

Integration of Manufacture and Commerce for a Product Learning System in the Service Industry

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Abstract

Purpose - The purpose of this thesis is to assess the product design digital learning status of universities that are currently involved in learning environment projects in manufacture and commerce integration (MCI). Thus, enterprises must keep learning and creating new inventions with revolutionary progress.

Research design, data, and methodology - This study not only emphasizes the analysis of technical ability, course concepts, conducting models, and learning environments of every aspect, but also systematically probes the planning of learning, system framework, web learning, environmental activities, data statistics, and digitalized learning, among other aspects.

Results - The results of this study help in finally understanding each school's manufacture and commerce integration situation, in order to evaluate product design learning. Consequently, it is essential to evaluate computer learning at schools, thereby affecting communication and the requirements of business education training.

Conclusions - It is essential to focus on MCI to promote web teaching to preserve and enhance knowledge disseminating technologies, and immediately share knowledge with learners, while improving work efficiency and cultivating the talent needed by industry.

Keywords: Courses Concept, Conducting Model, Learning Environments, Manufacture and Commerce Integration (MCI), Product Design.

JEL Classifications: G11, G33, M41.

1. Introduction

Alleged "Integration the Manufacture and Commerce (MCI)", automation and information technology and cooperate with resource share, standardization, systematic way, rationalization, fast reaction, innovation, and service oriented management strategy, to direct customer's demand rapidly through the supply chain system. Moreover by adopting e-purchase to realize fast product manufacturing with efficient customer service, the purpose is to raise production efficiency, lower cost purchasing, production and delivery, to improve goods circulating efficiency, to rapidly respond to demand variation, in order to elevate the competence of management.

This essay research is aiming at the university in learning system to execute the practice of the current condition in MCI integration, to establish by using electric business teaching system as chief body, to adapt to the environment change, no matter is manufacture or business, which will all face the informational era, the ever changing of consuming need, the demand of product speed, among the industry of supply chain arrangement and fast speed reaction etc.

So far, in this instantaneous change of international economy trade environment and development trend, small and medium enterprises ought to adopt by opportune moment to adjust management strategy, raise management capability and expand business sale, in order to grow stronger among the competitive environment, moreover, when scale down the size of cooperation, its self capital will no longer be sufficient, the produce technology and machine equipment would become simple and ugly, which lower the produce efficiency etc.

Thus, in this paper, university education for the sake to assist leading in the concept and technology of business automation, has fulfilled among the teaching content, expected to be able to positively foster modernize business management and management elite, to assist enterprise to lead in automation business and practical method, and to raise the competitiveness of the industry.

In the probing of the literature, no matter is domestic or overseas, regard the probing of web learning effect, majority holds a positive recognition for the result, which was not able to show the overall aspect for the web learning and the real substance benefit for the data, for instance, how's the learning achieve-

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ment of the learner, and what are the concrete figures that shows the attitude and skills, to prove that learner is making progress (Chen & Lin, 2002).

Previous researchers have developed various approaches to address this problem; this paper is organized as follows: Research method is discussed in section 2. A case study is section 3. Discussion is section 4. And Conclusions is the last section 5.

2. Research method

Case study visit and survey were introduced, and through the teaching website of each university, collecting whole relevant information by visit, and then design the survey questions based on the information collected from the visit. Take the 48 universities that have build up the web study to participate in the integration of manufacturing and commerce as samples, and finally through statistic analysis to get current status of web study and the critical successful factors in study assistant effective, technology ability, course idea, business model, learning environment and etc in each school, and analyzed the objective that under the establishment of mutual trust, share and win-win project, the manufacture and commerce utilized information technology and network to convey information and work process to reduce cost and quick respond.

2.1. Creating teaching environments

The appraisal used learning participate in MCI integration to reach the objective, normally speaking, learning can said to develop self and enhanced labor performance, then labor performance, on the other hand, reflects its objective and the value. For instance, by creating better products and lower services costs, with regard to the products of business market, has comparatively more competitiveness and creativity, and promotes manufacture production ability etc.

2.2. Product designer talent in MCI integration

How research apply web instantaneously in sharing the common resource, the problem in cultivate the demand for talent in MCI integration, which to analyze the occurrence by presenting the best way for the case, to actualize resolutions of the problem occurred in management, and integrate school and industrial unit to mutually cooperate, which must reach the results by adding and expanding, so MCI integration of learning material, is use by each school in the electronic, automatic, and electronic business degree etc.

Thus, the problem of the research institute to cultivate the needed talent in MCI integration, from the important point of learning, include practical teaching case, industry practicing, equipment share, common science technology, and industry co-

operate course of technical training and inquiry, other visionary creative thinking etc, which start from promoting industry and school cooperation, students who finish training with performance results, will then able to deal with society in the future, which must recognize the value of creativity and innovating from the problem, from the creative work of the past, to foster different kinds of outstanding environment, and to continue to innovate and invent. Many problems will occur in management, if enterprise cannot keeps on learning and creating new invention with revolutionary progress.

2.3. Research methodology

The main purpose for this research is to study product design web study to participate in the school integration of manufacturing and commerce, because, in recent years, each school is planning actively to cooperate with the executive for the automatic and computerized integrated manufacturing and commerce training program for the industry.

2.3.1. Research framework

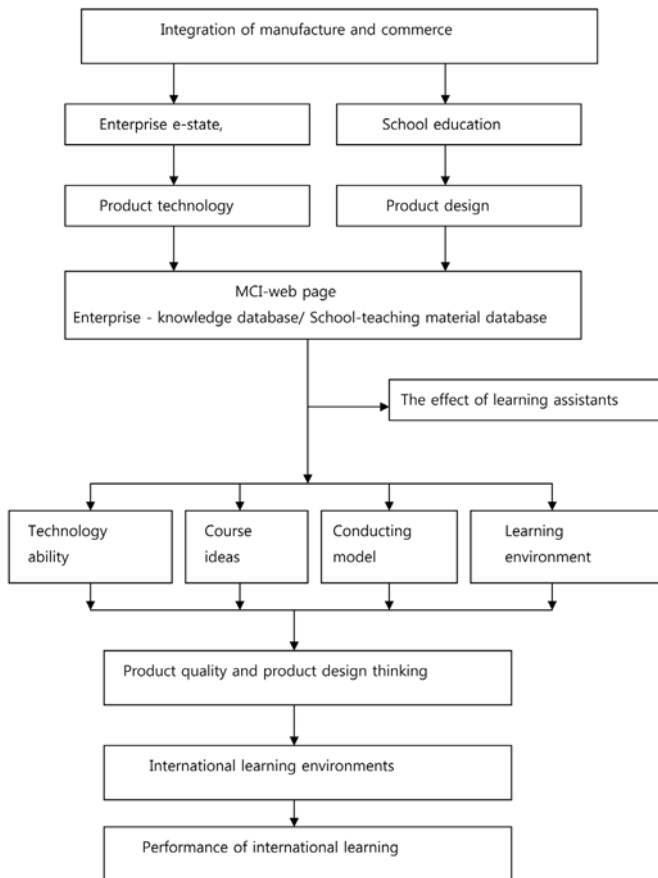
School integrated manufacturing and commerce framework is based on theory introduction and innovation knowledge, use teaching software, teaching equipment, school teaching material and resource to cooperate with industry for the discussion of practical problems, and utilize practical training environment of the industry and requirement orientation of the industry to promote practical operation of integrated manufacturing and commerce.

There are four aspects of this research, "Technology ability", "Course idea", "Conducting model", and "Learning environment". After case study visit and survey, analyze current status and viewpoint of the four aspects in each university. To gather the understanding static for the importance of the survey from the chairman and convener of each school's integrated manufacturing and commerce, and current construction status of the integrated manufacturing and commerce, and analyze the differences among different aspects.

2.3.2. International learning system

There are two major parts in the survey, the first part is basic information for fill up basic information of the school, including whether there is web study course or not, how many participants, teaching schedule, how much tuition, what kind of web system and whether the package software been used.

The second part is the key factors for successful web study participate in the integrated manufacturing and commerce, and classified into five types based on the importance degree, very important, important, average, not important, unusual not important.



<Figure 1> International learning system

2.3.3. Research system design

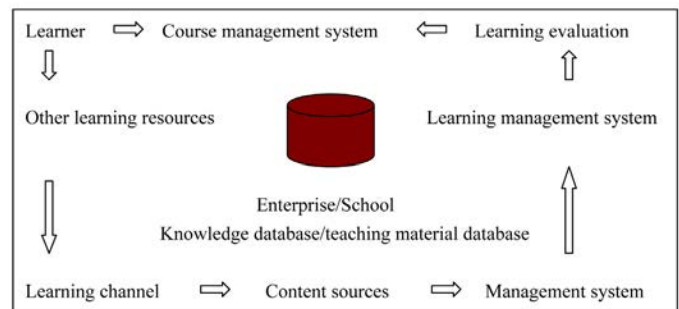
Build up complete system design, and improve the administration efficiency in a wild margin for the future development, the contents are:

- 1) Server database design: differentiate the authorities for accessing database from system administration, department chairman, teacher and student from web page.
- 2) Web page plan and design: the most important is the login design to confirm if the login user with correct account and cipher, and determine user's authority and access to different web pages.
- 3) Construction database design: set up installation for database and trading information.
- 4) Web design let user access for web study login with student's and teacher's account.

2.3.4. Research learning method

Each university's course of the integrated manufacturing and commerce, is to provide value added in education and new technology and knowledge introduction and innovation, the object is to make learner realized lessons of new knowledge and technology, and analyze learner to the multidimensional information courses from web study, to heighten study interest and ensure study effects. The methods for learning courses are:

- 1) Course contents: provide such as curriculum introduction, curriculum arrangement, teaching materials catalogue, unit test, and assignment results, report on special topics and etc.
- 2) Course information: up-to-date news, course announcement, common questions, student lists and etc.
- 3) Course interaction: provide page discussion, real time discussion, group discussion, subject discussion, opinion share, mailing assistant and so on.



<Figure 2> Net of international learning environments

3. A case study: An integration of manufacture and commerce

An integration of manufacture and commerce, allow learner to receive the learning effect efficiently under new learning model, finally realize the social, industry and research aspects, including high quality digital society computer country, into become to research develop science technology of lead country.

3.1. Problems descriptions

- 1) Analysis the trainings and industrial demand of manufacturer cooperation

Educate the cooperation staff in MCI, making use of school teaching facilities and teaching resources, enable school to combine with near region estate that have specialty, establish mutually help and benefit both estate and school cooperating education model, raised teaching quality and theoretical knowledge, so to effectively organize the education cooperation between school and industry, school will base on general knowledge as the theoretical basis and industrial case studies as professional training methods.

- 2) Analysis the intelligent learning establishment, assist ways of learning system

Using learning technology for foundation, establish the intelligent operational learning environment separately each year in progress, with arrange now has of special case plan result, moreover promoted to school and estate deep step of cooperate, enrich related teaching experiment laboratory, organize the MCI cooperation degree, editing the practicing materials, promote the cooperation teaching, consulting supervisors and other

ways of learning system, with culture possess has entirely practice knowledge and experiment of students, to meet the industrial demand on skill labors.

3) Based on the questionnaires, arrange the sequence of the degree of importance in traditional ways of education

According to 30 schools of statistics presented in table 1, course ideals and technical ability are both greatly important.

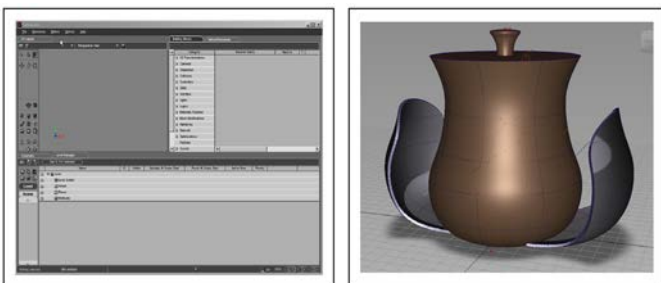
<Table 1> The degree of importance in traditional education ways

Sequence	Traditional ways of education	Investigated percentage
1	Course ideals	73.2%
2	Technical ability	71%
3	Learning environment	62.9%
4	Conducting models	52.7%

3.2. Data collection and statistical analysis

1) Sample recovers condition

Because the university web learning and products in integrated manufacturing and commerce has just begun, researchers have totally 48 questionnaires distributed to colleges participating in manufacturing and commerce integration; totally 34 of them retrieved, and 30 out of the 34 effective. The valid rate comes up to 62.5%, and the coefficient of reliability 0.9 upward, which suggests high consistency.



<Figure 3> Net of international learning and creative tea product

2) Foundation data analyses

According to readers see those schools which attend manufacturing and commerce integration and construct web learning systems. All these 30 schools spread around the island, including private and public universities.

3) Research variable order

According to readers may discover that school web learning systems association with the integration of manufacturing and commerce could be well ordered according to scoring from variables which signifies the importance of basic data. These two parts can be divided into the foundation data of school web learning condition and the effect of learning assistants as well. The contents will be as follows:

3.3. Phi-coefficients in every aspect of product design web learning collaborating with integrated manufacturing and commerce

Phi-coefficients means when some variable increases, some variable increases too, which can be represented by "R". It's pretty high if phi-coefficients are more than 90%, signifying that it's in the positively correlative height.

According to factors of all aspect in the questionnaires, arrange the degree of importance: very unimportant 1 point, unimportant 2 points, common 3 points, important 4 points, and very important gets 5 points.

1) Phi-coefficients of manufacturing and commerce integration's establishing on line learning systems as clever ways of assistant learning and technical ability

The effect of assistant learning indicates when the importance of founding smart systems increases, the importance of design and originality to schools also increases, which matches every aspect of phi-coefficients in technical ability, setting up an educational system and the designing teaching materials.

P.D.O = product design and originality

P.T = professional technology

M.C = mutual communication

M.D = Material design

O.L.K = on-line knowledge

A.O.F = ability to operate facilities

I.S = intelligent system

<Table 2> The related coefficients in establishing an intelligent system and technical ability

Factors	P.D.O	P.T	M.C	M.D	O.L.K	A.O.F	I.S
Unimportant	0	4	0	0	4	0	4
Common	6	18	9	12	12	12	9
Important	88	76	80	60	60	45	68
Very important	30	15	35	55	45	12	40
Average	31	28.3	31	31.8	30.3	17.3	30.2
Phi-coefficient	0.97	0.87	0.98	0.94	0.98	0.9	1

2) Instructors and learners should lay their emphasis on the phi-coefficients of the contribution and participation of on-line learning during the whole process

As for the contribution and participation in learning, school should try to make the old traditional ways of education and those new innovative teaching materials well matched with one another.

M.T.E = matching with traditional education

P.L.S = providing the information of schedule

D.C = designing courses

I.M.C = interactively multiple courses

L.A.S = learning assistant system

A.O.C = attending on-line courses

P.C = participation and contribution

<Table 3> The phi-coefficients of contribution, participation, course ideals during the digital learning process

Factors	M.T.E	P.I.S	D.C	I.M.C	L.A.S	A.O.C	P.C
Unimportant	4	4	4	0	0	0	0
Common	6	6	12	45	54	36	6
Important	68	52	72	60	72	54	84
Very important	45	65	30	50	50	65	35
Average	29.8	31.8	29.5	38.8	44	43.8	31.3
Phi-coefficient	0.97	0.75	0.99	0.72	0.74	0.49	1

3) The phi-coefficients of school's advancing network learning assistant on-line to achieve the conducting model of collaborating effect of manufacturing and commerce integration with industry and education partnership

Researchers see that both the use of valuable business information offered by students and the low cost policy will help produce the effect of enhancing industry and education partnership, when schools are running on-line learning systems.

- I.M = the importance of a model
- P.B.I = providing business information
- P.G = promote the gravitation
- A.G.I = advertise good image
- L.C.P = low cost policy
- R.G.H.G = rewarding those getting high grades
- E.I.E.P = the effect of industry and education partnership

<Table 4> The phi-coefficients of the effect of industry and education, partnership and conducting models

Factors	I.M	P.B.I	P.G	A.G.I	L.C.P	R.G.H.G	E.I.E.P
Unimportant	4	4	0	4	14	4	0
Common	9	0	18	18	18	42	6
Important	76	80	80	76	48	40	76
Very important	30	40	20	15	25	20	45
Average	29.8	31	29.5	28.3	26.3	26.5	31.8
Phi-coefficient	0.97	0.98	0.89	0.86	0.95	0.43	1

4) The phi-coefficients of using the gravitation of web learning in manufacturing and commerce integration to lead pupils to take part in learning activities and environments

Readers know that it takes better environments as well as educational resources participating in learning activities.

- N.L.E = new learning environments
- I.E.R = integrating educational resources
- F.E.O.L = fictitious environments web
- E.R.C.S = environmentsin which resources are commonly shared
- H.G = high gravitation
- A.L.A = attending learning activities

<Table 5> The phi-coefficients of participation in learning environments

Factors	N.L.E	I.E.R	F.E.O.L	E.R.C.S	H.G	A.L.A
Unimportant	0	0	2	0	0	0
Common	12	6	15	6	24	16
Important	96	76	60	61	40	80
Very important	15	45	50	65	70	35
Average	30.8	31.8	31.7	32.8	33.5	32.7
Phi-coefficient	0.96	0.97	0.92	0.8	0.54	1

3.4. Statistical of SAS software

According to table 2, 3, 4, and 5, statistical of SAS software, used to one-way ANOVA, research workers are aware of the face that $F=28.27$, $P=0.129$ ($P<0.05$). Generally, they are considered to be almost same both in learning affairs of every aspect and in its effect, which suggests that more and more people attend on-line education, and schools therefore put more and in the competitive excellence on technical ability, course idea, conducting model, learning environment and school should try to make the old traditional ways of education and those new innovative teaching materials well matched.

<Table 6> International learning of importance factors result

Importance factors	Average value
Material design	31.8
Learning assistant system	44
The effect of industry and education partnership	31.8
High gravitation	33.5

3.5. Product design of interaction learning environments in Taiwan industries

According to Taiwan school teaching statistics, 100 number of students' position learning computer result performance, as Table 6, student each kind of learning computer way percentage:

- X_0 : Students position learning of results
- X_1 : Traditional classroom learning
- X_2 : Digital learning and interaction multimedia
- X_3 : Network on line learning

Using Grey theory, get:

Step 1 Starting

With 78 dividing X_0 , after the sequence results in the starting value X_0

$$X_0 = (1, 1.08, 1.13, 1.15)$$

With 92 dividing X_1 , after the sequence results in the starting value X_1

$$X_1 = (1, 0.96, 0.93, 0.91)$$

With 6.8 dividing X_2 , After the sequence results in the start-

ing value X_2

$$X_2 = (1, 0.97, 1.04, 1.03)$$

With 13.5 dividing X_3 , After the sequence results in the starting value X_3

$$X_3 = (1, 1.01, 0.81, 0.69)$$

Step 2 Asks the in order sequence $\Delta_i\mu(K)$

$$\Delta_i\mu_1(K) = |X_0(K) - X_1(K)|$$

$$\Delta_i\mu_2(K) = |X_0(K) - X_2(K)|$$

$$\Delta_i\mu_3(K) = |X_0(K) - X_3(K)|$$

$$\Delta_i\mu_1 = (\Delta_i\mu_1(1), \Delta_i\mu_1(2), \Delta_i\mu_1(3), \Delta_i\mu_1(4)) = (0, 0.12, 0.20, 0.24)$$

$$\Delta_i\mu_2 = (\Delta_i\mu_2(1), \Delta_i\mu_2(2), \Delta_i\mu_2(3), \Delta_i\mu_2(4)) = (0, 0.11, 0.09, 0.12)$$

$$\Delta_i\mu_3 = (\Delta_i\mu_3(1), \Delta_i\mu_3(2), \Delta_i\mu_3(3), \Delta_i\mu_3(4)) = (0, 0.07, 0.32, 0.46)$$

Step 3 Asks $\max |X_0(K) - X_i(K)$

$\Delta_i\mu_1$ the biggest element is 0.24

$$\max_k |X_0(K) - X_1(K)| = 0.24$$

$\Delta_i\mu_2$ the biggest element is 0.12

$$\max_k |X_0(K) - X_2(K)| = 0.12$$

$\Delta_i\mu_3$ the biggest element is 0.46

$$\max_k |X_0(K) - X_3(K)| = 0.46$$

In three element is biggest value 0.46, Minimum value 0

Step 4 Asks $\xi_i(K)$

$$\xi_i(K) = \frac{\min_{i \in I} \min_K |X_0(K) - X_i(K)| + \max_{i \in I} \max_K |X_0(K) - X_i(K)|}{|X_0(K) - X_i(K)| + \xi \max_{i \in I} \max_K |X_0(K) - X_i(K)|}$$

If $\xi=0.5$, get

$$\xi_i(K) = \frac{0.5 \times 0.46}{|X_0(K) - X_i(K)| + 0.5 \times 0.46} = \frac{0.23}{\Delta_i + 0.23}$$

Will possess $\Delta_i\mu_i(k)$, the substitution above equation to be possible to result

$\xi_1 = 1$	$\xi_1(K) = 0.66$	$\xi_1(K) = 0.53$	$\xi_1(K) = 0.49$
$\xi_2 = 1$	$\xi_2(K) = 0.68$	$\xi_2(K) = 0.72$	$\xi_2(K) = 0.66$
$\xi_3 = 1$	$\xi_3(K) = 0.77$	$\xi_3(K) = 0.42$	$\xi_3(K) = 0.33$

If did not consider $\xi_i = 1$, get

$$X_1 = (0.66 + 0.53 + 0.49) / 3 = 0.56$$

$$X_2 = (0.68 + 0.72 + 0.66) / 3 = 0.69$$

$$X_3 = (0.77 + 0.42 + 0.33) / 3 = 0.51$$

So, $0.69 > 0.56 > 0.51$

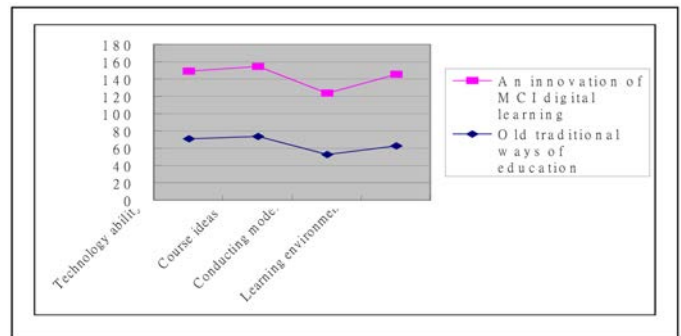
Thus, $X_2 > X_1 > X_3$

This demonstrates

Digital learning and interaction multimedia (X_2) > Traditional classroom learning (X_1) > Network on-line learning (X_3)

3.6. A traditional of learning and an international learning of comparisons result

The results of Table 1,2,3,4, and 5, analyses of the competitive excellence, the objectives of new knowledge effects obtain from online program, which helps to break through the bottleneck of individual's job. Subsequently, the enterprise and school can evaluate the whole effects.



<Figure 4> A traditional of learning and an international learning of comparisons result

4. Discussion

In the past, most researches related to learning were conducting in the area of learning behavior and effectiveness. This thesis takes a further step to research and analyze how each university can promote their learning in the product design education of MCI.

4.1 MCI for product service industries

According to the questionnaire table 2, 3, 4, and 5 of research content, it may conclude the learner result as following.

- 1) Technology ability: establish learning attending MCI cooperate of professional technology in leading position, continued investigates learning of teaching platform and producer kind power material, with improve school education.
- 2) Course ideas: abundant learning more diversify in learner courses content, providing it has valued the computer information, increase web interaction between teacher and students, that can raised the learn interesting.
- 3) Conducting models: establish on line managing model, provide information that are low costs with useful business information, respond to the demand quickly, and satisfied learner web learning.
- 4) Learning environment: able to work with traditional teach-

ing, besides, provide high quality of learning environment and courses, let teacher and students have a good learning environment and method, and enhance learner effect.

4.2 Interaction learning system of performance

According to Figure 4, it is important to build up a functional effect evaluation that can mark the learning effect of learners.

Before the enterprise implement the web teaching system into the organization, the objective of after bringing learning system to the firm should be confirm. The effect should be evaluated regularly to be able to understand if the company operation generates a better effect; the policy management layer should understand the results of web learning to improve the policy so that the accurate improvement has a basis and reduced the failure in entering learning system phase.

Among the progressing learning system, it would meet more other difficulties on work, how to provided assist and help is must, with grasp students learner progress, and practice result, and research manage performance is very much of important topic.

- 1) Course design: provide individual pattern of learning, provide appraise form web and accurate of learner method.
- 2) Teaching design: subject discuss and self appraised that used encourage and reward method progress, meantime, teacher attending to instantaneous discuss, must attracted to more learner men attend, add to teacher and students mutually active of opportunity.
- 3) Appraise: learner active into performance examine item, moreover consider learner men different pattern and characteristics and self-appraise score number.
- 4) System environment: develop better ways and discuss interface, for learner who have not go web in a very long time, must ask the reasons for those who are behind the schedules, and provide wise diagnose assistant learning functions.

Among the progressing learning system, it would meet more other difficulties on work, how to provided assist and help is must, with grasp students learner progress, and practice result, and research manage performance is very much of important topic.

Confront with e-time of come in, how to used high technology, provide compete capacity of instrument, in staff learner, must used to education training of unceasing of knowledge and experience, transmitted give staff, for to conduct centralize train, that after limit time distance, and teacher of difficult problem, then difficult common fast speed of handle, thus, using computer science technology assist promote education training, that step and step become to very much estate and school cooperate used of new trend, so far, domestic only less number estate and school cooperate has guide e-type of training model, after for apply to education training of transmitted and demand, and culture learner profession courses of knowledge and new technology. Thus established to a large pattern web learning of

education training, start learner men thinking, creating cooperate ability, with raised estate and school cooperate of compete superiority.

4.3 MCI in Taiwan service industries

The MCI in Taiwan has made steady progress over the past decade, playing a critical supporting role as the foundation of Taiwan's overall manufacturing industries. In Figure 4 and Table 6, it can be seen that, although there are very strong future business opportunities in MCI. However, Taiwan's government is now vigorously pushing to turn Taiwan into a MCI center in the Asia. According to the above description, the forecasting of the total production value of Taiwan's MCI is suitable for time series forecasting.

For instance, when Taiwan enters WTO, the competitiveness of school and the enterprise operation further require enhancing the competition strength to face the change of this era, the movement of society and the high speed growth of information technology. Similarly, it is expected that the lessons can be abundant, various and lively through high speed and stable information technology to meet the needs of knowledge and skills that required by users. Likewise, by providing better long-distance services, the learning environment can be humanity, economically and diversify.

So, university MCI integration center, in the MCI cooperate of business sale automation course, its primary objective is to enhance the student ability to manage and integrate the basic knowledge and technology in the environment of managing automation business.

5. Conclusions

Therefore, to discuss how to create new ideas from the web learning, learning information technology in order to promote homework efficiency, increase inside communication and trade, moreover apply line information develop learner performance, and how to add to learner men attend in Web of number and add to teach of mutually move, eradicate web learning has no real feeling, improve learning interest and performance, to become initiative of important work for learning, it is also the main topic for enterprise management.

Creating MCI cooperate of arouse learning contribute. The research emphasizes the current of university of MCI, system of framework, the benefit of MCI participation web learning, statistics of analysis report, the initial profile of the future digital learning development. According to the questionnaire result, it proves MCI cooperation on learning, it may bring positive response and benefit to the society, for school education improvement, it is a new teaching method, the discuss on-line learning teaching system, it can also make the society education training function work, with the use of related software and hardware, item create of teaching method, that probe learning of teaching system, reduce student's fears towards scientific technology.

At the moment, lots school started to notice the web study is going to the main trend of learning model, thus, to establish the

web learning education system, in hope the new learning model could work more effectively with more flexibility, everything work on independently, automatically, elasticity and interaction principles, satisfied the demand of web learning, let teacher and student in network lecturing, appraise, mutually active, cooperate study together and share the knowledge, let school receive the real teaching benefit, won the best competitiveness.

Enterprise e-state, in order to share every man's to information's of the used power, every man may stride across time and empty, all must study web, so high technology and high contact. So called high technology direct is used technology collection, moreover organized enterprise of the information, high contact is encourage staff work shared to information of the start, so encourage enterprise staff work more attend web discuss.

Confront all world state and digital state new economic time of the challenge, creating spirit and knowledge management become to establish compete superiority of the key power, government must has vigor and effect, government about to all world compete, country and government has compete, enterprise and each men must has compete, enter a step to country and society.

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