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Teacher's Strategies for Improving Online Learning or Exam Credibility

Ruey-Shin Chen
Department of Computer Science and Information Engineering, National Quemoy University,
No. 1 University Road, Jin-ning Township, Kin-men County, Taiwan, Republic of China

Abstract: In order to refine online learning performance or testing credibility, this study develops some strategies for teacher's. It is difficult for faculty or staff to control credible assessment in current web-based self-learning or Exam system because there is not enough student authentication and fair environment. Though some face recording system has discussed in earlier research, this study adopts Teacher Strategies and adjusted Authenticated Process for improving higher score credibility of online exam. In a survey of 551 students, 90% of the students regard that online testing scores are credible. According to data analysis, all p-values of questionnaires are significantly different between pretest and posttest, but the distributions of all posttest means are not enough. Then, after data analysis, 36 students were interviewed and obtained some improvements of Online Testing Policy for future reference of school teacher or faculty.

Key words: Exam credibility, authentication, teacher's strategies

INTRODUCTION

E-learning or exam pattern has been changed from the traditional practice because the advancement of information technology. As online learning or exam in foreign language study, e-Exam tool is convenient to make a quiz for evaluating students' learning performance (Gimeno-Sanz and de Siqueira, 2012).

Beside traditional methods, new cheating techniques have been born with the increase of e-Learning or exam system (Keresztury and Cser, 2013). Some Education Researchers have discussed the enormous diversity of behaviors and types of issues that involve cheating (Koul, 2012). In an e-Learning or Exam system, many students were observed with negative behaviors such as cheating with online message exchange during their e-Learning or test. Many students believed that, it is easier to cheat in web-based versus traditional study (King *et al*., 2009; Keresztury and Cser, 2013).

Teacher and students' credibility evaluation on e-Learning or exam is a factor to the success of online learning or exam. Educational trust worthiness has been a continuing concern of teachers in the past year (Langa, 2013). The assessment of the current cheating on school shows that many students conduct fraud examinations on several tests (Bolin, 2004; Keresztury and Cser, 2013). For the reliability, some teachers are challenged with the task of creating fairer e-Learning or exam environment. How do we find a solution to increase credibility of e-Learning or e-Exam becoming important?

In order to increase credibility, some face recording system has used in web based exam for reducing credibility gap between the web-based learning or exam and real traditional exam. After implementing face recording function, seventy four percent of the teachers and sixty nine percent of the students positively believe the online learning or exam result (Chen *et al*., 2010). There are still about thirty percent of teachers concerning the score credibility. New strategies are needed to go with authentication for increasing credible assessment in an e-Learning or exam. Therefore, this study applies authenticated system accompanying with Teacher's strategies to explore the credibility of current e-Learning or exam (Seidel *et al*., 2013). The purpose of this study includes:

- To explore teacher's strategies implemented on web based learning or exam after-school e-Learning or exam and evaluate whether learner or students acknowledges the fairness of the study work or test scores
- To explore how teacher's e-Learning or exam policies influence student's authentication behavior
- To assess whether strategies used by the teacher can enhance educator's trust on e-Learning or exam credibility
- To implement problem-solving methods in discussion with students, staffs and faculty for forming better strategies of e-Learning or e-Exam operation

SYSTEM DESIGN

Learning procedure and exam score credibility has been recognized as factors to the success of e-Learning education. In an easy cheat situation, web-based examination can only be performed as self-assessment to obtain feedback and revise mistakes because of insufficient surveillance and student's identification. In contrast with old exam, current studies also declared that up-to-date e-Learning or e-Exam systems are simply good using on self-assessment (Wang, 2011). Traditional and new cheating methods were considered as the huge problem preventing examiners to believe the score gotten from e-Learning or e-Exam (Langa, 2013; Keresztury and Cser, 2013).

Some online exam sites provide face recording function (Chen *et al*., 2010). In this situation, examiner still has to suffer a mental thinking which consists of the decision that may accept some students' cheating on web-based exam. Cheating actions such as replacement with exam-assistant might also happen. In this condition, the student completes the online test with negative emotion (Chen *et al*., 2010; Koul, 2012; Keresztury and Cser, 2013).

In order to increase the credibility of online learning or testing, this study applies teacher's strategies (Fig. 1) accompanying with authentication process (Fig. 2, 3) on e-Learning or e-Exam to improve the score credibility. It applies authentication functions with e-Campus system which is developed by Taiwan 3 Probe technologies and Quemoy University. This e-Learning and examination system can be selected from the options by using the computer with an embedded webcam screen. It can require students to provide notebook or computer's MAC address registration and web links when students in off-campus study or examination at home. This feature can also record student's portfolios and portrait (Fig. 3) as a process tracing of student's online learning or testing. Teacher can compare authenticated portrait with captured portraits which displaying three screen shots taken randomly throughout the online exam period.

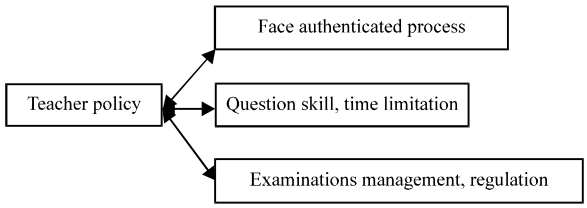

Fig. 1: Teacher policies that affect the student's attitude on e-Learning or testing

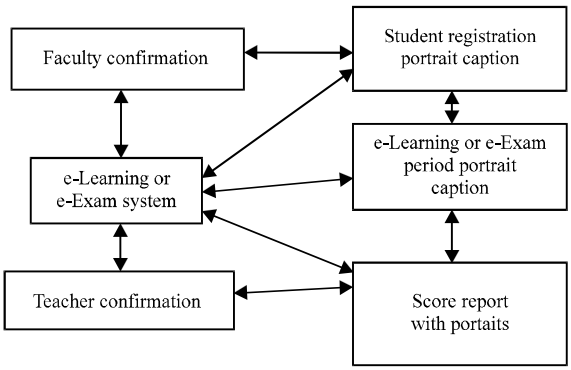

Fig. 2: Authentication process to ensure the credibility of the online learning

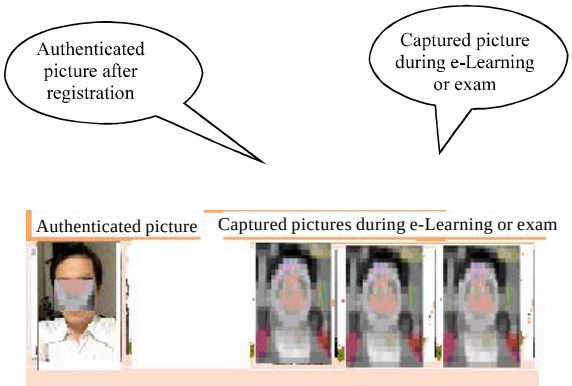

Fig. 3: Face authenticated system and captured portraits (Chen *et al*., 2010)

RESEARCH MODEL

Model development: In earlier study, it was discovered that teacher who doubts the fairness of a test are less likely to adopt online exam for study evaluation. It may influence student credit acquirement and knowledge distribution (Chen and Liu, 2013). This study will improve the trust of the student score with authenticated process and teacher's strategies. Face authenticated process (Fig. 2) with portrait capture may be a suitable mechanism to prevent student substitution in e-Exam. During online course registration, web-based system captures one portrait from the webcam and save it in the student's basic record. After the registration, student can get authentication from public authenticated school teacher. In a normal situation, the recorded pictures will be the same person of the original registered student. Faculty can check the student's portrait which taken from the e-Learning or e-Exam (Chen *et al*., 2010).

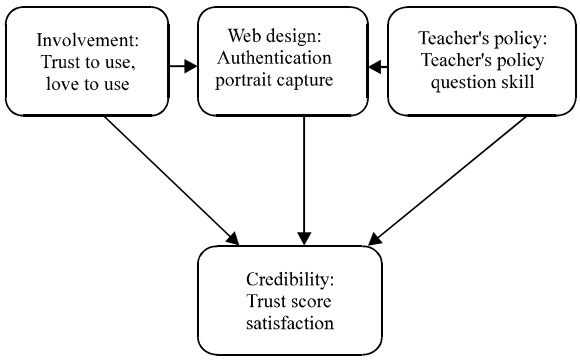

Fig. 4: Research model of the factors to improve e-Learning or exam credibility

The development of information technology will modify user behavior. For example, Technology Acceptance Model, suggested by Davis (1986), primarily explores acceptance of novel information technology toward operators. Two contributing factor of perceived variables have great influences on the purpose of using new technology: Perceived usefulness and perceived ease of use. These two variables are concerned by peripheral variables as well (Davis and Venkatesh, 1996; Venkatesh and Davis, 2000). For example, e-Exam self-trust has constructive effects on perceived usefulness, indicating that higher e-Exam self-trust can make users feel that using e-exam is easy and honorable. As Fig. 4 shows, the aim of this study is to know whether authenticated process, teacher's strategies and student's participation increase the credibility of online exam on web-based learning environment (Venkatesh and Davis, 2000; Seidel *et al*., 2013).

Authenticated process: In order to enhance business advance, the Electronic Authentication Initiative was established in Pennsylvania in 2006. It was the first of its kind in United Nations of America. E-Authentication permits eligible notaries public to implement Authentications electronically. In compliance with requirements of E-Authentication, the Authenticated Public Law and the Uniform Electronic Transactions Act also amended. The Department of State has taken new steps to make e-Authentication more accessible to Pennsylvania's approximately 80,000 notaries public. This study also implements e-Authentication function in research model.

Students may use some unusual policies to get better score in a web-based Exam. This problem could give rise the feelings of fault; harming their own honesty (Skagert *et al*., 2008). Other kinds of dishonest also happen, such as teacher's performance is scored by student's performance. In order to get advanced score, not only teachers but more commonly students involve e-exam fraud. After the combination of Authentication, the fairness of the online test may be improved (Haney and Clarke, 2007). The strategy of web design influences user trust and consequently influences online intentions (Fogg *et al*., 2003; Chen *et al*., 2010).

The design of authentication of this study will be influential to build the confidence level in the student's e-Learning or e-Exam. The function of the authentication is to confirm the correct identity for off-campus study students. The doubt of the online exam function forces the system designers to search a fairer solution. Face recording has been rapidly developing as one of the most significant vision performance due to its helpful applications such as individual identification (Koul, 2012; Chen *et al*., 2010). By adding authenticated process, a model of web-based e-Learning or exam system with credible equipment (Face authentication and portrait capture function) can allow teacher to manage a just Test. Therefore, the credibility of the web based e-Learning or Exam is consolidation with the addition of the face authentication and portrait capture technology.

In order to test the credibility between online e-Learning or exam site credibility and authentication, the hypothesis of the relationship is listed as following:

- **H1:** The e-Learning or exam site credibility is positively influenced by authenticated process

Student motivation: Participation defines that student has motivation to use a new process. Perceived love to use has been a factor affecting information system practice and achievement. The issue of trust is in relation to student participation. Schools actively work to create practice and learning situations with the purpose of encouraging student's activity and making participation possible (Thornberg and Elvstrand, 2012). Information excellence and function value are keys to the success of information system (Lin and Lu, 2000; DeLone and McLean, 1992). Motivation is a variable for measuring information system quality and examining its relationship with perceived credibility (Liu *et al*., 2010; Chen and Liu, 2013).

Innovated and trusted function influences user's participation intention. Willing to use is the main variable in the explanation of online student's achievement, as it is a critical trait in the efficiency of web-based higher education. Authenticated process is, an innovated factor may influence the purpose of participation (Castillo-Merino and Serradell-Lopez, 2014).

In order to test the relationship between online exam credibility, authentication and participation, the hypothesis of the relationships are listed as following:

- **H2:** The willingness of participation positively influences the online exam credibility
- **H2-a:** The willingness of participation of online exam positively influences the authentication process

Teacher's strategies: Increasing e-Exam credibility and e-Learning value is one of solution for decreasing student's knowledge divide (Chen and Liu, 2013). In a standard Exam situation, class rule primarily focuses on student's manners where students may not talk to help each other in exam (Langa, 2013). The standard administration level not only drives e-Learning implementation but also ensures adequate e-Exam. Teacher's adoption of e-exam policies is necessary factor for successful e-learning. Students trust in teachers because of teacher's respectable opinions and enlightenments and/or fair discussions and cooperative participation in decision-makings (Thornberg and Elvstrand, 2012). Teacher's policies are shown to be important academic strategies which drive e-Exam improvement. Teacher's policies are also necessary for successful e-Learning management (Czerniewicz and Brown, 2009; Chen and Liu, 2013; Castillo-Merino and Serradell-Lopez, 2014).

E-Learning or e-Exam credibility is combined teacher strategies which leads exam process normally through online exam system (Seidel *et al*., 2013). Teacher's strategies includes offering authentication benefit for students, score acknowledgement, question skill, exam regulation, random selection of questions from a question pool, Time limitation for an Exam and examinations scheduled in the same time slot. Those have relationships with personal willingness and credibility of doing exam at web based site. Thus, the credibility of exam will be examined by the following hypotheses with the variable of teacher's strategies (Fig. 4).

In e-Learning and exam, student's attitudes toward cheating may be different between the traditional and online process depending on what students see and hear, e-Learning or exam regulation and policies adopted by the teacher and the school culture related to educational credibility (King *et al*., 2009; Koul, 2012). Teacher's strategies (Fig. 2) includes random selection of questions sequence from a question pool for each student, time limitation for an exam and examinations scheduled in the same time slot (i.e., all students' test scheduled at the beginning of 2:00 pm on the same day).

Hopefully, fairer e-Learning or e-Exam may be achieved through the development of proper Teacher's strategies. As web-based model mentioned in e-Learning system, e-Learning or e-Exam policies affect its procedure and result, with the hypothesis that the most efficient outcome will happen when information technology and exam strategies are tune fully integrated (Liu *et al*., 2010; Chen *et al*., 2010). Then, this study model adds factors of student's participation, authentication and teacher's police into the credibility model of e-Learning or e-Exam system:

- **H3:** Hypothesizes that e-Learning or exam credibility is positively influenced by teacher's strategies
- **H3-a:** Hypothesizes that authenticated process is positively influenced by of teacher's strategies

MATERIALS AND METHODS

Teacher's strategies is implemented on the process of this research (Seidel *et al*., 2013). At the beginning of a course, students register e-Learning system and uploads personal portrait. Students should make appointment with teacher's and show up and get confirmed by faculty before the e-Learning or exam. The score report will show photo confirmation date and who confirms the photo. Before the test, all students are announced with the teacher's policies of e-Learning or E-exam. When examining with the webcam embedded screen, the system will randomly take three student's portraits and recorded these portraits with their test report (Fig. 3). After the e-Learning or test, all stakeholders can look up the study process or score report (Chen *et al*., 2010). Then, the registered pictures will be compared with the pictures captured by e-Learning system. Then, the students are asked to fill out the research questionnaire for the credibility of score they got.

Subjects: This study implements the maximum likelihood method to estimate the model's parameters for the data analysis. Subjects were enrolled in University courses and surveyed after the Web Based Examination. The purpose of the study is to identify the student's confidence level toward the web based examination. For each factor, sample factors were compared for any significant differences. It was hypothesized that significant differences in online exam credibility would exist between different factors (i.e., Authentication, Participation and Teacher's strategies). These dimensions were collected with questionnaire for resolving which are important factors influencing the credibility of web based examination (Westland, 2010; Otsuka *et al*., 2011).

Table 1: Factor analysis of variables affecting online testing credibility

	Factors			
Questionnaire	1	2	3	4
Easy to use join 1		0.950		
Easy to use join 2		0.904		
Love to use join 3		0.926		
Authencated process 1	0.561			
Face rec-authencate 2	0.918			
Face rec-authencate 3	0.843			
Teacher's strategies 1				0.652
Teacher's strategies 2				0.945
Score acknowledge				-
Credibility 1			0.905	
Credibility 2			0.975	

Data analysis: In order to inspect this model, the first step is to prove the construct validity that includes the confirmation of hypotheses made from this study. Factor analysis and path analysis are elementary tools used to prove the construct validation for a model. Table 1 shows the consequences of Exploratory Factor Analysis (EFA).

An item of score acknowledgement in the construct is deleted because it was found that it is not designed appropriately as shown in Table 1. Initially, the questionnaire contained 11 items, but one item mentioned above is deleted during Exploratory Factor Analysis (EFA), so that the model would be more stable. Thus, the final version of the questionnaire contained 10 items. Cronbach's alpha is reliable if its value is at least 0.7. The value of Cronbach's alpha for the four constructs in this research is more than 0.8.

The average variance extracted, which is used to measure the discriminate validity of each construct, is only acceptable when it is more than 0.5 (Fornell and Larcker, 1981). The average variance extracted is generally more than 0.56. Additionally, KMO test is 0.87, which means the questionnaire was well designed. The credibility and validity of the questionnaire are both acceptable.

Statistical analysis: All p-values of questionnaires are significantly different between pretest and posttest, but the distributions of all posttest, means are not high enough. Then, after data analysis, we interview students and obtained some improvements of online testing strategies for future reference of school teacher or faculty.

SEM is a suitable research methodology to analyze the complex and multidirectional relationships between inputs and outputs in education (Castillo-Merino and Serradell-Lopez, 2014). To evaluate a model, many indices can be used to measure the appropriation of a model (Westland, 2010).

RESULTS

This study takes on some indices suggested by Kelloway (1998). In general, the closerobserved data is to the theoretical model, the better the fit of the model and the easier it will be to satisfy the thresholds of index values. As the study of this research model in Fig. 5, $\chi^2/df = 2.86$ (<3.0), Goodness-of-fit index (GFI) = 0.88 which is close to recommended value 0.9, Normed Fit Index (NFI) = 0.94 (>0.8), Incremental Fit Index (IFI) = 0.96 (>0.9), Root Mean Square Residual (RMR) = 0.09 (recommended value is less than 0.05) (Liu *et al*., 2010). Most index values comply with recommended values and estimates of regression weights are significant at $p<0.001$.

Figure 5 shows the causal relationship between the constructs and the standardized path coefficients. H1 hypothesizes that the online exam site credibility is positively influenced by Authentication. Face Authentication and Recording technology will strengthen fairness of the online exam site. From the result of analyses, H1 is accepted because antecedent variables (Authentication) significantly ($p<0.001$) affect online exam site credibility with $R^2 = 0.45$:

- **H2:** Hypothesizes that the willingness of participation is positively influences the online exam site credibility. From the result of analyses, H2 is rejected because the antecedent variable (Participation) is not significantly affecting online exam site credibility
- **H2-a:** The willingness of participation of online exam site positively influences authentication process. From the result of regression analyses, H2-a is accepted because the variables (Authentication process) is significantly ($p<0.001$) affected by willingness of participation with the $R^2 = 0.28$
- **H3:** Hypothesizes that online exam site credibility is positively influenced by Teacher's strategies. From the result of regression analyses, H3 is accepted because an antecedent variable is not significantly affecting online exam site credibility
- **H3-a:** Hypothesizes that authenticated process is positively influenced by Teacher's strategies. From the result of regression analyses, H3-a is accepted because the antecedent variable (Teacher's strategies) significantly ($p<0.001$) affects Authenticated Process with $R^2 = 0.77$

Figure 5 shows, there is strong relationship between Teacher's strategies and authenticated process; the reason may be that students always accept Teacher's strategies to do simple process for taking a convenient web exam when they are required. The antecedent variables (Authentication and Participation) significantly (***p) affect Online Exam Site Credibility. It means that the face authentication provide an Exam environment

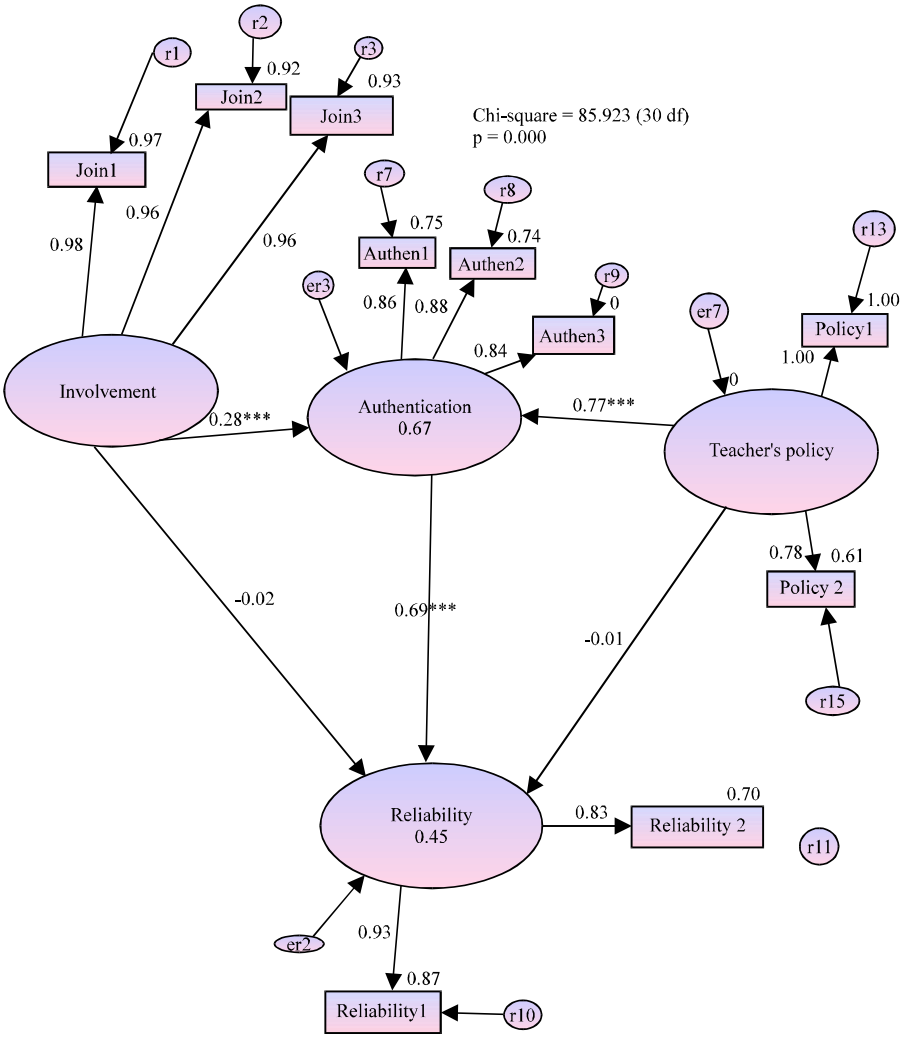

Fig. 5: Structural equation modeling that shows authentication and Teacher's strategies can significantly improve online testing reliability, ***Significant at p<0.001

where substitute Exam is prohibited and identified. It also confirms that students trust the Web Exam by using the Authentication system.

DISCUSSION

Good online evaluation method will guide successful web based education. This study aims to develop online testing effectiveness through the application of Teacher's strategies and authentication process. We change new factors to the model which is based on the User Acceptance Model (Davis, 1986). Online exam site with face recording has adopted in e-Learning or e-Exam model but the problem is the score credibility is not high (Chen *et al*., 2010). It is important to investigate student's level of credibility as regards the effectiveness e-Learning or e-exam. New strategies are applied for getting various problem-solving strategies in different problem-solving contexts (Yearworth *et al*., 2013). The study adds authenticated process and Teacher's strategies to an e-exam model and explore whether it strengthens the Credibility of e-Learning or e-examination. Positively, it provides some suggestions to the Teachers. According to the data analysis of hypotheses H1, H2, it implies that authenticated process is playing important roles in constructing a reliable online testing. It can provide some suggestions to our Teachers. Figure 5 show that students accept the value of Authenticated Process. In this situation, students are also more willing to participate a authenticated process as it confirmed by H2-a and H3-a

where antecedent variables (Authentication) is significantly (p) affected by willingness of student's participation and Teacher's strategies. Then, with Authenticated Process, Online Exam Site environment can attract more students to participate web Exam. From Fig. 5, face authentication, participation and Teacher's strategies greatly shape how the users think toward authenticated process and credibility of online exam though the Teacher's strategies and participation factor is not directly affecting the exam credibility compared to authenticated process.

For teachers, this study also provides several recommendations as strategy to implement web based learning or examination in the following ways:

- Teacher's strategies directly affects Score Credibility and Authentication process. For example, teacher ask students to finish the testing in the same limited time period with random selected question sequence Teacher's strategies are also playing important roles in attracting student to use authenticated online testing environment. For example: Teacher's can request students to be verified of true identities at the beginning of testing registration and to be recorded at the Exam process
- Authentications significantly affects credibility of Online e-Learning or Exam. Government or Teacher should provide a authenticated public mechanism in the future. Credible system will be accepted by all stockholders and be convenient for online studying or long distance learning students
- Student's participation is playing important roles for a authenticated e-Learning or e-Exam. Teacher should provide a series of preferential policies to attract students to follow authentication process as an encouragement or incentive. For example, in order to encourage student to finish authentication process, teacher can offer the chance of taking e-Learning or exam at home
- After data analysis, this study interviews thirty six students and get their response as " students still need to have face to face interaction with other classmates or teachers. The e-Learning and online testing may not replace all traditional styles of exam". They also suggest that online testing style can be the style of multiple choices, short-answer, single choice. Writing test is currently not sufficient enough to be scored by online testing
- Though comparing with previous 70% of credibility, 94% of the students agree that online testing scores are credible after applying Teacher's strategies and authentication. Better policies are recommended for future e-Learning or e-Exam implementation. For example, Students may take the online exam not only by editing their answers and watching video but also by speaking into the microphone to record their voice in response to a video recorded question that will trigger the students' interest and credibility (Gimeno-Sanz and de Siqueira, 2012)
- Teacher should show consistent behavior in e-Learning or e-Exam management. The different learning situation and e-Exam environment and teachers' interventions to maintain rules in each e-Exam are complicated and hard (Thornberg and Elvstrand, 2012; Langa, 2013). From the student's response of posttest interview, poor management is the number one reason for failure of credible e-Learning or e-Exam. For example, when some students couldn't take the e-Exam in regular schedule, teacher provides second chance of e-Exam for them in the same questions pool or some student exchange information with cell phone during online test. These situations generate some unfair feeling for normal students. This is one of reasons why some teachers or students still doubt the credibility of e-Learning or exam. Teacher may apply more appropriate strategies for future e-Learning or e-Exam process to prevent students from developing negative feeling

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