always spelt the same, e.g. in "sign" and "signal" the root is the same, but their pronunciations are different. In pure Persian there are a few roots and most of the roots we see are entered into Persian from Arabic such as: سلیم.سالم.سلامت.سلام. They are pronounced according to their structural rules (e.g. subject, object) but the roots have unique spelling.

Feature 3: symbols in writing system

Some of the symbols used in the writing systems are combinations of two or more letters from alphabet e.g. "ph" represents the sound /f/ as 'fish' (like phase) –'th-' speaks for two sounds as in 'thick' and 'there' are pronounced. In Persian regarding [وا] in خواهر (xaahar) (sister) and خواستن (xaastan) (to want) just [ا] has the sound value.

Feature 4: spelling as a separative factor

Two words which are unrelated and different in meaning tend to be 'separated' visually for reader by their spelling even if they sound the same such as 'rough' and 'rough' or 'son' and 'sun'. In Persian we have گزاردن (as in نماز گزاردن, to pray) and گذاردن (to put, to let) that are read /gozaardan/ or خواستن (to want) and خاستن as in برخاستن (to rise) pronounced as /xaastan/.

Feature 5: silent letters

Some symbols are used to signal something about another symbol. They have no sound value themselves when they are functioning in this way. The clearest example is the letter 'e' at the end of a word. However, it tells the reader something about the value of the preceding vowel letter. In word 'fete' the last 'e' is silent it shows that the first 'e' sounds /I/ as in 'feet'. In Persian there are 3 long vowels ا ای او that are sometimes used as a base to represent their short equivalents. In words like خوش /khosh/ و is pronounced a short vowel /u/. Other examples are: خوشحال.خوشبو.احرام (ehraam), اهرم (ahrom), اقبانوس (oghyaanoose).

Feature 6: different position, different sound

Position and surrounding are extremely important in English system. 'GH' can represent the sound /f/ if only it is at the end of the word. /Wh/ can come at the beginning of the word and '-ng-' at the end. In Persian this feature can exist only for a few letters and sounds such as ی and و in examples. یعنی (ya?ni), یابو (yaaboo), وقتی (vaghti). In different positions they sound different.

Feature 7: different spelling of the same sound

There are lots of different spelling for the same sound, e.g. 'k' can be spelled with several different letters and letter combinations, such as k (king), c (cat), ck (back), qu (queen), ch (chorus), and que (boutique). In Persian we have س (سالم) (healthy), ص (صابون) (soap), and ث (ثابت) (fixed) for /s/.

Feature 8: criteria for spelling

English words are spelled according to both their sounds (phonemes, such as /b/) and their meaningful parts (morphemes such as dict). In contrast, Persian uses single, consistent letters and letter combination for sounds. It is much stick to phonology representation. It seems easy to learn Persian, but if you come to a new word you can not get the meaning. In English, however, when

there are Latin roots, you can find words like credible, credit, incredulous, and incredulity with the same underlying meaning of root, 'to believe'. However, they are different in sounds.

Feature 9: phoneme-grapheme correspondence

Speech sounds are spelled with single letters and/or combinations of up to four letters. The sound-symbol relationship is known as phoneme-grapheme correspondence. Graphemes may be composed of one to four letters, e.g. /a/ in cradle, may be, feign, weigh. In English we have just 26 letters to work with but about 40 phonemes and 250 graphemes. In Persian we have at most, two letter combinations to represent one sound such as [وا] in خواستن (to want).

Feature 10: sounds are more than letters

English has much more sounds than letters and these sounds may change according to context and influence each other. There are letters that have no corresponding sound in certain contexts as 'g' in 'sign'(sain), and 'though'. Or some of them transfer only a signal, not a sound e.g. double consonant. There are different words that can be categorized in this feature:

Letters that usually shorten the preceding vowel:

A. (*Though-bought-brought*), (نگهبان-خود)

Words with silent letters:

(*gnat-gnaw*), (*know-knee-knit*), (*isle-aisle-island*), (*should-could-would*), (*debt, doubt*), (*listen, soften-castle*)... (خواستن-خواهر)

B. Words that look the same but are pronounced differently:

wind /wind/ (=moving air outdoors)...*wind* /waind/ (=twisting motion),

tear /tir/ (=drop of eye)...*tear* (t3r/ (=become torn),

جنگ /jang/ (=war).../jong/ (=miscellany),

نقل /naghl/ (=transfer, quotation).../noghl/ (=suger-plum),

مهر (*mehr*=affection; name of month)... (*mahr*=wedding gift)... (*mohr*=sign)

C. Words that look and sound the same but mean differently:

can (*be able*) (*container*)

lie (*lie down*) (*don't tell lie, tell the truth*)

شیر (*milk*; *tap*; *lion*)

مهر (*mehr*=affection; name of a month)

خان (*inn*; *khan*)

D. Words that have the same sounds but are spelled differently:

byte, bite, bight

here, hear

Their, they're, there

Err, heir, air

خوان /khaan/ (= table), خان (=khan)

خرد /khord/ (=small), خورد (=ate)

Feature 11: spelling style

English has both printing and writing, with capital and small letters. But Persian has only writing and letters always connect to each other. There is no capital letter in Persian but it can have as 4 different shapes, according to the place of occurrence, e.g. [غ] in "غصه", "زبغ", "تغییر", "باغ".

5) Analyzing the English pronunciation errors of the EFL learners at the three levels of beginner, intermediate, and advanced

This section actually supports the last stage of the present contrastive study, i.e. the prediction stage, which determines and predicts the type of English pronunciation errors that EFL learners make, along with the prediction of the sources of such erroneous pronunciations. In fact, error analysis, offered as an alternative to contrastive analysis, has its value in the classroom research. Although contrastive analysis, which may be least predictive at the syntactic level and at early stages of language learning (Brown, 1994), and does not take a distinct system called "interlanguage" into account, so that does not predict all learner difficulties and differences (Corder, 1971; and Selinker, 1972), it allows for prediction of the difficulties involved in acquiring a second language (Richards, 1974); and therefore, error analysis emphasizing "the significance of errors in learners' interlanguage system" (Brown, 1994) may be carried out directly for pedagogical purposes in contrastive studies (Ellis, 1995; and Richards *et al.*, 1993).

So, this part of the study will show those problematic areas and features described, juxtaposed, and compared and contrasted in the preceding sections of the study in practice in the form of "error analysis." Therefore, the results of this section can be very helpful for both EFL learners and teachers to take into consideration.

The pronunciation problems are analyzed in five respects; problems with vowels, consonants, consonant clusters, stress, and intonation. Then each pronunciation problem is diagnosed. In the diagnosis phase, the following factors are taken into consideration as possible sources of the problems:

1. Momentary mental overload, distraction, fatigue, and haste which result in mistakes or performance lapses.
2. Mother Tongue Interference:
 - a) Negative Transfer
 - b) Positive Transfer
 - c) Non-existent linguistic Items: Items which exist in L2 but not in L1
3. Loan Words
4. Inherent Difficulties of the Target language:
The pronunciation, for example, we have:
chemist pronounced as /kemist/
chief pronounced as /tʃi:f/
chef pronounced as /ʃef/
The "ch" letters in all the three words are pronounced differently.
5. The Model: The teacher may not be a good model with regard to the way s/he speaks.
6. The Method: The teaching method may be at fault by overemphasizing one aspect of the language and neglecting the other.
7. The Materials: Materials which have teaching items sequenced in a certain way or which lack organization could lead to errors.

8. Inadequate Exposure to the Target Language: Students who live in a country where English is taught as a foreign language obviously do not have adequate exposure to the target language.
9. Overgeneralization: Overgeneralization covers instances where the learner creates a deviant structure on the basis of his experience of other structures in the target language.
10. Indeterminacy: It refers to an inconsistency or uncertainty in handling a linguistic item.
11. Medium Transfer: This is a term used by Tench (1983) for the learner's undue reliance on either the spoken or the written form of a word when the other medium is being used. If a pupil pronounces a word according to its spelling, then medium transfer has taken place (spelling pronunciation).
12. Communication Strategies: "A systematic technique employed by a speaker to express his meaning when faced with some difficulty" because of his "inadequate command of the language used in the interaction." (Corder, 1981, p. 103, cited in Mohideen). Some of these strategies are as follow:
 - a) Avoidance: Learner's avoidance leads to replacement of erroneous items.
 - b) Prefabricated patterns
 - c) Appeal to authority
 - d) Approximation
 - e) Word coinage
 - f) Circumlocution
 - g) Language switch

Results and Discussions

The results indicated that Persian learners who are learning English may encounter with lots of difficulties learning English spelling as it is represented the language at two levels at the same time, the level of units of meaning and the level of sounds. The sounds in the words do not correspond to their representative letters. On the other hand, English learners have to learn a completely new writing system as Persian is non-Roman language. Moreover, the results maintain the fact that English spelling is not purely 'phonetic'. If 'regularity' is defined as a direct and invariable one-to-one correspondence between symbol and sound, then it is not completely regular. But regularity can be looked at in another way- the regular and unique representation of any of the units of a language. Furthermore, it illustrated the fact that Persian has a regular spelling system in the sense of one-to-one correspondence between sound and symbol. Therefore, based on the results of the comparison proper stage, it can be concluded that Persian learners may face spelling problems in the following areas:

- When one sound is represented by more than one letter as in /s/ and س, ص, ث.
- The symbols which are considered as a base for short vowels and do not have the sound value in themselves as in قائم.
- Some letters are written but have no sound value as in خواهر.
- Short vowels are written and they should be guessed in context.

Also, English learners may have spelling difficulties in following parts:

- Some letters are written but have no sound value, e.g. brought.
- There is not much correspondence between the sounds and their representative letters, e.g. rough.
- Silent letters, e.g. sign, know.

- Sounds which have various letters and letter combinations in different contexts such as /f/ in fish and rough.
- One vowel sound can have different written forms: /ey/ in rain, may, etc.

One of the strategies which have been taken into account with regard to coping with such problematic areas deals with "Phonics" and "Phonograms." Phonics is a method for teaching English spelling which exploits various factors: (a) what regularities there are in the English spelling system; (b) what is known about how children handle reading and writing cognitively (for instance, that children may not have mastered certain sounds upon beginning reading instruction, and that they focus more strongly on the beginnings of words than the ends). Phonics proceeds in a sequence intended to make the complex subregularities of English spelling easier to handle for both student and teacher. Phonics must be distinguished from *phonetics/phonology*, which is a scientific attempt to analyze the English *sound system*, not its *spelling system*. Phonics does not strive so much for *scientific accuracy* as it does for *finding regularity in the system for representing sounds with letters, and presenting those regularities in a scope and sequence that make it easier for a learner to master*. Therefore many of its practices, such as distinguishing long from short vowels, are not phonologically accurate (length does not differentiate English vowel phonemes from one another; tongue height does). There was a time in the English language (ca. A.D. 500 to around A.D. 1500) when length did differentiate vowel phonemes, and the spelling system indicated this. But because English pronunciation continued to change after its spelling system became relatively fixed from 1200 to 1500 A.D., the spelling reflects the earlier period of English pronunciation. The phonics description of English spelling reflects the pronunciation of English in 1300 CE more accurately than it does today's pronunciation.

Finally, in the last stage of the study, i.e. the prediction stage, some certain deviant phonological structures and pronunciation errors, which were expected to be produced by the three EFL learners, were analyzed meticulously in order to find the sources of such sound-spelling problems. Having a look at the lists of the sources of pronunciation problems of these Persian learners of English, we notice that the three factors of 'The Model', 'The Method', and 'Inadequate Exposure to the Target Language' are present in the diagnosis of almost all of them. This fact can lead us to one of the most important results that can be taken from this research; that is, in a country like Iran where English is considered as a foreign language, the teacher, the method, and the educational atmosphere play vital roles in teaching this language. In other words, since Persian learners of English are out of contact with native speakers, teachers, methods, and educational systems are responsible for bridging this gap.

'Mother Tongue Interference' and 'Overgeneralization' are two other important factors observed frequently among the sources of the problems. 'Mother Tongue Interference' mostly appeared in the shape of non-existent linguistic items; that is items which exist in English but not in Persian. This shows that the influence of non-existent linguistic items on the emergence of pronunciation problems overweighs the influence of negative and positive transfer from the L1.

Another point which is worth mentioning here is that by comparing the problems in different parts of the sample, we notice that performance lapses are more visible in the summary and reading aloud sample. For example, the learners can easily produce /w/, /ŋ/, and /θ/ sounds respectively in 'watched', 'interesting', and 'thin' when they are pronounced in isolation. But when it comes to producing the same words or words containing these sounds in either spoken or written contexts, the learners produce those Persian sounds which are 'close enough' and easier for them to produce. Therefore, they pronounce /w/, /ŋ/, and /θ/ as /v/, /ng/, and /t/ respectively.

As Kenworthy (1990) argues, those problems that are vital for intelligibility and their occurrence impedes communication, need to be given high priority. In general, the areas of rhythm, word stress, and sentence stress are high priority areas for all learners. Other problems which do not

affect intelligibility can be given low priority. The last groups of problems are those which, may contribute to a very noticeable foreign accent, will usually do not lead to intelligibility problems. This group can be given optional attention.

For Persian speakers of English, the priorities could be as follow:

High Priorities

1. Rhythm
2. Sentence stress
3. Word stress
4. Consonant clusters and sequences as in 'stop'.
5. Problems with vowels which do not exist in Persian and their mispronunciation causes confusion. Examples are
 - /ɪ/ in 'ship' which could be pronounced as /i:/ in 'sheep', and
 - /ʌ/, /a:/, /o:/ in 'cut', 'cot', 'caught' that if are used interchangeably, can cause difficulty.
6. Problems with consonants which do not exist in Persian and their mispronunciation causes confusion. For example /θ/ in 'thick' which might be pronounced as /s/ in 'sick'.
7. Intonation, especially in tag questions.

Low Priorities

1. Sounds which are slightly different in Persian and English, like /r/, /l/, /ŋ/, etc.
2. Diphthongs

Optional Attention

1. Linkage in connected speech
2. /ð/ as in 'that'

Conclusion

As for the first research question, the Persian sound-spelling system was described in detail. Also, as the answer to the second question, the English sound-spelling system was described fully. Therefore, the first section of the study dealt with the description stage of contrastive studies in general. According to the description stage, the study concluded that different languages have different orthographic systems; some of them are more similar such as Roman alphabet in languages like English, German, and French. The others have much greater difference in writing system such as Roman vs. non-Roman as in Arabic and Persian. Therefore, the description section of the study indicates that all the languages, including Persian and English, are rule-governed in terms of spelling along with a number of exceptions. Learning the rules with their exceptions can decrease misspelling. Reading in context can be helpful in diagnosing the meaning. But yet, there are some irregular words that just can be internalized by rote learning.

Moreover, in order to answer the third research question, the juxtaposition and comparison stages were performed in which, firstly, those comparable features were identified and then the comparison proper was done.

On the basis of the results of the comparison proper, the study concluded that the Iranian EFL learners as well as teachers must take these features into account, so that they do not face any

sound-spelling problems. Furthermore, with regard to English learners of Persian language, the study concluded some sound-spelling features that they may encounter with.

Finally, regarding the last research question related to the prediction stage of the present contrastive study, it was concluded that the sources of the pronunciation problems of Persian learners of English as a foreign language mainly lie in the pedagogical system through which this language is taught. Factors like 'Mother Tongue Interference' and 'Overgeneralization' certainly result in pronunciation problems but when it come to teaching English in a country like Iran, where it is considered as a foreign language, other factors such as 'The Model', 'The Method', and 'Inadequate Exposure to the Target Language' will become more perceptible as the sources of pronunciation problems. Since intelligibility is the most sensible goal of pronunciation, problems like those which occur in the areas of rhythm, word stress, and sentence stress, and those problems with vowels, consonants, consonant clusters, and intonation which interfere with the process of communication and cause unintelligibility should be given a higher priority than the others. To avoid pronunciation problems, both learners and particularly teachers should expose themselves to the target language as much as possible through the mass media. Teachers should create an English atmosphere in which learners are able to think in English.

Pedagogical Implications

According to the results of the present study, the following implications are drawn in the form of a trouble-shooting manual to reduce the number of pronunciation problems committed by our Persian learners of English as a foreign language:

1. Students should be advised to listen to good English from what available source_ radio, television, native speakers, and good local speakers of the language. They should listen for correct pronunciation and understanding.
2. Students can record their speech, compare it to that of a native speaker in terms of vowels, consonants, consonant clusters, stress, intonation, etc., find their problems in each area, and practice the correct pronunciation.
4. Teachers must frequently remind their students that when they speak in English, they must think in the target language so that they do not bring in any feature of their mother tongue.
5. English is not an easy language to master. Teachers of English should advise their students to persevere in studying English. There are no short cuts to learning the language. When they are sufficiently exposed to target language, the possibility of making pronunciation errors is minimized.
6. Teachers need to keep themselves abreast of current issues by reading books and journals related to our profession.
7. Teachers should make sure that there is all round language development. They should not spend too much time on one area of language to the detriment of others.
8. Teachers should encourage students to speak in English with their fellow students in school or on campus and create an atmosphere in class that is conducive to learning the language.
9. The teacher should provide an explanation with regard to the possible source or cause of error to bring about an awareness of what could be the potential contributory factor.

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