

A Study of Online Asynchronous Learning Monitored by Face

Recognition

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Abstract: -The purpose of this study was focused on the learning behavior and performance of asynchronous distance learning with face recognition system among in-service teachers. There were 48 participants invited. In this study, teacher's gender, age, job status, educational level, school level, and school district were analyzed to explore the differences in learning behaviors and performance. The results showed that the higher average face identification rate, the more learning satisfaction, subjects had more login times, login times in the morning, time total quantity of login, study time total quantity, participation modular unit numbers, the higher summary examination average scores. We also found subjects had more summary examination average times, the less summary examination average scores, subjects had more time total quantity of login, average face identification rate, the more learning satisfaction, and subjects' summary examination average times can predict summary examination average scores.

Key-Words: Learning behavior, Asynchronous distance learning, Face recognition system, In-service teacher

1 Introduction

With the current advances in Information and Communication Technologies (ICTs) by way of improved computer power, faster data transfer rates, and attendant lowering of costs, coupled with the fact that the effective integration of these technologies into educational curricula has been demonstrated to have positive effects on learner learning [1]. Distance learning is thus being rapidly adopted by educational institutions worldwide as an alternate or complementary mode of education delivery, and indeed has been heralded as the next democratizing force in education, particularly in higher education [2].

Asynchronous distance learning implements the way which the distance learning most often uses. Asynchronous distance learning it does not take place with a professor simultaneously. A professor delivers instruction/assignments by computer, emailed text packages or other formats, with learners then responding at a later time via e-mail messages or postings to a virtual classroom. Asynchronous learning mode allows professors and learners to send and receive information anytime and anyplace [3]. The asynchronous distance learning may manufacture the teaching material beforehand, speaking of the curriculum executor, is the safe way, therefore more universal use. Distance learning in higher education poses a great challenge as this mode of instruction delivery relies solely on the available information and communication technology infrastructure and doesn't confirm the real learning status of learners. The reasons that students dropouts from distance learning that reveal such reasons as job duties, course difficulty, and time constraints resulting from family duties [4]. Carries on the teaching by the network, what most was denounced is the curriculum comments the value way, including teaching resources on, teaching material use, teaching transfer mode, learner actual participation rate and so on[5]. Regarding the teaching resources, the teaching material, the transfer mode is easy to solve, but is difficult regarding the learner actual participation rate to overcome [6].

If can adopt the suitable involvement or the management, may promote the learning performance of asynchronous distance learning. Using the World Wide Web to establish under the asynchronous distance learning environment, the findings demonstrate that the use management software the computer auxiliary teaching has the good study effect

[7]. Records learner's study course automatically in the distance learning which helps situation which the learner understanding itself studies carries on, analyzes learner's study result, as well as assists the teacher to survey learner's study manner and the fan thinks and so on, may or carries on basis of the recovery teaching as the adjustment[8].

Biometric devices may be ways to understand that the learner carries on one of asynchronous distance learning participation situation. A biometric is an automated use of unique human physiological or behavioral characteristics to determine or verify a person's unique identity [9]. Biometric devices implement biometrics. This is to say, they are pattern recognition systems that recognize a person based on a feature vector derived from a specified physiological or behavioral characteristic that a person possesses [10]. he accuracy, "the physiological characteristic" surpasses "the behavior characteristic" obviously in uniqueness and the security. And, speaking of the human vision, the person face characteristic compares in other characteristics, the person face identification is defers to each person face to present the different characteristic to make the status identification, is one most direct identification way [11].

Face recognition is one of biometric device. Its main concept is to collect all kinds of different person face chief feature (e.g., the eye, the mouth) and so on method training known person face phantom establish the person face phantom meaningful model because of the statistical analysis and the machine, which characteristics does this model describe the person face outward appearance to have, makes compared to rightly in these characteristics and the phantom face characteristic, discovers the person face's in phantom position. Therefore, this research's asynchronous distance learning curriculum, recognizes learner's status by the biological identification's face identification technical management, and records learner's study course, understands the learner participation of situation in the network study.

1.1 Aims of the Study

In this study, we use asynchronous distance learning with face recognition system to explore learners' learning behavior and performance. There are four research goals listed as follows:

- 1) To understand the learning behavior and learning performance situation of learners.
- 2) To compare with different learning behavior and

learning performance by learners' background variable.

- 3) To compare with learners different learning performance by learning behavior situation.
- 4) To analyze the relationship between learning behavior and learning performance.
- 5) To analyze the background variable and learning behavior to forecast of the Summary examination average scores.

1.2 Definition of Terms

Each key term used in this study is elaborated on as follows:

1) Asynchronous distance learning

Asynchronous distance learning is a learner-centered teaching method that uses online learning resources to facilitate information sharing outside the constraints of time and place among a network of people. The online learning resources used to support asynchronous distance learning include email, electronic mailing lists, threaded conferencing systems, online discussion boards, wikis, and blogs. Course management systems such as Blackboard, WebCT, Moodle, and Sakai, have been developed to support online interaction, allowing users to organize discussions, post and reply to messages, and upload and access multimedia.

This research asynchronous distance learning refers to the learners login "Distance learning website" set by "Nationwide Teacher In-service Education Information Web" (<http://inservice.edu.tw/>) to take "Excel practical courses."

2) Face recognition system

A facial recognition system is a computer application for automatically identifying or verifying a person from a digital image or a video frame from a video source. One of the ways to do this is by comparing selected facial features from the image and a facial database. In this research, facial recognition system refers to the face identification system first to detect and the establishment faces characteristic mold train, this face characteristic mold train is composed of the search face characteristic mechanism. In the face detection obtains face phantom storage after face phantom information database, learner the mechanism which recognizes after the face thought firmly in the information database the respective character shade image space can enter the thorough study curriculum to carry on the

study. In thorough study curriculum period also stochastically will photograph and recognizes the learner face phantom, and will record in the face phantom information database.

3) Learning behavior

The learning behavior refers to the learner in thorough study curriculum opening period (October 1, 2009 to October 14) enters distance learning website performance the behavior, contains the participation "Excel practical courses" to record login times, the summary examination average times, the average face identification rate, time spot of login, to record the time total quantity, the study time total quantity, the participation modular unit number and so on.

a. Login times

It refers to the total times of learner to login distance learning website.

b. Summary examination average times

Refers to the learner to participate in various units personally sum total of dividing Participation modular unit number the summary examination number of times.

c. Average face identification rate

The face identification rate refers to when the learner wants to enter the thorough study curriculum, must first carry on the status to confirm, whether learner of for the registration thorough study curriculum, after to entering the thorough study curriculum, continues to pick up and to recognize the face phantom, and records in the phantom information database. The average face identification's rate computing mode enters of for the learner when and starts to study the modular course, the face identification system initiation picks up face phantom all single identifications rate percentage of sum total and the identification total degree. Ratio higher representative learner's study situation is better; Because otherwise expresses the learner possibly midway leaving the table or glances over other homepages, affects the whole identification rate, the study situation is bad.

d. Time spot of login

It refers to the learner to record distance learning website, after mainly divides into "early morning", "the noon", "afternoon", "gets off work", and so on four time intervals.

- e. Time total quantity of login
It refers to learner individual each time to record the total time login distance learning website.
- f. Study time total quantity
Refers to the learner to participate in each thorough study unit personally, watches each thorough study curriculum movie all temporal summation.
- g. Participation modular unit number
“Excel practical course” to contain unit one, unit two and the unit three, the learner limited to only one unit, the learner cannot the free choice participate in several modular courses. Participation modular course several figure of learner individual choice participates in the thorough study unit the total, from one to three units different.

4) Learning performance

The effect which the study result is refers to after study produces, this research institute refers to the study result to have two, one participation after the learner curriculum of the asynchronous distance learning union face identification system studies, carries on this modular course the summary examination, after examination of highest scores footing, obtained various units carries on the average; Two repairs the class after the learner, learner's study degree of satisfaction investigation.

- a. Summary examination average scores
The Summary examination average scores is refers to each learner in each unit thorough study curriculum summary examination which participation the average scores, the computing mode sum total of dividing participation for each thorough study modular course summary examination highest scores curriculum number, obtained average scores.
- b. Learning satisfaction
The study degree of satisfaction is the learner in the learning process, innermost feelings whole feeling, but this kind of feeling is comes from the curriculum in the learning environment, obtains actually the study connotation and anticipated should obtain value disparity. The study degree of satisfaction divides into two parts, its one penetrates on the Nationwide Teacher In-service Education Information Web in the questionnaire back coupling system to

construct the topic item for the material collection tool, mainly investigates study of degree of satisfaction traditional or the general study state, has nine topic items; Its two pieces essence of take the asynchronous distance learning union face identification system as an establishment topic key point, have ten topic items. Therefore the distance learning study degree of satisfaction survey form altogether 19 topics, fill in the answering scores to be higher expressed that right “the distance learning - applies flexibly calculates the actual cut which and the patterned responses good helper Excel the practical course” handles is better; Otherwise, the expression actual cut and the patterned responses are bad.

2. REVIEW OF RELATED RESEARCH

This part provided a review of the literature relevant to distance learning. First, the meaning of distance learning was reviewed. Next, we reviewed literature about related research about distance learning.

2.1 Meaning of distance learning

What distance learning emphasis is an open society learning system, the learner has the study right to independence, carries on the distance learning by the network the teaching material may elastic extension, the teaching material has the ductility[8]. The network distance learning carries on the time according to the teaching activity, the teaching and the learner whether simultaneously to produce links takes the discrimination, the synchronized network distance learning refers to the teacher and the learner must produce in the same time by the transmission system links with interacts. The asynchronous distance learning will teach the school constitution to refer to will study the teaching material to lay aside on the far-end teaching system, the teacher may compile the teaching material, the editor examination, to assign the work, the learner to be possible to read the teaching material on the system, to complete assigns the work and the examination, the learner may not the time and the space limitation, momentarily may access the net to carry on the study. Synchronization with asynchronous mixed style, is has at the same time the teacher teaching material preparation and the immediate teachers and learners in advance interacts[12].

States by above, the distance learning has many characteristics, includes [13]:

- 1) The study way with presents the method the diversification.
- 2) Imparts compared to the tradition in the space and time has the elasticity.
- 3) The curriculum may cover regular, non-regular, the unofficial educational institution and the facility, quite widespread.
- 4) The curriculum implements the emphasis innovation, to unify and to utilize the multimedia designs fully, in accordance to educational reform tendency.

In accordance to the distance learning's implementation characteristic, the distance learning curriculum content design contains approximately includes four kinds[14]:

- 1) Unit teaching: Namely presents the curriculum main body the part and takes the knowledge transmission the main pipeline.
- 2) Discusses together: Every with the study curriculum related subject, the learner may access the net to inquire, to express the opinion freely.
- 3) Examination with comments the quantity: After implementation on-line curriculum study examines, the convenient learner understands the study result, momentarily provides the study back coupling. The teacher may also by the computer processing result, save the merit rating or the management time.
- 4) Study record and management: Uses one of computer teaching benefits then facilitates the collection study record, like learner's hands-on number of times, the study time, the study content and the study result and so on, all may by way of the website collection management, provide reference of the teaching.

Synthesis it, the distance learning is one take the network as the foundation study mechanism, implements, the discussion area by the curriculum, to announce the fence, the examination and comments ways and so on quantity to carry on the interaction, breaks the space and time limit, and more elastic curriculum implements the way. This research institute refers to the distance learning to teach the department by the asynchronous form, opens it by the Nationwide Teacher In-service Education Information Web "the distance learning - to apply flexibly calculates the good helper Excel practical curriculum", the curriculum implementation is penetrates "distance learning website" the union face

identification system, the discussion area, to announce the fence, the examination and comments functions and so on quantity to carry on the study.

2.2 Related research about distance learning

2.2.1 Distance Learning Assessment

A computer learning environment integrating the concept of learning and assessment, as a distance learning environment for assessment purposes[15]. Profile is inclined to the quality of the evaluation methods, statistical data is the tendency to quantify the orientation of the evaluation methods, diagnosis is both qualitative and quantitative-oriented approach, as described below:

1) Portfolio

Personal files are the establishment of learners in the learning process of the study records, including logs, special reports, works the course of development records. Personal Profile is based on a more holistic point of view to assess progress in the case of learners, help teachers to track learner growth curve.

2) Summary statistics

Through the formative tests and summative tests in order to understand learner learning conditions, and based on these statistics, to revise teaching strategies to meet the needs of learners. With computer technology, the learners interact with the materials to obtain statistical data to help teachers diagnose learners to progress in the case, as well as to monitor each stage of the suitability of materials for learners.

3) Diagnosis

Diagnosis based on many types of information, including personal files, statistical data, teachers and learners in the degree of progress and capacity evaluation, learner self-reflection, self-evaluation and so on. Is a continuous, dynamic nature of the evaluation methods, teacher analyze learner learning and teaching strategies to amend a timely manner to meet the learners in a real teaching situation in the learning needs.

Because the actual participation rate of learners is more worthy of taking into account the part of distance learning model is built on mutual trust between teachers and learners before a state can operate normally as a teaching method, they are inevitably some doubts, in the present study curriculum planning in order to "Study time total quantity", "average rate of facial recognition" and other learning behavior to understand the distance learning learners in the course of participation.

2.2.2 Learning performance of distance learning

Over the past literature, there are various teaching experiments conducted the study effectiveness evaluation, general assessment of the effectiveness of methods of analysis is mainly descriptive statistics, the number of sample test and regression analysis. However, the choice of indicators to measure the effectiveness of learning identified vary, it is, as described below [16]:

1) Test scores

To test the effectiveness of performance indicators as an assessment of learning, test comes in many forms, depending on the time of assessment can be divided into formative and summative tests. Assessment of the implementation of the method is quite diverse, including pencil and paper tests, portfolio assessment, etc., is a more objective measure of way.

2) Learning Satisfaction

Learning satisfaction of learners in the learning process, the inner feelings of the whole, and this feeling comes from the course learning environment, the actual access to the learning content should be the value of the expected gap [17]. With learner learning satisfaction surveys as a measure of the effectiveness of the aim to understand the subjective assessments of their learners through the study, the right of teachers, teaching materials, curriculum and learning performance satisfaction. Factors on learner learning satisfaction construct, it should contain two elements, one for the overall experience, that is, the satisfaction factor constructed to cover learners in course learning to be the overall experience, including physical, psychological, outside school, and school learning experience for all of the other; The other question asked, namely, levels of construction of the factors to look at every aspect of the problem or really care about the core issues of curriculum implementation[18]. In this study, learning activities through the network involved in learning satisfaction content is divided into five categories, including teachers, teaching strategies, teaching materials, teaching administration, curriculum, learning environment, equipment [19].

3) Mixed views

For web-based learning assessment criteria should include "regular classroom teaching" and "potential to classroom teaching" both to be assessed [20]. The former mostly based on test

scores, while the latter, after learning of the affective emphasis on performance, it is not easy definition and measurement.

This study used mixed views, both summative tests and learning satisfaction between the two, as a "distance learning online learning website" implementation of the effectiveness of the measure. Among them, learning satisfaction is divided into two parts, one in-service education through the Nationwide Teacher In-service Education Information Web online feedback system built into the questionnaire items for the data collection tool, primarily to investigate the learning styles of traditional or general satisfaction with the learning-based; Second, according to distance learning with face recognition systems focus on the essence for the preparation of items to find satisfaction with curriculum implementation of the circumstances, this study learning satisfaction questionnaire consists of 19 items.

2.3 Distance Learning about learning behavior and learning performance

Distance learning learners in their studies of the behavior is the main factor affecting the effectiveness of learning [21]. The number of login, teaching materials and the total time browsing, as well as the number of courses to discuss areas of speech and other learning behaviors, are related to learner's learning effectiveness significantly positive correlation[22]. That is, the teaching activities for learners to participate, the higher the level the better the effectiveness of their learning. According to master's degree online courses, learning behavior is closely related with the scores, learner participate in more learning activities, have the higher grades[23]. Asynchronous distance learning learners as a sample, the results show that more than half of learners (58%) confirmed online teaching economics, learning is helpful. In addition, the website logins, the learners consider themselves learning attitude, and whether we have personal computers and other factors, test scores for learners of economics no significant effect[16].

In addition, the distance learning different data transfer method, the impact on learners differ. Sinclair Community College, Ohio, has compared the means of transmission distance learning materials, including audio tapes, video tapes and network and so on, found that learners learning through the internet to learn a low success rate, but there is the continuing high rate (persistence rate) [24]. That is,

with other distance learning methods to compare data transfer to web-based learning approach, learners learn more effectively than the poor, but the learners are more likely to continue to choose to conduct web-based distance learning. Can be seen, to Web-based distance learning methods, learning effectiveness is a subject of concern, in addition, due to network far and wide and the wealth of information outside the regular curriculum so that learners will want to return the neglect of formal learning, while affect the effectiveness of learning. The current distance learning study the impact of behavior on the effectiveness of learning is still an

open, probably because the data is difficult to quantify as a learner based on participation in learning, that is, the number of login, browse time, the number of statements and other data, no can really understand the substance of learner participation in the case. Therefore, this study through facial recognition technology as a confirmation of the identity and records of learner learners learning process of the mechanism, and then explore the distance learning study the impact of behavior on learning to enhance the effectiveness of learning behavior on the impact of the credibility of the study.

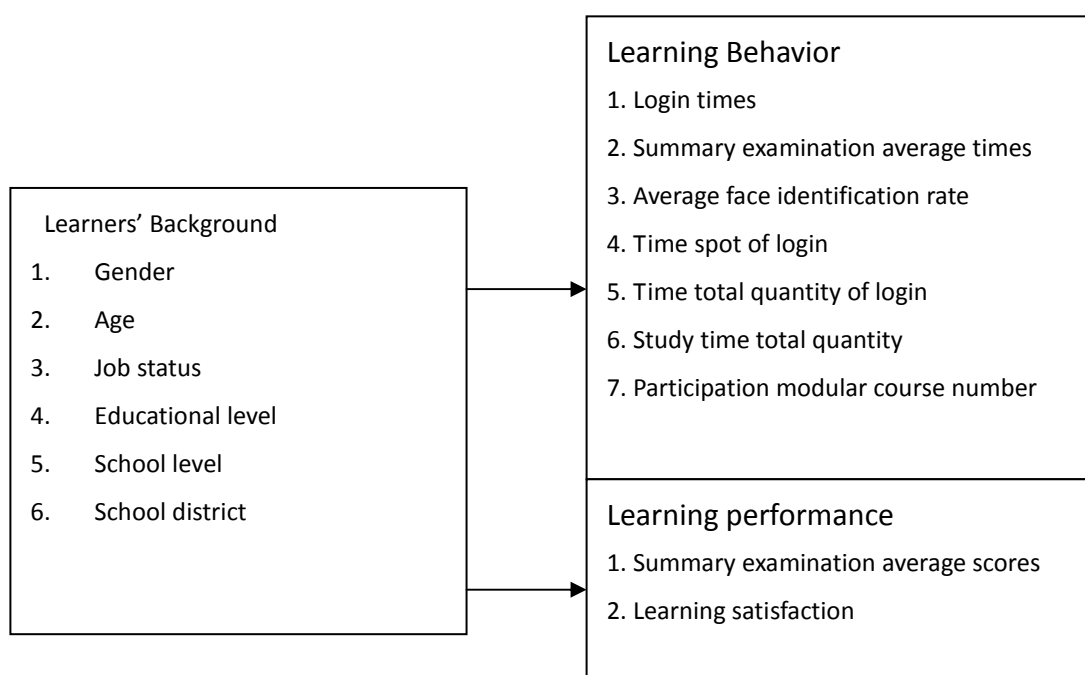


Figure 1 Research Framework

3 METHODOLOGY

In this section, we provide a description of the framework, participants, instruments, and analyses used to address the research questions.

3.1 Framework

In this study, teacher's gender, age, Job status, educational level, school level, and school district of the background variables for this study aims to understand the teacher-learning behavior and learning result difference between the background variables. In addition, this study analyzed

teacher-learning behavior on the learning effects.

3.2 Participants

In this study, the Nationwide Teacher In-service Education Information Web set up the "distance learning – excel practical course", for example, for K-12 school teachers enrollment in-service education at the Nationwide Teacher In-service Education Information Web, total of 48. Sample information such as shown in Table 1.

Table1 Background variables of research samples

Background variables	Group	Sum	(%)
Gender	Male	17	35.42
	Female	31	64.58
Age	22-29	12	25.00
	30-39	23	47.92
	Above 40	13	27.08
Job status	Qualified teacher	36	75.00
	Non-qualified teacher	12	25.00
Educational level	College	21	43.75
	Master and doctor degree	13	27.08
	Others ¹	14	29.17
School level	kindergarten	5	10.42
	Middle and elementary school	27	56.25
	Senior and vocational school	16	33.33
School district	North	10	20.8
	Central	2	4.2
	South	33	68.8
	East	3	6.2
Total		48	100.0

Note ¹ : Teachers did not fill out the information on the Nationwide Teacher In-service Education Information Web database, it is classified as others.

3.3 Instruments

3.3.1 Nationwide Teacher In-service

Education Information Web –distance learning website (<http://moodle.inservice.edu.tw/>)

Nationwide Teacher In-service Education Information Web - distance learning website is Modular Object-Oriented Dynamic Learning Environment (Moodle), the Department of social constructivist learning theory, the basis for the development of teaching and learning platform[25], the focus is to learn is through a simple interface and smooth operation of the network environment, course management and teaching activities to meet the demand; the use of online multimedia and high interactivity, activation of the teaching contents, extended the coverage of job training . Whenever learners are through a browser, that is able to attend courses at any time, increase learning opportunities for learners to further enhance the overall effectiveness of teaching.

In this study, Moodle1.9 version built by Nationwide Teacher In-service Education Information Web - distance learning website, and based on the number of e-learning standards Sharable Content Object Reference Model (SCORM) through materials reuse and sharing mechanisms

establishment of educational materials to shorten development time, reduce development costs, and promote the use of materials on the free movement of the various learning platforms. SCORM curriculum content integration model for the content of the object includes: how to package materials content; how the teaching material package plus a whole and additional information; and how to set serialization and navigation information. Objective is to promote a consistent manner the storage, labeling, packaging, exchange, and discover content, and the provision of teaching and practice of designers who wish to deliver the desired learning experience, learning resources, construct a neutral classification method.

3.3.2 Luxand Face SDK

Face recognition technology is mainly the use of people's facial features as a biometric identity recognition technology. The web camera or digital cameras capture facial features (such as eyes, nose, mouth), the image data transmitted by the database with the faces of the respective image data and compare both for immediate identification is a influence through the facial image capture and facial features of transmission (feature), identity recognition approach. In this study, Luxand

FaceSDK facial recognition technology as tools, in this research mainly used facial feature detection as follows:

- 1) Detection of 40 facial feature points (eyes, eyebrows, mouth, nose, face contour)
- 2) Detection time: 0.65 second* (not including face detection stage)
- 3) Allowed head rotation: -30~30 degrees of in-plane rotation, 0~10 degrees out-of-plane rotation. Returned information: array of 40 (x, y) coordinates of each facial feature point

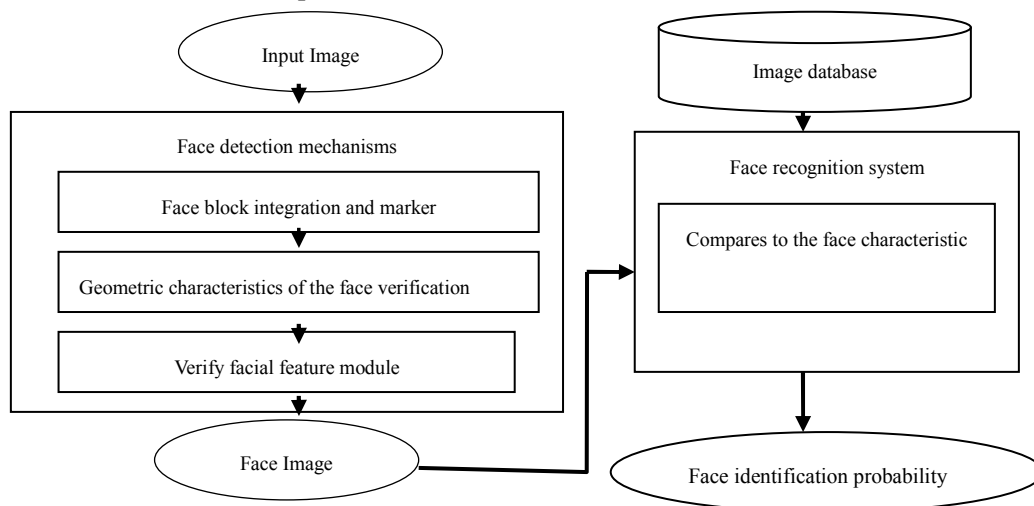


Figure 2. Face recognition system process

3.3.3. Course content and timing

Distance Learning - excel practical courses, divided into three modules, each learner only on a limited curriculum, course content is as follows in Table 2 below. Courses start during October 1, 2009 to October 14, 2009.

3.3.4 Learning Satisfaction Survey

Nationwide Teacher In-service Education Information Web adds new function "Teacher learning feedback" to understand teachers' learning satisfaction after taking in-service courses. Learning satisfaction of Nationwide Teacher In-service Education Information Web is including nineteen items. After taking courses, system sends questionnaire to each participant who has already take courses. Each item rated on bipolar agree-disagree statements on a 6-point Likert scale (1=strongly disagree, 6=strongly agree), and subjects were asked to select the one that most accurately describes their learning satisfaction.

3.3.5 Data analysis

1) Descriptive statistical analysis

In this study, the mean and standard deviation indicated that the learners learning behavior and

This study presents the use of Adobe Flash Player software, education studies courses, and write the program for asynchronous distance learning and face recognition system to combine in order to capture webcam learners face images stored in image database to record the learner's learning process. Face recognition system process shown in figure2.

learning outcomes of the concentration and discrete cases.

2) Independent-samples t test analysis

In this study, independent-samples t test analysis to compare learners of different gender behavior and learning outcomes in learning whether there are differences, to test the hypothesis 1 and 2. In addition, the study has given independent samples t test analysis of different learning behavior, whether the effectiveness of learning differences, to test the hypothesis 3.

3) Independent-samples one-way ANOVA analysis

In this study, independent sample one-way ANOVA analysis to compare learner learning behavior and learning outcomes is a result of background variables vary. If the F test results reach significant level, then choose a post-hoc Scheffé method to test the hypothesis 1 and 2.

4) Product-moment correlation analysis

In this study, Pearson correlation analysis to explore the effectiveness of teachers, learning behavior and learning between the relevant circumstances, to test the hypothesis 4.

Table2 Distance learning—excel practical course

Course	Content
	Start Excel, Windows introduction, the use of menus, dialog boxes used
	Using the Toolbar can not be unknown to the online help, close the file and leave the
Unit 1	Excel
Excel basic introduction	Enter text and punctuation marks, numeric, date / time
	Edit / Copy / remove / delete cell data, Undo / Redo / Repeat
movie time: 46 minutes 41 seconds	The establishment of a general numerical sequence, create a text sequence, set the alignment, the text replacement
	Create a formula expression for the use of online help query function, plus a total instrument
Unit 2	Create a chart, change the chart type, add a few columns, modify the data source
Establishment and hypothesis series	Titles, categories and values, legends, floating text, together with information on labels
printing function	Adjust the data series order, formatted line chart data markers
movie time: 41 minutes 26 seconds	Change axis scale, adjust the three-dimensional charts, create a picture format chart
	Set print range, set the print layout, set the header / footer Title
	Set print titles, grid lines, order, print a single chart, print preview
Unit 3	Inventory and database, establishment of the list (database), editing data using a form function
Using the list and PivotTable	Automatic filtering, advanced filtering, general sort, in particular the sort
	Group Subtotal, Conditional Sum
Video time: 40 minutes 16 seconds	Create a PivotTable, additions or deletions PivotTable field, change the field settings
	Sort PivotTable, group data, hide and display data
	Analysis of the establishment of a hub map of the Pivot Table to a hub-chart analysis diagram editing hub

Table 3 Different background variables and learners' learning behaviors

	Login times	Time spot of login				Time total quantity of login	Study time total quantity	Summary examination average times	Average face identification rate	Participa-tion modular unit number
		Early morni-ng	Noon	After-noon	Off work					
<i>Gender</i>										
Male	10.94	45.21	25.29	33.67	113.19	295.73	135.77	1.04	36.59	2.53
Female	7.19	37.05	13.50	36.08	94.59	224.17	138.91	1.23	35.51	2.52
<i>Age</i>										
22-29	6.44	41.50	13.00	24.60	94.14	184.14	136.01	1.37	42.10	2.22
30-39	8.35	25.95	15.00	38.46	94.82	244.51	131.26	1.13	33.30	2.67
above 40	11.20	70.22	23.71	35.71	127.44	327.93	153.62	1.03	36.04	2.50
<i>Job status</i>										
Qualified	8.56	41.10	17.86	40.21	99.34	264.81	141.20	1.08	33.80	2.53
Non-qualified	8.80	36.40	20.67	18.17	112.33	208.64	127.09	1.40	42.43	2.50
<i>Educational level</i>										
College	8.26	40.06	15.14	36.00	102.59	230.30	138.00	1.08	38.22	2.41
Master and doctor degree	8.82	42.60	23.00	36.83	98.70	309.79	135.33	1.09	26.68	2.64
others	9.00	38.14	17.00	32.00	105.55	231.40	139.63	1.33	40.87	2.58
<i>School level</i>										
Kindergarten										
Middle& elementary school	12.40	38.00	25.50	38.40	109.60	265.22	166.91	1.67	42.24	2.80
Senior& vocational school	8.88	37.67	19.10	40.00	96.28	260.26	145.73	1.10	34.63	2.54
	6.50	46.09	14.00	20.17	117.12	227.30	109.67	1.06	35.80	2.36
<i>School district</i>										
North	9.00	49.14	26.00	38.60	88.29	286.83	114.07	1.08	28.92	2.25
Central	9.50	43.50	7.00	60.00	125.00	323.60	237.61	1.17	12.12	3.00
South	8.50	36.78	17.00	31.82	107.78	238.30	137.20	1.19	39.30	2.57
East	8.00	48.50	15.50	39.50	57.00	234.74	140.84	1.00	38.37	2.50

4. Results and discussion

4.1 Learners participate in distance learning of the current situation

We use mean and standard deviation to understand the learner's learning behavior and learning effectiveness of the current situation, it describes as follows:

4.1.1 Enroll in distance learning of the learning behavior of the current situation

Table 3 presents the different attributes of the learner learning behavior cases, Table 4 for learners involved in distance education of the mean and standard deviation.

Table 4 Learners' learning behavior of the mean and standard deviation

	Sum ¹	M	Range	S.D.
Login times	42	8.62	25.00	5.43
Time spot of login				
Early morning	34	40.41	136.00	36.57
Noon	17	18.35	73.00	18.68
Afternoon	25	34.92	90.00	27.60
Off work	38	102.42	355.00	81.82
Time total quantity of login	42	137.76	767.88	80.57
Study time total quantity	41	251.43	303.53	164.37
Summary examination average times	40	1.16	3.33	0.54
Average face identification rate	41	35.90	86.12	22.32
Participation modular unit number	40	2.52	2.00	0.82

Note : The actual participation in distance learning - excel practical course a total of 42 practical courses, but each learner to participate in curriculum activities, the situation varies, so different from the teaching behavior, the difference in the number of participating learners.

According to mean and standard deviation, the mean of login times of participants for the 8.62 times; time spot of login get off work mean was the highest (102.42 times); the time total quantity of login of 137.76 minutes; the study time total quantity 251.43 minutes; to summary examination average times 1.16 times; average face identification rate of 35.90%; participation modular unit number 2.52 modules.

In terms of the standard deviation, "study time total quantity", "time spot of login after work," "time total quantity of login," the standard deviation are larger. It shows students the amount of learning time, after work, as well as the number of log-log distance learning online learning web site there is a big amount of time the individual differences. A paradigm shift in recent years, teacher education, the community pays great attention to the

implementation of teacher in-service continuing education, and because of rapid social change, the emphasis on lifelong learning and the concept of teacher professionalism, but also expect our teachers to in-service training to become an important way to enhance the teaching profession. Promote the professional growth of teachers, but there are still many obstacles, negative effects of environmental factors, individual teachers shall be one of the factors affecting, for example: teachers, often by poorly timed, family fetters, or study the impact of distance, in this study sample , the age distribution of 23 to 53 years, with an average age of 35.54 years, the age distribution of the whole distance is rather high, so teachers in the family background factors, the burden of a different situation and may indirectly affect the learning activities involved in the case.

Table 5 learners participate in distance learning performance of the mean and standard deviation

	sum ¹	M	minimum	maximum	S.D.	Average scores of each item
Summary examination scores ¹	40	94.92	70	100	9.24	--
Learning satisfaction ²	28	80.88	68.00	95.00	9.20	4.26

Note: The summary test average scores of the total is divided into 100 points.

Note: Learning Satisfaction Scale including 19 items, learners' scores between 5 and 95 points.

4.1.2 Enroll in distance learning of the learning performance

Table 5 showed learners involved in distance education learning outcomes of the mean and standard deviation, the participants of the summary test average scores ranged from 70 to 100 points, an average of 94.92 points. In addition, distance learning systems combine face learning satisfaction scores ranged from 68.00 to 95.00 between the single-title average 4.26 points, it is indicating participants distance learning - excel practical course practical courses almost equally satisfied with the courses.

4.2 Learning behavior and performance among different demographic characteristics

In order to further investigate the differences in dimension responses between different demographic characteristics of participants, t-test, one-way ANOVA and post hoc comparisons of (Scheffé) were administered on a dimension-by-dimension basis; the results are presented in table 9.

4.2.1 Demographic characteristics effect on the learning behaviors

In this study, we used t-test to understand gender effect on learning behaviors. Table 9 presented the findings, it showed only the "login times" is different. Male subjects had higher login times than female subjects. So the hypothesis 1-1 was supported.

Similar to the findings that male teachers for the information input and interest in computers than female teachers in integrating information technology into the teaching level of participation and involvement is also higher than female

teachers[26]. In addition, the society's general view that women should bear more family responsibilities, female participants in this study the average age of 34.65 years old, this age of the participants, perhaps because of, who have to care of children and deal with family, and limited the site to learn sign the opportunity.

In addition, one-way ANOVA analysis of other different background variables, including age, job status, educational level, school level, school district, etc., in learning whether the significant differences in learning behavior. Table 9 presented findings, it showed only "age effect" in the "time spot of login (morning)" were significant. By post hoc comparison were found in the morning whose login times of distance learning website, above 40 years old subjects higher than 30-39-year-old subjects. Therefore, part of the research hypothesis 1-2 was supported. In addition, the job status, educational level, school level and school district, etc., the participants in each group there was no significant difference in learning behaviors, the hypothesis 1-3,1-4,1-5,1-6 not supported.

The characteristics of learners are to design distance learning should be considered an important factor. The designers of Web-based Instruction will focus on multi-information technology can operate smoothly, and less attention to the characteristics of web-based learning in the learner[27]. However, due to the complex nature of individuals of different age groups of learners, learning behaviors differences, remains to be further studied.

Table 6 Learners of different background variables in the learning behaviors of the difference analysis

	Login times	Time spot of login				Time total quantity of login	Study time total quantity	Summary examination average times	Average face identification rate	Participa-tion modular unit number
		Early morn-ing	Noon	After-noon	Off work					
Gender ¹	2.28	0.64	1.31	-.21	0.69	1.39	-.12	-1.03	0.15	0.05
Age ²	1.97	5.78	0.47	0.44	0.54	1.94	0.26	0.98	0.48	0.94
Job status	-0.12	0.26	-0.23	1.78	-0.41	0.94	0.48	-1.66	-1.07	0.11
Educational level	0.07	0.03	0.27	0.06	0.02	0.94	0.01	0.11	1.36	0.29
School level	2.29	0.19	0.26	1.15	0.21	0.18	1.19	0.09	0.23	0.49
School district	0.04	0.23	0.33	0.36	0.35	0.31	1.28	1.40	1.28	0.54

Note¹: There were gender effect on login times and male were higher than female subjects.

Note²: There were age effect on login times and above 40 years old were higher than 30-39 years old subjects.

* $p < .05$ ** $p < .01$

4.2.2 Demographic characteristics effect on the learning performance

In this study, one-way ANOVA analysis of different background variables, whether the learning performances are significantly different, Table 7 presents the findings. It showed there were no demographic characteristics effects on learning

performance. Therefore, the study hypothesis 2 was not supported. Another study also pointed out that the characteristics of potential learners a greater impact on distance learning, such as learner interdependence and other characteristics of relatively deep, with strong explanatory power [28].

Table7 Learners of different background variables of the learning performance difference analysis

	Summary examination average scores	Learning satisfaction
	F value	F value
Gender	2.79	1.54
Age	1.35	1.54
Job status	0.10	-0.27
Educational level	0.11	0.60
School level	0.09	2.85
School district	1.40	1.04

4.3 Different learning behaviors and learning performance analysis

For teachers or researchers in terms of a reasonable percentage, it is each group between 25% -33% [29]. In this study, learner's learning behavior will conduct the case study participants from low to high order, select below 27% and the above 73% of the observed value scores, respectively, the low group and high group, and use t-test analysis of to comparison between two group members. Table 8 presented results of the analysis. In terms of learning behavior effect on learning performance, two groups had differences between login times, time spot of login (morning, gets off work), time total quantity of login, study time total quantity, and average face

identification rate. Therefore, in the study assumed 3-1,3-3,3-4,3-6,3-8,3-9 supported, the hypothesis 3-2,3-5,3-7,3-10 not be supported. In terms of learning satisfaction, there was significant difference in average face identification rate. That is, the higher the average rate of facial recognition learners learning in the course of this study satisfied degree of facial recognition was significantly higher than the average low rate of trainees. The reason may be because the learners below the literacy standard (in this study the threshold of recognition rate of 70%), need to click the mouse studies courses page window, can only continue to watch courses, interruption of study that may affect learning satisfaction this need to be further clarified.

Table 8 Learning performances between the higher and lower scores group

	Login times	Time spot of login				Time total quantity of login	Study time total quantity	Summary examination average times	Average face identification rate	Participa-tion modular unit number
		Early morn-in g	Noo n	After-noon	Off work					
Summary examination average scores	-3.13**	-2.21*	-.63	-1.55	-2.59*	-2.14*	-2.46*	.92	-.47	-1.73
Learning satisfaction	-.13	-.15	.05	.11	-.26	-2.58	.18	.44	-3.53**	-.92

* $p < .05$. ** $p < .01$.

4.4 Relationship between learning behaviors and learning performances

Table 9 showed relationship between learning behaviors and learning performances.

In terms of summary examination average scores, this positively correlated with login times, time spot of login (morning), time total quantity of login, study time total quantity, participation modular unit number. However, there was a different view, the number of login times, participate in the discussion frequency, answer frequency online without a significant impact, it will only affect learners that online learning whether there is a chance to help[16]. In addition, there was negatively correlated between summary examination average scores and summary

examination average times. The reason is because some learners did not watch the study courses will be directly involved in the summative tests, this study did not watch a total of five courses a direct answer, five learners to answer the average number of 3.60 times higher than the overall average number of learners to answer 3.00 times Therefore, in an ongoing trial and error learning learners to conduct multiple tests in order to reach under the eligibility criteria, making the number of tests the more conclusive test average scores, the lower the likelihood. Furthermore, in learning satisfaction, this positively correlated with time total quantity of login and average face identification rate.

Table 9 Learning behavior and learning performance of the correlation matrix

	Login times	Time spot of login				Time total quantity of login	Study time total quantity	Summary examination average times	Average face identification rate	Participation modular unit number
		Early morning	Noon	After-noon	Off work					
Summary examination average scores	0.39*	0.40*	0.19	0.38	0.29	0.34*	0.36*	-0.32*	0.04	0.35*
Learning satisfaction	0.09	-0.01	-0.16	0.05	0.09	0.52**	0.00	-0.10	0.47*	0.19

* $p < .05$, ** $p < .01$.

4.5 Gender, age, and learning behavior predict the summary examination average times

In this study, the learners' learning background variables and learning behavior as predictors of learning performance. We used stepwise multiple regression analysis to test the hypothesis 5. In the learner's background variables of gender, age

predictors. In order to type variables can also be included, together with the other variables in regression models to predict, and therefore converted into a dummy variable to fit the regression analysis. Gender, age, and learning behavior on the summary examination average scores of stepwise multiple regression as shown in Table 10.

Table 10 Gender, age, and learning behavior on the summary examination average scores stepwise multiple regression

Model	R	R ²	ΔR	F value	Unstandardized Coefficients	Standardized Coefficients
1.Summary examination average times	.89	.79	.79	41.99 ***	-12.33	-.89

*** $p < .001$.

Within nine predictors predict the summary examination average scores, only summary examination average times were significant prediction. Therefore, in the study hypothesis 5 was supported. The summary examination average times predict the summary examination average scores, which multiple correlation coefficient was .89, explained variance was .79, which is the summary examination average times can predict the summary examination average scores 79% of the variance. The average number of tests standardized regression coefficient is negative, indicating the number of learners on average fewer tests, summative tests, the higher average scores. The reason may be because some of the trainees did not watch the study courses, will be directly involved in the summative test, until the test by far, resulting in repeated tests carried out more, while the summary test average scores, the lower case.

5 Conclusions and Recommendations

5.1 Conclusion

- 1) Participate in distance learning learners learning satisfaction was high.
- 2) Login times of distance learning website male subjects more often than female; login in the morning above 40 years old subjects more often than the age of 30-39 years old.
- 3) Higher and lower group subjects by login times, time spot of login (morning, gets off work), time total quantity, study time total quantity were differences in summary examination average score.
- 4) The higher average face identification rate, the more learning satisfaction.
- 5) Subjects had more login times, login times in the morning, time total quantity of login, study time total quantity, participation modular unit numbers, the higher summary examination average scores.
- 6) Subjects had more summary examination average times, the less summary examination average scores.
- 7) Subjects had more time total quantity of login, average face identification rate, the more learning satisfaction.
- 8) Subjects' summary examination average times can predict summary examination average scores.

5.2 Recommendations

5.2.1 To obtain the study courses in the proposed unit

- 1) Enhancement facial recognition technology or the use of other biometric identification technology to improve the rate of capacity

The results of this study found that the average recognition rate of facial recognition system is 35.90, and identifying a high enough level, due to the limitations of face recognition system, face recognition system of this study support the head - 30-30 degrees left and right rotation; 0-10 degrees up and down range of movement, resulting in less recognition.

Stored in the database of images, the actual identification on the learners themselves may also be due to aging, light intensity or change the impact of posture, resulting in recognition rate is too low, this is the face recognition system must overcome[30].. However, the use of facial recognition system aims to identify the identity, not limit the scope of activities the learners, it is suggested that the subsequent use of facial recognition technology, you can simultaneously image database stored in multi-angle photographs, in order to increase the recognition rate. In addition, the processing unit of study may also consider using other biometric technology, such as: voice prints, fingerprints, etc., to compare the effect of different biometric technologies, and indirectly enhance the learners learning.

- 2) Design learning mechanism so that learners can learn first then to test

The study found that learners involved in concluding the average number of tests the more conclusive test, the lower average scores. The reason may be due to some participants of this study did not watch the program and direct answer, did not pass the standard will continue to answer the question, until the adoption date. Ran learner participation will affect the learners to study the effectiveness of teaching and learning perspective, if through lesson plans designed to encourage learners to participate on-line learning, the learners will be able to indirectly enhance the effectiveness of learning[31]. Therefore, participation of the teaching learning or distance learners enter the courses, should first conduct a review of the subject. In order to look at this study, the participants in advance if watching Studies, further respondents had not only a complete study can also check through the tests of nuclear self-learning effectiveness, the implementation of distance learning purposes. So it is proposed should apply for study courses in research and development unit of learning mechanism, such as to enable trainees to watch the course, can only carry out tests in order to reduce the standard for up to constant trial

and error, but ignore the learning process means for the purpose of mentality.

5.2.2 Future research

1) In terms of variables

This study focused on asynchronous distance learning with face recognition systems in learning. In the distance learning study, in addition to other variables associated with the analysis, we can consider distance learning to explore the different types of learning behavior and learning effectiveness; influence the effectiveness of distance learning to study the factors, personal factors such as learners, the preparatory experiences, learning environment, teachers, teaching methods and other direction, and to construct the performance of learners to study the causal relationship model of distance learning can only right to have a thorough understanding.

2) In terms of study design

This study used a questionnaire survey method and database to collect information in order to understand asynchronous distance learning with face recognition system to study the effectiveness of, and some research results and hypotheses are not, but the researchers produced the result for the reasons most of can only be taken speculative manner inference; and because the questionnaires are vulnerable to the subjects of social expectations, respondents had situational, and yearned for a fixed response or defensive mentality has been the impact of the error, and therefore unable to understand the idea of teachers to address the problem. In fact, using questionnaire is more difficult to fully grasp the individual differences. Furthermore, using scale approach to data collection, often makes it difficult for respondents had to quantify the actual situation, resulting in the correctness of respondents had been questioned. Therefore, the researchers recommended the follow-up if either a qualitative research approach, such as interviews, observation, through the quality and quantity of the hybrid approach can obtain a deeper understanding. In addition, for this study involved the facial recognition system can be addressed through experimental design, through the facial recognition system for experimental treatment, to adopt the experimental group and control group to compare the facial recognition system for learners in their studies of the impact.

Correspondingly, we sought to elucidate whether face recognition system could be applied to monitor distance learning. Other on-line activities might be also becoming impact to learners, such on-line PBL,

mobile device for learning and integrated information providing. [32, 33, 34] It is suggested that further study could be conducted.

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