
Software Only Biometrics to Authenticate Student ID

Report of Pilot with the University of Texas System TeleCampus

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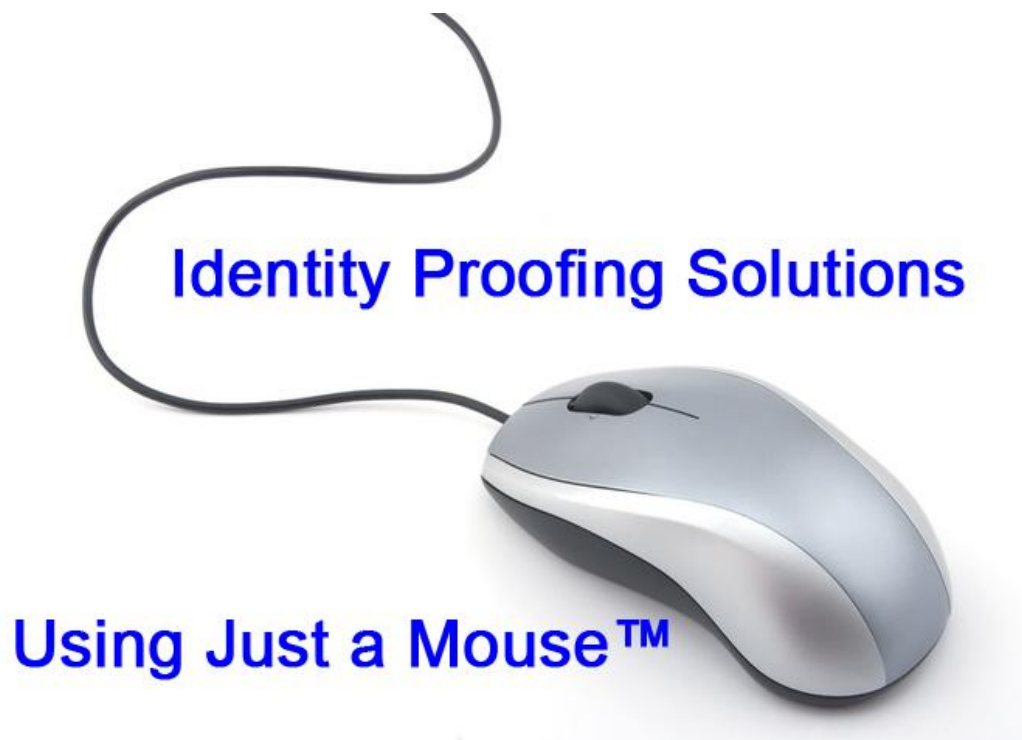
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This paper describes a pilot project of Biometric Signature ID's (BSI) student authentication software conducted in partnership with the University of Texas System TeleCampus (UTTC). During five weeks in spring 2010, 167 students enrolled in online courses offered by nine campuses within the University of Texas System to test BSI's technologies (BioSig-ID, Click-ID, and Complex Security Questions). Students who completed the project reported very positive experiences with Biometric Signature ID's systems. The project also facilitated the development of student enrollment procedures, and the majority of student participants had a positive experience with the enrollment materials and process.

Introduction

Beliefs about Academic Integrity in Online Education within the University of Texas System

The pilot project was conducted with students enrolled in fully online courses offered in the University of Texas System (UT System). Academic integrity is important to administrators, faculty members, and students within the UT System, and was investigated in two recent studies.

- McNabb and Olmstead surveyed 76 faculty members with experience teaching both on campus and online. Forty-three percent indicated a belief that undergraduates cheated often or very often, and another 43% thought they cheated occasionally. Additionally, 68% believed graduate students cheated at least occasionally.
- About one-half of faculty members surveyed by McNabb and Olmsted said they believed that the likelihood of a cheating in an online course was the same as in an on campus course. Nevertheless, 26% of faculty members thought that undergraduate students were more likely to cheat in an online course, and 13% believed the same about graduate students.
- Olson and Hale surveyed 51 administrators at five campuses within the UT System in 2000, and 26 at the same campuses in 2006. Their survey explored attitudes toward online learning, including academic integrity. In both studies, more than 60% of administrators indicated they were more concerned about controlling cheating in online courses than they were for on campus courses.

Legislative Requirement to Authenticate Distance Learners

The Higher Education Opportunity Act of 2008 (HEOA) requires accreditors to ensure that institutions have processes in place to assure that a person who registers in online courses also does the coursework. The Department of Education requires accreditors to make certain that institutions verify students' identities through (1) secure logins and passwords, (2) proctored tests, or (3) identification technologies and practices as they become widely accepted.

The legislation is aimed at curbing academic dishonesty in online courses through misrepresentation. This project was an effort to gather information about UT System students' acceptance of the use of identification technologies.

Biometric Technologies

Authentication technologies use biometrics to confirm the identity of an individual through anatomical, physiological, or behavioral characteristics. Some biometric solutions do not require any hardware. These are “dynamic biometrics” that are behavioral in nature. Dynamic biometrics offer the same identity authentication attributes as anatomical biometrics (such as fingerprints).

Unlike verification technologies, which confirm a user can demonstrate they possess required information (such as a password or the answers to personal questions), biometrics are difficult to duplicate and nearly impossible to share. Because authentication through biometrics can be applied to multiple course elements, assessments are not limited to tests as is the case with proctoring or monitoring (digital proctoring). Additionally, biometric systems have low implementation costs and staffing needs, unlike traditional and digital proctoring.

UT System TeleCampus/Biometric Signature ID Pilot Project

The primary goal of the pilot project was to gauge student acceptance of the use of Biometric Signature ID (BSI) identity proofing technology for student authentication. A secondary goal was to develop optimal student enrollment procedures. Additionally, the results were compared to a similar pilot project with the University of Maryland University College (UMUC).

University of Texas System TeleCampus

The UT TeleCampus (UTTC), which disbanded in August 2010, provided centralized technology, services, and support for online learning within the UT System. UTTC’s charge included tracking and review of new educational technologies, a mission it fulfilled through this and similar projects.

UTTC was founded in 1998, and prior to its closure, supported almost 95,000 enrollments in close to 3,500 fully online undergraduate and graduate courses. More than 30 online degrees and certificate programs were offered through UTTC by the 15 institutions within the UT System. UTTC was a recognized leader in online higher education, receiving numerous awards for quality and innovation. UTTC courses met or exceeded state and national standards for excellence, interaction, and learning outcomes. This was demonstrated through UTTC’s high course completion rates; in spring 2009, approximately 90% of enrollees earned a passing grade in their course.

The 2009 Annual Report for UTTC indicated almost all enrolled students lived in the United States (99.5%), and most lived in Texas (96%). The majority of students (63%) were 20-25 years old. Twenty percent were aged 26-30, 13% were 31-35 years old, and ten percent were aged 36-40.

The UTTC/Biometric Signature ID pilot project was conducted during the spring 2010 semester. During the term, 11 UT System campuses offered 206 courses with 6,381 census day enrollments through UTTC.

Biometric Signature ID

Biometric Signature ID’s BioSig-ID software gathers data on a student’s mouse, stylus, or touchpad characteristics such as the speed, direction, height, length, width, and angle of the student’s movements. These unique biometric characteristics represent

the highest level of identity authentication and security. When a student enrolls in BioSig-ID, their biometric data creates a unique profile that is stored in a secure database. The student is authenticated when his or her actions match the unique profile on subsequent logins. To ease implementation and limit the need for student support, Biometric Signature ID provides two additional validation methods: Click-ID and Complex Security Questions.

Due to these multiple methods, a student only needs help desk assistance after failing to successfully be authenticated through one of the three methods. This helps limit help desk calls for password resets, while continuing to require the highest security login procedures.

BioSig-ID provides authentication of a user by measuring the individual's unique characteristics, commonly referred to as "something that you are." Click-ID and Complex Security Questions incorporate "something that you know." These multiple methods of authentication make BSI's software a true multi-factor authentication system similar to those required for online banking. BSI's authentication system:

- is intuitive and simple to use;
- identifies students with a high accuracy;
- increases security within learning management and other IT systems;
- can authenticate tests, as well as other types of assessments such as written work and participation;
- does not require the purchase or installation of any hardware or software;
- can be used at login or for periodic, random challenges;
- may be integrated with the in the university website or portal, learning management system, student information system, or other similar technologies;
- can scale, to adapt to program growth;
- includes a process to easily distribute, revoke, renew, and replace credentials in the event of loss;
- only requires a student to create a profile one time during his or her relationship with the institution;
- works across different channels of interaction, from desktops to smart phones; and,
- does not make students feel uncomfortable or that their privacy is threatened.

Methodology

Students were recruited through faculty members, who were asked for permission to contact their students about participation. As can be seen in Table 1, 45 faculty members agreed to allow UTTC to contact their students. These faculty members were responsible for about 70 course sections representing just over 2,000 census day enrollments.

Table 1. Potential Student Participants by Campus

Campus	Faculty Members	Course Sections	Census Day Enrollments
UT Arlington	6	9	595
UT Brownsville	9	18	300
UT Dallas	1	1	85
UT El Paso	8	12	419
UT Pan American	4	4	128
UT Permian Basin	9	11	235
UT San Antonio	1	2	50
UT Southwestern Medical Center	2	9	132
UT Tyler	5	5	89
<i>Total</i>	45	71	2,033

Students were contacted by email two times and asked to participate. Involvement was voluntary, but some faculty members offered extra credit and BSI offered token gift cards to ten participants chosen randomly. Students were asked to visit a basic customized website by the enrollment deadline. The website to which students were directed included written instructions and an instructional video. Students were asked to spend about 30 minutes over five weeks creating a BSI profile and then being authenticated with it ten times. Specifically, they were asked to:

1. Watch a brief instructional video.
2. Enroll with BioSig-ID.
3. Enroll with Click-ID.
4. Select and answer Complex Security Questions.
5. Be validated by BioSig-ID or Click-ID ten times.
6. Complete a survey about the enrollment and validation process.

After the enrollment deadline, email communications were limited to just the students who enrolled. Two reminders to complete ten validations were sent to participants, as well as an email reminder about providing input through the survey. Additionally, students who finished the project received a Certificate of Completion by email.

Integration with a learning management system was not a component of the pilot project. Therefore, access to UTTC courses and services was not affected by a student's ability to be validated by the BSI system. Students accessed the authentication system on servers hosted by BSI, which also provided technical support.

BioSig-ID

Students started the process by registering and enrolling in the BioSig-ID system. Only an email address was required to register. After registration, a student was taken to a drawing screen with gridlines, as seen in Figure 1. Each student registered by drawing a “secret code” of his or her choice, made up of numbers and/or letters, within the grid. To complete his or her profile, a student had to repeat their secret code three times. When a student returned, he or she drew their secret code on a validation screen with the same gridlines. If the drawing matched the student’s enrollment profile, they were successfully validated.

Figure 1. BioSig-ID Drawing Screen

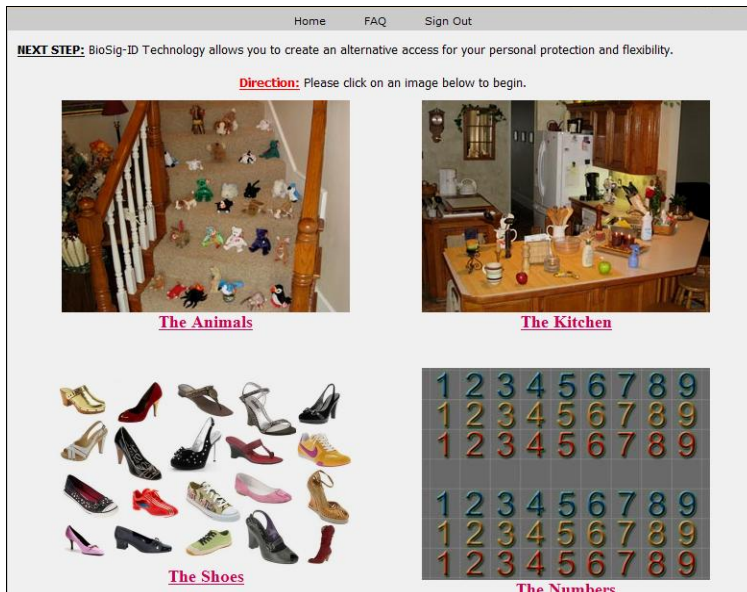
The screenshot shows the 'Enroll BioSig-ID Profile' interface. At the top right, it says 'Hello, jeff2347@biosig-id.com' and has a 'My Account' link. Navigation links for 'Home', 'FAQ', and 'Sign Out' are at the top. The main heading is 'Enroll BioSig-ID Profile'. Under 'Directions', there are four bullet points: 'Select 3 or more different characters/initials/shapes to use as your personal ID (see example)', 'Using your mouse, hold the left mouse button down', 'Draw these different characters/initials/shapes in the space provided', and 'Use the lines as the reference'. An 'Example:' box shows the handwritten initials 'JST'. Below this, 'Success Tips' include: 'Write slow & move your mouse with consistent speed and direction.', 'Using your mouse, don't forget to hold the left mouse button down', 'Speed and direction should resemble your stored profile', and 'Try using last 3 or 4 numbers of your cell phone as your secret code. Sometimes numbers are easier than letters.' A 4x7 grid is provided for drawing. The first row contains '2', the second row contains '9' and '0', and the third row contains '2'. At the bottom, there are checkboxes for 'Check box to enable invisible ink' (unchecked) and 'Uncheck box to remove grid lines' (checked). There are also colored numbers '1 2 3' and buttons for 'Clear', 'Next', and 'Re-enroll'. The 'Flash Client Version : 1.1' is noted in the bottom right.

If a student was unable to successfully create a BioSig-ID profile after five attempts, he or she was directed to Click-ID. The student’s primary authentication method would then be Click-ID.

Click-ID

Regardless of whether or not a student successfully created a Bio-Sig profile, each also enrolled in a second, alternative authentication method called “Click-ID.” Each student chose an image from four options, as seen in Figure 2, and then selected three specific objects within in that image. To complete the profile, a student repeated their selections three times, in the same order.

Figure 2. Click-ID Selection Screen



If a student returned (if unable to be validated in BioSig-ID), he or she had to select the same image, and then the same items in the image in the same order. In addition, images were always presented differently on the validation screen (for example, compressed or elongated), for added security.

If Click-ID was a student's primary authentication method, successful validation gave them system access. On the other hand, if Click-ID was a student's secondary authentication method (they return to it because they are unable to be validated in BioSig-ID after three attempts), successful validation in Click-ID allowed the student to re-create his or her BioSig-ID profile.

Complex Security Questions

Students also selected and answered two of 12 Complex Security Questions as a part of their registration in the BSI system. This allowed a student using Click-ID as his or her primary authentication method, who could not validate himself or herself in Click-ID, to successfully answer personal questions to be given the opportunity to create new Click-ID profile.

Results

Eight academic campuses had students involved in the pilot project. In addition, a small number of students from a medical branch participated. As can be seen in Tables 2 and 3, 163 students completed the enrollment process, 90 students completed ten validations, and 73 students completed the feedback survey. Also, as shown in Table 2, 52% of the students who completed all of the pilot components (enrollment, validation, and the survey) were undergraduates and 38% were graduate students.

Table 2. Student participation by level

Level	Enrolled	Completed Validations	Completed Survey
Undergraduate	98	48	38
Graduate	59	39	28
Not Identified	6	3	7
<i>Total</i>	163	90	73

Table 3 categorizes student participants based on the discipline of the course(s) in which they were enrolled. Math and science courses made up the largest group, representing about 30% of participating students. Business and education courses each made up about 20% of participants. The remaining courses were from humanities, fine arts, nursing, and various medical disciplines.

Table 3. Student participation by discipline

Discipline	UTTC Programs	Enrolled	Completed Validations	Completed Survey
Business	General Education MBA	26	20	15
Education	Educational Technology Kinesiology Literacy Studies	38	20	16
Humanities & Fine Arts	General Education	34	16	9
Math & Science	General Education	48	25	22
Nursing & Medical	Nursing Physician Assistant Studies Health Services Technology	11	6	4
Not Identified		6	3	7
<i>Total</i>		163	90	73

Participant activities were tracked through BSI system audit trails and additional information was gathered through interactions with students. The data gathered indicates that:

- Every student who attempted to enroll in BioSig-ID did so successfully. (No students used Click-ID as their primary authentication method.)
- The average enrollment times for BioSig-ID and Click-ID were 49 seconds and 35 seconds respectively.

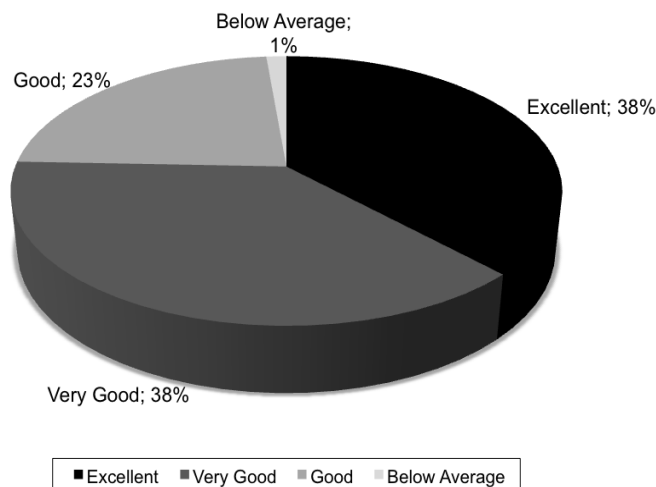
- One student contacted BSI for technical support.
- Forty-two percent of students who enrolled with BSI completed the project (enrollment, ten verifications, and the feedback survey).
- Participants completed 3,647 enrollments, validations, or re-enrollments.
- Three faculty and four staff members also enrolled. Of these, one faculty member and one staff member completed ten validations and the survey.
- More than 80% of participants who completed ten validations spent time experimenting with the system, completing additional validations.

Outcome

Ninety students completed enrollment and ten validations and were asked to complete a feedback survey. Eighty-one percent did so.

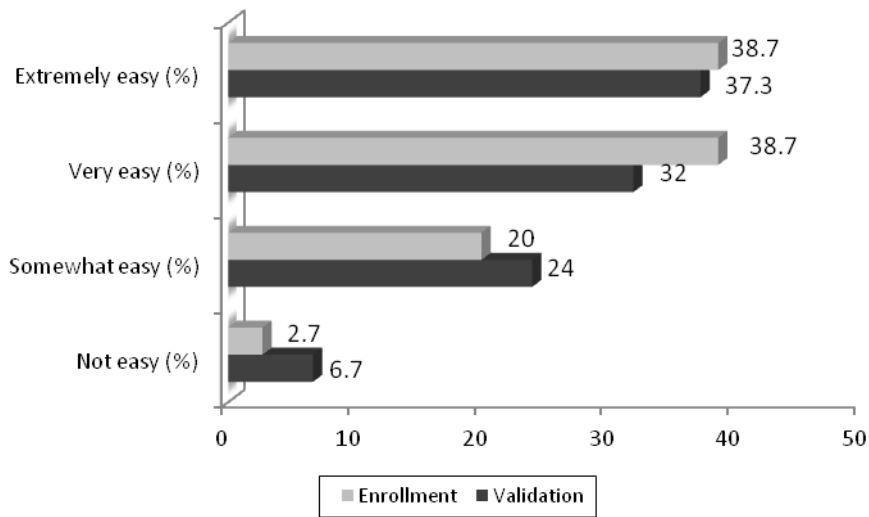
As can be seen in Figure 3, nearly all (99%) of students who completed the pilot had positive feelings about the experience. Additionally, all the students who completed the pilot indicated that the email and website instructions were easy to follow.

Figure 3. Overall experience with the pilot project.



Almost all the students who completed the pilot project indicated a positive experience with the enrollment and validation processes. As illustrated in Figure 4, 97% of students who completed the pilot felt the enrollment process was easy and 93% said the same about the validation process.

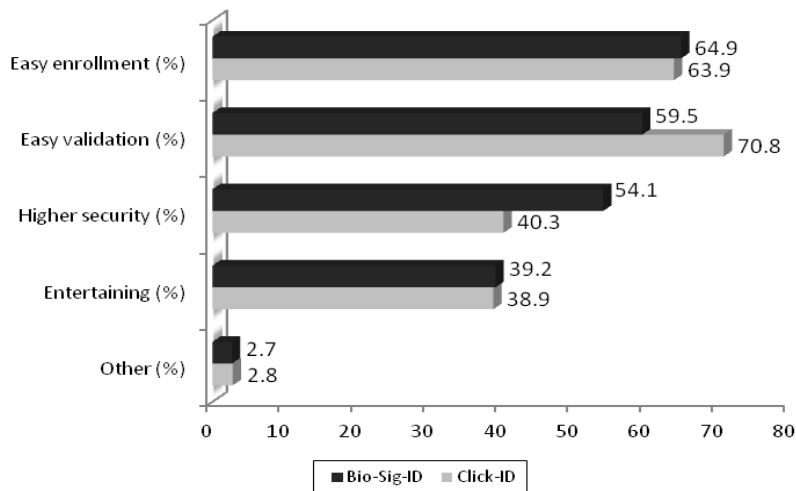
Figure 4. Feedback on ease of enrollment and validation from students who completed the pilot.



All participants indicated the BSI’s system was convenient. This included one-half of the students surveyed, who said it was “very convenient.” Also, as illustrated in Figure 5:

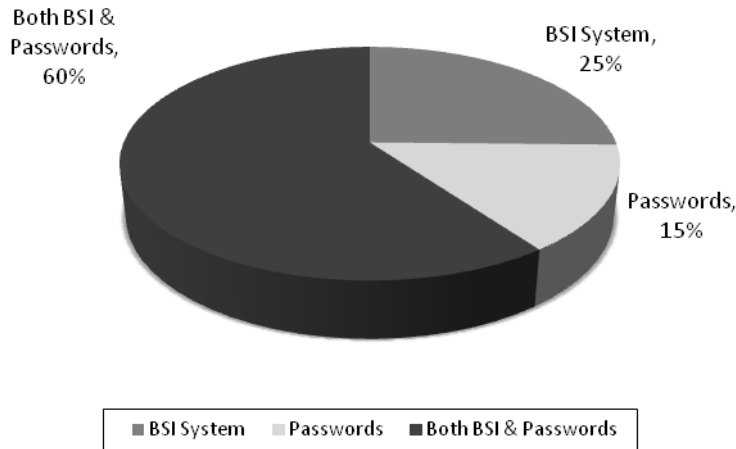
- More than 60% of students liked how easy it was to complete the enrollment and validation processes.
- A majority of students liked that BioSig-ID provided more protection than passwords. Additionally, more than 40% of students liked that Click-ID was stronger than passwords.
- Close to 40% of students thought the BSI system was entertaining.

Figure 5. Favorite system features of students who completed the pilot.



As shown in Figure 6, 60% of students who completed the pilot said they would choose both passwords and BSI software (rather than either passwords or BSI software) if given the opportunity.

Figure 6. Preferred method of login reported by students who completed the pilot.



Discussion

Input from the 73 students who completed the project show broad student acceptance of the BSI system. These students indicated the instructions were very easy to follow, and they thought the enrollment and validation processes were very easy to complete.

The results confirm a smaller pilot with the University of Maryland University College (UMUC) and BSI. That effort, with 25 students completing a feedback survey, also found high levels of student satisfaction. A majority of UMUC students said (1) the system was very convenient and user-friendly, (2) the instructions were very or extremely easy to follow, (3) enrollment and verification were very or extremely easy to complete, (4) they preferred BSI's system to traditional proctoring, (5) they thought the system was more secure, (6) they would be willing to pay to use the system, and (7) they preferred BioSig-ID and at-home online tests to traditional proctoring.

Conclusion

The pilot project implemented by Biometric Signature ID and the UT TeleCampus resulted in a high level of acceptance of the BioSig-ID dynamic biometric system. Students who completed the project—enrollment, ten validations, and a feedback survey—had positive experiences with the enrollment and validation processes, as well as the communications and instructions they received. Participating students thought the system was very easy to use. They also appreciated its value in increasing security. Enrollment and validation required very little of participating students' time. Additionally, students indicated they enjoyed using the BSI system.

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