



PROCEEDING

The 3rd International Symposium on Innovative Education and Technology

ISIET 2018

“Innovative Education for Globalization in 21st Century”



16 – 17 July 2018

Venue : Rajamangala University of Technology Thanyaburi, Pathum Thani,
Thailand

<http://www.teched.rmutt.ac.th/isiet2018>

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MESSAGE FROM HONORARY CHAIR (HOST)

The 3rd International Symposium on Innovative Education and Technology (ISIET 2018) is most important means of dialogue, which offers to the community of professionals and researchers concerned with innovation and technology in education for the 21st century. The first ISIET 2015 demonstrated that vocational and technical teachers felt a strong need to unite, talk, and discuss the problems or issues concerned with the challenge and changes in the contemporary teaching and learning situation. This symposium brings together specialists and academics to discuss and disseminate the results emerging from their research. Accordingly, this symposium has been organized around opportunities for researchers and practitioners to meet and network.



I would like to thank our co-organizer, Universiti Teknologi Malaysia (UTM), whose together systematic work has built up this network and brought people here from many parts of the world. I am happy to see here many of our old partners, with whom we have had a good relationship for a number of years, and I hope that our cooperation with new partners will be as fruitful.

The key to our symposium, of course, is to address the problem of ensuring that the curriculum we offer our students equips them for the jobs of tomorrow. We need to consider where future employment demands will come from, and the skills our graduates will need to complete in a world that has been transformed by the internet and new digital technology. In addition, in this symposium, the focus is directed at the research and design of new technologies and media that will deliver powerful learning strategies and promote engaged learning on the part of students. Students who will have the competency and vision to deal with the problems of the 21st Century. Recognition should go to the ISIET 2018 organizing committee members who have worked extremely hard to prepare and host the important aspects of the symposium programs and social activities.

We hope you will find the symposium rewarding and your stay in Pathumthani both valuable and fruitful. Please take a little extra time to enjoy the spectacular and unique beauty of this region.
With best wishes,

Assoc. Prof. Prasert Pinpathomrat, Ph.D.

President of Rajamangala University of Technology Thanyaburi (RMUTT), Thailand

President of the Regional Association for Vocational and Technical Education in East and Southeast Asia (RAVTE)



MESSAGE FROM HONORARY CHAIR (CO-HOST)

السلام عليكم ورحمة الله وبركاته and Sincere Greetings to All, it is my pleasure to welcome all of you to the 3rd International Symposium on Innovative Education and Technology (ISIET) 2018. I would like to congratulate the Faculty of Technical Education, Rajamangala University of Technology Thanyaburi for the great efforts in planning and organizing this conference. ISIET is one of the platforms to build a global network, improve collaboration and initiate sharing of ideas in research with the aim to improve the quality of education, mainly on Innovative Education and Technology and other related issues in education.



Malaysia has embarked on various initiatives to propel the country towards its goal of becoming a high income nation and developed economy by 2020. The cornerstone of this aspiration is the availability of highly skilled human capital. In this context, ISIET plays a pivotal role in providing skilled workforce to fit the demand for the country's economic transformation. According to MOHE's Malaysia Education Blueprint (Higher Education), there will be an increase in demand for an additional 1.3 million TVET workers by 2020 in the 12 National Key Economic Areas (NKEA) identified under the Government's Economic Transformation Programme (ETP). Therefore, TVET qualifications play a vital role in the country's economy by equipping our future talents with TVET knowledge and skills from basic to advanced levels in various economic sectors. Pursuing an ISIET qualification will enable students to acquire real skills which can prepare them towards further training in various fields and also prepare them for future employability. In addition, these students also will have the potential to become leaders of innovation.

Therefore, this conference is an opportunity for academicians from local and international institutes of higher education, postgraduate and undergraduate students from various disciplines in ISIET to present, share, exchange opinion and discuss research ideas to promote Innovative Education and Technology. As a co-organiser, we are very grateful for the significant contributions made by Rajamangala University of Technology Thanyaburi to ensure that this conference is a success. It is our aspiration that the discussions and sharing from the conference will contribute towards achieving our national agenda to become high income countries.

Last but not least, I sincerely hope that this conference will achieve its objectives in providing a platform for researchers in ISIET to share research findings, knowledge and latest development in ISIET. Thank you.

Prof. Datuk Ir. Dr. Wahid bin Omar

NAIB Chancellor, Universiti Teknologi Malaysia (UTM), Malaysia



MESSAGE FROM GENERAL CHAIR

On behalf of the organizing committee for the 3rd International Symposium on Innovative Education and Technology (ISIET) 2018, I have to say thank you very much to everyone for coming today and be part of this event. This international conference is in accordance with RMUTT internationalization strategic policy and for education to meet the international standards in 2018. The Faculty of Technical Education realizes the importance of university policy for internationalization. We therefore create and transfer technology for learning and teaching.

We have been promoting and developing research as well as giving chance to the researchers to present their research to international forum. The Faculty of Technical Education respectfully request for the approval of the 3rd International Symposium on Innovative Education and Technology 2018 (ISIET 2018) with the theme “Innovative Education for Globalization in 21st Century” for the purpose of gathering researchers from different parts of the world to present and discuss their research works.

This is for the third time and we got cooperation and support by other international organizations, Co-hosted by Regional Association for Vocational Technical Education in East and Southeast Asia (RAVTE) and Universiti Teknologi Malaysia (UTM). The presentation to be presented will highlight research on innovation, technology and education. Now is the auspicious time to invite the president to open the 3rd International Symposium on Innovation and Technology 2018 (ISIET 2018).



Asst. Prof. Arnon Niyomphol
Dean of Faculty of Technical Education
Rajamangala University of Technology Thanayaburi (RMUTT), Thailand

KEYNOTE SPEAKER

Prof. Dr. Rolf Gennrich : “*Future Challenges of Global TVET Education*”

Dr. Rolf Gennrich has been closely associated with Technical and Vocational Education and Training (TVET) for over 50 years. His professional career started in 1963 as a skilled worker and master craftsman. Soon afterward he became a trainer, teacher and school manager at a vocational training school associated to a state holding company in the construction sector. He has held various leading positions since 1983 within vocational schools, government authorities and at TVET-research institutions in Germany. Completing post-graduate studies in the adult vocational education at the Humboldt University of Berlin, Germany, in 1991 he was awarded a doctorate in vocational pedagogy at the same university.



From 1975 to 1978 he was assigned overseas as a TVET expert and team leader tasked with establishing the first vocational training centre for construction workers in Vinh, Vietnam. Following that he was employed by the German Agency of Technical Cooperation GTZ (now GIZ) for over 17 years as a team leader and programme director in several of the countries undergoing rapid development at the time. Aside from other responsibilities he was involved in vocational system advisory and human resource development projects to promote labour market-oriented TVET development and research.

Dr Rolf Gennrich has spent over 27 years of his professional career working as an expert in TVET in various developing countries, largely in North Africa, the South East Asian region and China. At the moment he is active as a consultant and lecturer in strategy and policy development for the TVET sector assisting government authorities and international development cooperation agencies serving also as a coach and management advisor. Dr Gennrich is a frequent guest lecturer at universities offering vocational teacher education programmes.

From 2008 he has been assisting the German development agency GIZ to found the Asia's first regional cooperation platform on vocational teacher education (RCP).

Prof. Dr. Rolf Gennrich, Senior consultant of Higher Education, Vocational Teacher Education and TVET, Vientian, Lao PDR.

INVITED PAPER

Prof. B.C. Mahapatra : “*Intervention of Technology Based Learning Environment for Globalization of Education*”

Prof. (Dr.) Bhuban Chandra Mahapatra had earned the Bachelor Degree in the discipline of Education in 1989 from Utkal University, BBSR, Orissa, India. In the year 1991, he had earned M.Ed. Degree from Devi Ahilya Vishwavidyalaya (DAVV), Indore, India with specialization of Educational Technology and Computer Education. Apart from that, he have been awarded Ph.D. by the same University in the year 1995 with super specialization in Educational Technology i.e. Technology of Teaching and Instructional Design.



After completing his studies, he have taught two years in Institute of Management Study Devi Ahilya Vishwavidyalaya (DAVV), Indore with specialization subjects (Operational Research and Computer Application in Management Studies). In 1997, he have joined Dr. Baba Saheb Ambedkar National Institute of Social Sciences (BANISS), MHOW, Indore, for his Post-Doctoral research work and to promote research, extension and teaching activities by the institution for the M.Phil. and Ph.D. scholars. In 2003, he joined Madhya Pradesh Bhoj (Open) University, a Global Mega University as Lecturer in Education (Assistant Professor) in the Department of Multimedia Education. After two years the University gave him an opportunity to work in the Department of Special Education for the development of innovation in Instructional Designing through Multimedia approaches of learning. During his professional career, he have taught various educational subjects with specialization in Research Methodology, Educational Psychology, Special Education, Educational Technology in different Universities and Institutions.

He enjoy student-teacher supervision and consider such applied responsibilities to be among the most important contributions, also like to work for education of children. Apart from that, he have twenty two years of Research, experiences with his Ph.D. and Post-Doctoral research activities associated with the problem of India Education System. With more than five dozen of Research Papers, Articles and sixteen books available in International market. With un-doubtable administrative capacity in the University/Institution, academic contribution, direction and management of educational problems of staff, students and administrators with suave co-ordition in the International bodies, Government and NGO's reveals my suitability. He have visited several countries for exploring higher education in general and Teacher Education in special.

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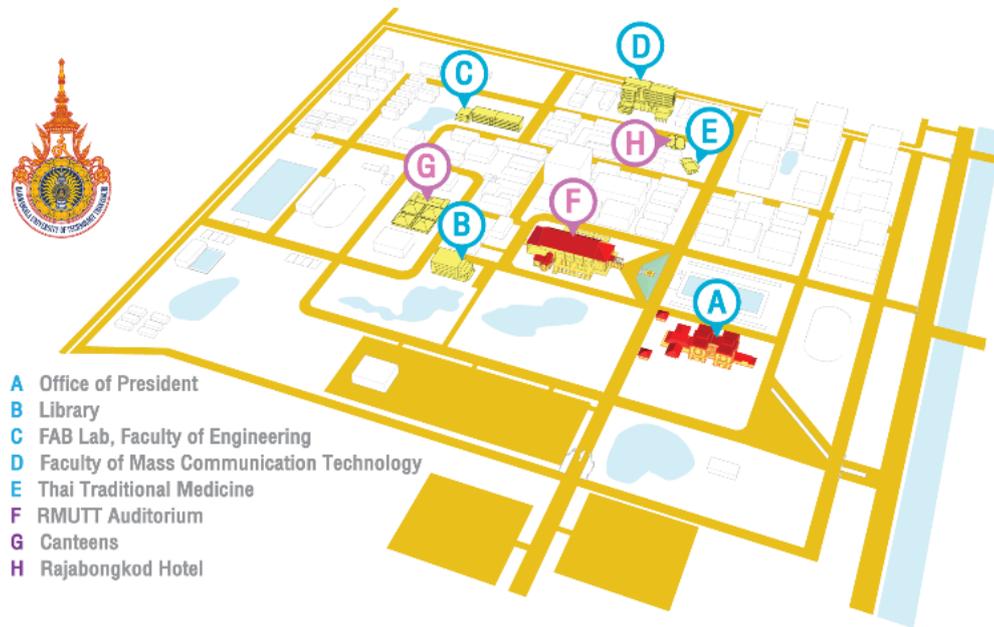
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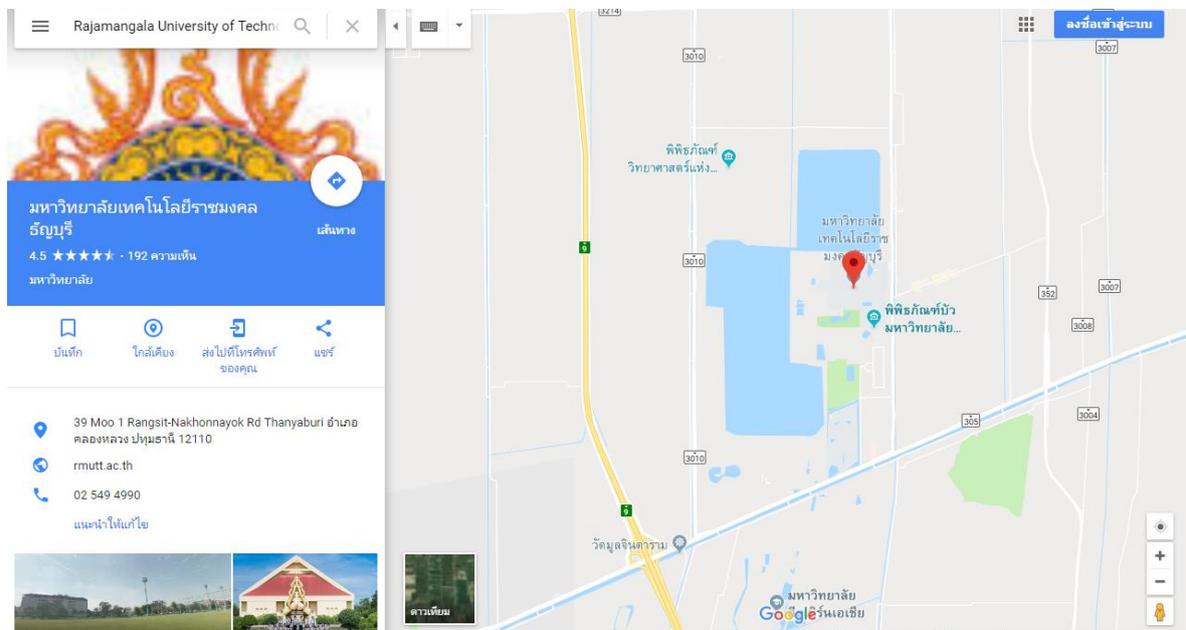
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Dr.Megat Aman Zahiri bin Megat Zakaria, UTM, Malaysia
Dr.Muhammad Sukri bin Saud, UTM, Malaysia

VENUE AND LOCATION

Venue : Office of the President (“A” on Map)



Address : Rajamangala University of Technology Thanyaburi, Pathum Thani, Thailand



Google Map : 14.034197, 100.730077

TENTATIVE PROGRAM

July 16, 2018			
08.00 – 09.00 AM	Registration		
09.00 – 09.30 AM	Opening Ceremony by Presidents and RMUTT & UTM (Songthanapitak Convention Hall)		
09.30 – 10.40 AM	Keynote Speaker : “Future Challenges of Global TVET Education” by Prof. Dr.Rolf Gennrich		
10.40 – 10.50 AM	Coffee Break		
10.50 - 12.00 AM	Invited Paper : “Intervention of Technology based Learning Environment for Globalization of Education” by Prof. B.C. Mahapatra		
12.00 – 13.00 PM	Lunch (Victoria)		
13.00 – 17.00 PM	Session I (Room : Mangkala-Ubon)	Session II (Room : Chalongkwan)	Session III (Room : Thanyakan)
	PID : 05, 06, 07, 08, 11, 13	PID : 01, 04, 09, 10, 12	PID : 02, 03, 14, 15
17.00 – 20.30 PM	Welcome Party (Location : Faculty of Technical Education Building)		

July 17, 2018	
08.00 – 16.30 AM	Excursion : Thai Culture Experience
Meeting point at Faculty of Technical Education Building	

Secretary Office : Victoria room, 1st FL.

SUMMARY OF PAPERS

- Number of papers
 - Number of papers by Thai authors 8
 - Number of papers by foreigner authors 8
 - Number of international country 4
(Malaysia, Japan, Turkey, India)

- Countries of Participants (Presenter)
 - Thailand 8
 - Malaysia 4
 - Japan 2
 - Turkey 1
 - India 1

TABLE OF PAPERS

PID	Paper Titles / Authors	Page
Invited Paper	Intervention of Technology based Learning Environment for Globalization of Education B.C. Mahapatra	1
01	Development of Engineering Skills using Students Projects for Science Students Program, Faculty of Education Chiang-Rai Rajabhat University Saengrawee Na Lamphun, Hranseuk Lebkhute, Banchob Sukprapaporn, Janjira Chaipamornrhit, Charuwan Sirinapadol	8
02	Factors Affecting the Effectiveness of the Government Fiscal Management Information System (GFMIS) in the Royal Thai Arm Force Silath Reanmanee	16
03	Problems and Needs Analysis in English Use of Staff at the International Airports in the South of Thailand Rattaneekorn Pochakorn, Vikrom Chantarangkul, Kanyakorn Sermsook	25
04	Gesture-based Operation System for Robot Arm and Electric Wheelchair Tomoya Ichikawa, Ken'ichi Yano, Tsutomu Shimada, Lanijun Yang, Ryota Sakamoto, Shintaro Shimada, Panya Minyong	36
05	New Academia Learning Innovation Strategy used in Undergraduate and Postgraduate Programs at UTM Emmanuel Simon Yayock, Nornazirah Suhairom, Noraffandy Yahaya, Yusri Kamin, Muhammad Sukri Saud, Megat Aman Zahiri Megat Zakaria	43
06	Scenario Based Learning: A Technical Review Muhammad Sukri Saud, Yusri Kamin, Mohd Zolkifli Abd Hamid ,Noraffandy Yahaya,Zainal Abidin Zainuddin	51
07	A Review of Moore Transactional Distance Theory Hassan Mahmoud AbuHassna, Noraffandy Yahaya, Yusri Kamin, Muhammad Sukri Saud, Megat Aman Zahiri Megat Zakaria	55
08	The Use and Acceptance of Virtual Learning Environment in Melaka Primary School Megat Aman Zahiri Megat Zakaria, Yusri Kamin, Noraffandy Yahaya, See Shanyu, Muhammad Sukri Saud	62
09	A Curriculum Evaluation of The Master of Arts in Aviation Management, B.C.2017 and the Developmental Approaches Krit Witthawassamrankul	68

TABLE OF PAPER ID (Cont'd)

PID	Paper Titles / Authors	Page
10	Trajectory Estimation of Table Tennis Ball by Aerodynamics Model Considering Translational and Rotational Speed Yoshiki Takamura, Norihiko Kato	73
11	The Design of a Learning Activity by using Constructionism Approach through Social Network Improving Team Base Learning Sawit Chimruang, Sakesun Yampinij	79
12	The Effect of FATIH Project on Digital Divide and Equal Opportunities in Education in Turkey Kerim Karabacak, Subhan Eksioğlu, Thosporn <u>Sangsawang</u> , Irfan Simsek	84
13	Local Wisdom Application for Participatory Career Development Varataya Thammakittipob	97
14	Development of Creative Thinking Entrepreneur Program Based on Creative Economy Varataya Thammakittipob, Kunyayut Eiamsa-Ard	105
15	Problems of Authentic Assessment And Guideline for Authentic Vocational Student Assessment in Vocational Education Institute, Thailand Varataya Thammakittipob, Suntra Tobua, Panit Khemthong	110

[INVITED PAPER]

Intervention of Technology based Learning Environment for Globalization of Education

Prof. (Dr). B.C. Mahapatra

Professor of Education, Ph.D. Guide JJT University, Rajasthan, India

Abstract — This paper is trying to focus on need and importance of educational technology and information communication technology for the promotion of education worldwide. The principle of Instructional Technology (IT) and Learning Technology (LT) are associated with the Teachers, Teaching Environments and Learners' achievement. Intervention of technology in the teaching learning process as a result of Educational Technology is the product of instructional and learning process. In both IT and LT are more potential by the use of Information Communication Technology (ICT) for resolving the burning issues teaching learning process now a days. For many of us, the lure of computers is a powerful one. The views and action taken by UNESCO through ICT application with critical thinking of different thinkers for the promotion of ICT in order to come learning deficiencies of different components working to education are explored. In our teaching learning process the core principle according to the national goal how to see the maximum output in the part of the learners. Lastly by explaining all these factors concluded by the social implementation of ICT in education.]

Keywords: Information Communication Technology, Multimedia Education, Learning Technology, Instructional Technology, Competency Framework for Teachers, Open Education Resource.

*Prof. B.C. Mahapatra, Professor of Education, Ph.D. Guide JJT University, Rajasthan, India. Correspondence Address (A-103, Minal Residency, J.K. Road, Govindpura, Bhopal, M.P., India, b_cmahapatra@yahoo.co.in, 0919424482314)

Introduction

In the world of globalization concept and its acceptability in the knowledge society which shape the progress and development of any county are trying to redefine according to their needs. The Learning Community is an organization developed for the improvement in the ways of teaching and learning by the application of creativity and innovative practices in Education System. Objectives of the organization are to develop and promote Learning & Education and to provide a forum for discussion and deliberations on issues and problems related to Education in general and Learning in particular. Teachers are key players in maintaining and improving the quality of education and training systems. In the present era of technology, teacher's obligation is confined not only to acquire new knowledge and skills but to develop them continuously also. The education and professional development of every teacher needs to be seen as a lifelong task, and be structured and resourced accordingly. Professional development refers to activities to enhance professional career growth of teachers to foster teacher's growth. Professional development of teachers is to develop new insights into pedagogy and their own practices, and explore new or advanced understandings of contents and resources. To equip the teaching body with the skills and competences requires continuous professional development programmes. Need of out sources and localization of education through Information Communication Technology (ICT) in order to achieve National Goal through planning is a challenging issue for teachers, teacher educators, academicians, and scholars need single platform to deliberate and attain valuable and viable suggestions for professional development of teachers.

ICT and Higher Education

Higher education plays a pivotal role in the development of a country, as it is viewed as a powerful means to build knowledge based society. In India, higher education imparted by universities is facing challenges in terms of Access, Equity and Quality. The Government of India has taken several initiatives during the Eleventh Five Year Plan period to increase access to higher education by adopting state specific strategies, enhancing the relevance of higher education through Curriculum reforms, Vocational programs, Networking, Information Technology adoption and Distance Education along with reforms in governance. This paper is considering the rapid spread of ICT applications has brought about markedly drastic technological, social and economic transformations. These changes have caused educational institutions, administrators, teachers to rethink their roles, teaching and vision for future. The sustainability of a nation in the era of knowledge economy depends on the effective educational system. Productivity is an economics concept where productivity is considered as the comparative analysis of input and outputs. In educational system the inputs are teachers, students, classroom material, equipment of teaching, methods of teaching and outputs are quantity and quality of student learning. The proper integration of ICT with teaching/learning environment increases education and increased productivity. ICT provides various opportunities to educational learners and make teachers aware of their new roles & responsibilities in teaching and learning process. The growing use of ICT will change many of the strategies employed by both Teachers and Students in the learning process. The role of ICT the educational administration is recurring and unavoidable. ICT has enabled us to monitor and evaluate what is learned, how it is learned and when and where learning took place. It is also enable the educational management system to discharge various functions such as, conduction of exams, coordination between potential institutes, alumni network. ICT also

work for nontraditional students by providing internet based education to them anytime and anywhere and these internet technologies enables innovative ways of teaching e.g. Tata Sky educational system. ICT is going to play a vital role in bringing about qualitative change in every aspect of our life in general and that of governance of education.

Some Quick facts about Indian Higher Education

There are 24.6 million students undergoing Higher Education in India as of 2016. There has been a significant rise in enrollment from rural population in Higher Education. The GERs in rural areas have been rising steadily and expected to reach 12.84% by 2020. A growing number of women are expected to enroll in Higher Education Institutes. Currently over 6.1 million women are enrolled in Higher Education and is expected to grow to 12.15 million by 2020.

There is a high demand from working professionals for Executive Education programs. Three Indian universities were listed in the Times Higher Education list of the world's top 200 universities — Indian Institutes of Technology, Indian Institutes of Management, and Jawaharlal Nehru University in 2015 and 2016. Six Indian Institutes of Technology and the Birla Institute of Technology and Science - Pilani were listed among the top 20 Science and Technology schools in Asia by Asia Week. The Indian School of Business situated in Hyderabad was ranked number 12 in global MBA rankings by the Financial Times of London in 2010 while the All India Institute of Medical Sciences has been recognized as a global leader in medical research and treatment. (Source: UGC Higher Education in India 2008 - 11th Five Year Plan Vol. II)

ICTs stand for Information and Communication Technologies. According to Blurton : ICT is defined as “diverse set of technological tools and resources used to communicate, create, disseminate, store, and manage information”. Technologies included in ICTs are: Radio and

Television (broadcasting technology), Telephony, Computers, and the Internet.

E-Learning: Commonly associated with higher education, professional and corporate training, e-learning encompasses learning at all levels, both formal and non-formal, that uses an information network—the Internet, an intranet (LAN) or extranet (WAN)—whether wholly or in part, for course delivery, interaction and/or facilitation. Others also term it an online learning.

Open and distance learning: Open and distance learning is defined by the Commonwealth of Learning as “a way of providing learning opportunities that is characterized by the separation of teacher and learner in time or place, or both time and place; learning that is certified in some way by an institution or agency; the use of a variety of media, including print and electronic; two-way communications that allow learners and tutors to interact; the possibility of occasional face-to-face meetings; and a specialized division of labour in the production and delivery of courses. “The use of ICT has extended the scope of offering educational programmes at a distance. The off-campus delivery was an option for students who were unable to attend the classes regularly. Today, many students are able to make this choice through technology-facilitated learning settings. This makes available the education everywhere, it is time and cost saving also. The major benefit of ICT implementation in education is it extending courses of choice to students of different backgrounds, cultures, perspectives. Learners are free to participate in learning activities at their convenience through online technologies. Eminent teachers from different parts of the country and abroad can be utilized for teaching at their convenience through mobile technologies and seamless communication technologies that support 24x7 teaching and learning for instance NPTEL (National Programme on Technology Enhanced Learning, India, 2007), EKLAVYA Technologies Channel, India, 2007, Tata Sky Active education classrooms

etc. All these above technologies are the fruitful result of ICT implementation in education sector which provide a new direction in modern education. All these education can be provided through Teleconferencing, Videoconferencing, Web-based conferencing, Audio conferencing and other ICT technologies. MOOC and SWAYAM platform accredited by the Government of India for Higher Education facilitation and for the quality improvement of the Higher Education with Global Inter with intra factors assimilations.

Teleconferencing: refers to “interactive electronic communication among people located at two or more different places.” There are four types of teleconferencing based on the nature and extent of interactivity and the sophistication of the technology: 1) audio conferencing; 2) audio-graphic conferencing, 3) videoconferencing; and 4) Web-based conferencing. **Audio conferencing:** involves the live (real-time) exchange of voice messages over a telephone network. When low-bandwidth text and still images such as graphs, diagrams or pictures can also be exchanged along with voice messages, then this type of conferencing is called audio-graphic. Non-moving visuals are added using a computer keyboard or by drawing/writing on a graphics tablet or whiteboard. **Video conferencing** allows the exchange not just of voice and graphics but also of moving images. Video conferencing technology does not use telephone lines but either a satellite link or television network (broadcast/cable). **Web-based conferencing:** as the name implies, involves the transmission of text and graphic, audio and visual media via the Internet; it requires the use of a computer with a browser and communication can be both synchronous and asynchronous.

ICT IN TEACHER EDUCATION UNESCO VISION; AN INITIATION

The objectives of the UNESCO were to be ICT:

Explore how ICT has been integrated into teaching and learning in the Pacific;

Review the issues, challenges and initiatives related to ICT competencies for teachers in the Pacific;

Introduce the UNESCO ICT Competency Framework for Teachers (CFT);

Discuss teacher development approaches that make capacity building possible;

Discuss where and how policies and practices in education need to respond to harness the potential of ICT in teacher development;

Explore possibilities for further implementation/contextualisation of the UNESCO ICT CFT in the Pacific; and

- Engage multilaterals, donor agencies, NGOs, private sector on collaboration within the region to implement ICT in Education initiatives.

During the forum, presentations were made by Pacific regional representatives including USP, UNESCO-Pacific Office and the Secretariat of the Pacific Community on the current status of ICT in education in the region. Professor Chandra made a presentation on ICT and its role at USP and the Pacific region. He was also a member of the panel discussion on issues in ICT in the Region. The donor presentations were focused on the importance of building teacher capacity in ICT in education. Best practices and case studies from the Caribbean region were also shared with the objective that they could possibly be re-contextualized for the Pacific region. The presentations brought about engaging discussions amongst the delegates on experiences, challenges and opportunities of integrating ICT in education for the Pacific region. The discussions will be extended through an online forum to continue to discuss issues raised at the forum.

Globalization and technological change—processes that have accelerated in tandem over the past fifteen years—have created a new global economy “powered by technology, fueled by information and driven by knowledge.” The emergence of this new global economy has serious implications for the nature and purpose of educational

institutions. As the half-life of information continues to shrink and access to information continues to grow exponentially, schools cannot remain mere venues for the transmission of a prescribed set of information from teacher to student over a fixed period of time. Rather, schools must promote “learning to learn,” i.e., the acquisition of knowledge and skills that make possible continuous learning over the lifetime. “The illiterate of the 21st century,” according to futurist Alvin Toffler,” will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn.” Concerns over educational relevance and quality coexist with the imperative of expanding educational opportunities to those made most vulnerable by globalization—developing countries in general; low-income groups, girls and women, and low-skilled workers in particular. Global changes also put pressure on all groups to constantly acquire and apply new skills. The International Labour Organization defines the requirements for education and training in the new global economy simply as “Basic Education for All”, “Core Work Skills for All” and “Lifelong Learning for All”. Information and communication technologies (ICTs) — which include radio and television, as well as newer digital technologies such as computers and the Internet—have been touted as potentially powerful enabling tools for educational change and reform. When used appropriately, different ICTs are said to help expand access to education, strengthen the relevance of education to the increasingly digital workplace, and raise educational quality by, among others, helping make teaching and learning into an engaging, active process connected to real life. However, the experience of introducing different ICTs in the classroom and other educational settings all over the world over the past several decades suggests that the full realization of the potential educational benefits of ICTs is not automatic. The effective integration of ICTs into the educational system is a complex, multifaceted process that involves not just technology—indeed, given enough initial capital,

getting the technology is the easiest part!—but also curriculum and pedagogy, institutional readiness, teacher competencies, and long-term financing, among others.

The basic objective and responsibility of any Government all over the world is to provide and avail quality and education for all from elementary level to higher education. In our teaching learning process the core principle according to the national goal how to see the maximum output in the part of the learners. The principle of Instructional Technology (IT) and Learning Technology (LT) are associated with the Teachers, Teaching Environments and Learners' achievement. Intervention of technology in the teaching learning process as a result of Educational Technology is the product of instructional and learning process. In both IT and LT are more potential by the use of Information Communication Technology (ICT) for resolving the burning issues teaching learning process now a days. For many of us, the lure of computers is a powerful one. However, many of us also refrain from using computers for fear of failure. We want to hone computer skills, but are scared to make the effort because we lack those very skills. Too many of us, especially in the field of learning, are caught in this modern tug-of-war. Better understanding by the applications of pedagogical issues related to learning process of the learner in any stages are the remarkable area for the of educational problems. ICT in teaching learning process in both LT and IT trying to facilitates pedagogical issues with respect to other learning constraints of both learners and teachers. The emerging concept of media approach of teaching learning changed with the integration different media with single platform as Multi Media (MM) approaches of teaching learning.

REMARKS

The ICT has become indispensable and will remain as such with the growth of higher education and the civilization in future. At the same time care must be taken by the governing authorities for proper control and licensing to ensure quality, accountability

and certification in higher education. Information and communication technologies (ICTs) are a major factor in shaping the new global economy and producing rapid changes in society. Within the past decade, the new ICT tools have fundamentally changed the way people communicate and do business. They have produced significant transformations in industry, agriculture, medicine, business, engineering and other fields. They also have the potential to transform the nature of education—where and how learning takes place and the roles of students and teachers in the learning process. Teacher education institutions may either assume a leadership role in the transformation of education or be left behind in the swirl of rapid technological change. For education to reap the full benefits of ICTs in learning, it is essential that pre-service and in-service teachers have basic ICT skills and competencies. Teacher education institutions and program must provide the leadership for pre-service and in-service teachers and model the new pedagogies and tools for learning. They must also provide leadership in determining how the new technologies can best be used in the context of the culture, needs, and economic conditions within their country. To accomplish these goals, teacher education institutions must work closely and effectively with teachers and administrators, national or state educational agencies, teacher unions, business and community organizations, politicians and other important stakeholders in the educational system. Teacher education institutions also need to develop strategies and plans to enhance the teaching-learning process within teacher education programs and to assure that all future teachers are well prepared to use the new tools for learning. This is intended to help policymakers in developing countries define a framework for the appropriate and effective use of ICTs in their educational systems by first providing a brief overview of the potential benefits of ICT use in education and the ways by which different ICTs have been used in education thus far. Second, it addresses

the four broad issues in the use of ICTs in education—effectiveness, cost, equity, and sustainability.

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PID 01 Development of Engineering Skills Using Students Projects for Science Students Program, Faculty of Education Chiang-Rai Rajabhat University

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Abstract — This research study on the Development of engineering skills using student's projects. Science Students Program, Faculty of Education Chiang-Rai Rajabhat University. The Objective to study was compare skill level and create the model of engineering skill development for Science students of the Faculty of Education, Chiang-Rai Rajabhat University. The tools used in this research study were the research knowledge form (T1); the research report evaluation form, assignment 1 (T2); the Keyword - Engineering Skills; Students Projects quality assessment of the title and the introduction, assignment 2 (T3); the quality of assessment and related theory, assignment 3 (T4); the quality assessment of research methodology, assignment 4 (T5); the quality assessment of research project, assignment 5 (T6); the quality assessment of the abstract, assignment 6 (T7); and the quality assessment of the references, the learning records, the dialog records, and the lesson plan. Data analysis was mean and standard deviation the comparison mean was T-test and variance analysis. There are present information in the table with a description and content analysis. Results indicated that:

1. The results of the study of engineering skill levels of Science students program in the Faculty of Education at Chiang-Rai Rajabhat University showed that before learning activities. The students have achieved the top three highest score were 14, 12, and 10. Furthermore, the group discussion which

solution analyze, it was shown that the students problem were planning and development. Secondly, there are testing and evaluation, the last problem was outcome presentation.

2. Development of engineering skills using student's projects. Science Students Program, Faculty of Education Chiang-Rai Rajabhat University provided 7 topics in student's projects.

3. The comparison of engineering skills using projects as the foundation for Science students program in the Faculty of Education at Chiang-Rai Rajabhat University. Mean was used to analyze of engineering skills, both before and after learning activities. Overall, analysis revealed that students have better skills after learning activities than before learning activities at percentage of advancement was 34.94.

4. The procedure has created model for engineering skills using projects as the foundation for Science students program in the Faculty of Education at Chiang-Rai Rajabhat University. The model of this study provided:

Step 1: Training courses were provided the knowledge of STEM Education and has taught about engineering skills.

Step 2: An engineering development process was presented 9 steps:

- 1) Problem Identification
- 2) Related Information Search
- 3) Testing

- 4) Evaluation
- 5) Solution Design
- 6) Final test
- 7) Examine Analysis
- 8) Procedure Summary
- 9) Presentation

Step 3: The solution and problem in the first step have created projects and lesson plans that appropriately with activities in every classroom for students in the bachelor's degree.

Keywords: Engineering skills, Students projects

Background and Signification of the Research Problem.

The society have been changing rapidly and production methods with personnel efficiency for competition in the social. The level of expectations regarding the performance for personal efficiency of employee that have professional skills as an ethical, moral, ethical person who can be a good role model in the society. There are national economic and social development plan. Moreover, the national society realize that development of people are priority. This research applies to achieve the Philosophy of the sufficiency Economy as promote all level of the nation to be peaceful. Therefore, Social Development Strategy and Culture. This development focus on human development through education and provide Knowledge to everybody for improving quality of life in every fields which can balance on mental health, physical, Knowledge and abilities. Learning activities and arranging plenty of local knowledge according to proper environment in the society. According to foundation of live as resources, knowledge and culture. Moreover, people should be aware of multicultural, traditions, local harmony cultural and multi culturalism.

This reason can develop the community or local stability. According to Rajabhat University strategy encourage employee productivity, professional quality and standard of Rajabhat University Acts 2004

focus on Four section such as academic, research, academic services and support culture, still follow this strategy until present. Science and technology are necessary and have influence in daily life. This is very important for society have knowledge, think logically and solving problem. However, the system have effect to support people intelligence, which have the same method in scientific knowledge. Particularly, ASEAN Community have plan to increase quality of students have graduated from University. All students will be teacher, who should have quality of education accordance with the standards in ASEAN countries. Furthermore, student be able to apply their knowledge with local community, which have difference learning environments.

STEM Education is the integration of science (S), technology (T), engineering (E), and mathematics (M). The results of STEM Education in the United States found that teachers arrange activities by using Project-based Learning method can motivate student be more creative. STEM Education is also a context Integration related to dairy life as well. This will increase the chances of work. Strengthening the country's economy. [1](50) Chiang-Rai Rajabhat University is an institute that produces science teachers to society. Being teacher in various school, which is very important to preparation student teacher follow STEM Education system, similar with teaching another subjects, the results showed that the first significant of failures is science classes in the elementary school because training teacher lack of confidence and experience. [1](54) The science project work was findings indicated that science teacher was lack of engineering skills such as quantity, size, compatibility and critical thinking. The second important skills was sense of magnitude. Therefore, Thai education learn only project work without engineering critical thinking. The learning STEM Education by using inventions are not successful. [2] (43, 53, 96)

In conclusion, development engineering skills using project-based to students Faculty of

Education, Chiang-Rai Rajabhat University. However, teaching style should be modified according to the integration of education in many disciplines. This learning method can support students as critical thinking, analyze, synthesize and they will apply this knowledge to their own teaching experience and solve problems in the future.

Objective

1. To study the engineering skill level of science students, the Faculty of Education program, Chiang-Rai Rajabhat University.
2. To develop the engineering skills by using the project as the foundation of the science students program in the Faculty of Education, Chiang-Rai Rajabhat University.
3. To compare engineering skills using student-based projects. Faculty of Education, Chiang-Rai Rajabhat University
4. To create a model for developing engineering skills using project-based. Faculty of Education, Chiang-Rai Rajabhat University.

Research Methodology

Research on the development of engineering skills using project-based. Faculty of Education, Chiang-Rai Rajabhat University. The research was conducted in the form of experimental research. The experiment showed that: Experimental plan, this study will examine the sample by pre-test and post-test. One Group Pretest - Posttest Design is a diagram.

O1 X O2

When O1 is the engineering skill of the student before the learning activities.

X is an activity-based learning project.

O2 is the engineering skill of post-learning students using project-based teaching activities.

Phase 1: Study skills in engineering using student projects. Faculty of Education, Chiang-Rai Rajabhat University.

1) Target audience, there are 80 science students in the Faculty of Education, Chiang-Rai Rajabhat University.

2) Tools, Tools was the engineering skills test.

3) Collecting data, the researcher conducted self-collected data to obtain empirical data.

4) Data Analysis, the data were analyzed by means of statistic, mean, and standard deviation.

Phase 2 develops engineering skills using project-based projects. Faculty of Education, Chiang-Rai Rajabhat University

1) Population, there are 80 science students in the Faculty of Education, Chiang-Rai Rajabhat University.

2) Tools, the instruments used in this study were the Engineering Skills Test (T1), Project Evaluation Task 1 (T2) Quality Assurance for Problem Identification Task 2 (T3) Quality Assessment for Related Concepts, Task 3 (T4), Quality Assessment for Planning and Development, Task 4 (T5) Quality Assurance and Testing, Task 5 (T6) Quality Evaluation of Presentation, group discussion recording, STEM Education Training Program.

3) The process of creating and finding the quality of tools. The researcher constructed and researched the quality of the research tools.

Study relevant documents and research related to engineering skills. The research tools meeting with researcher teams and engineering skills measurement by using multiple choices tests.

4) Collecting data

Session 1 learning and understanding of STEM education and clarify training course was using engineering skills for 2 days.

Session 2 Provides basic engineering knowledge and content that student can search more information by themselves.

5) Solving problem and develop training course in Session 1 to create project, lesson and warm up activities for bachelor's degree students in the lesson plan.

6) Analysis and evaluation of the research project. This research focus on the development of student skills according to lesson plan. The research results encourage community development. The tools used in this study are the learning report.

Collecting data: the researcher self-collected data to obtain empirical data.

Data analysis: the data were analyzed by frequency, percentage, mean and standard deviation.

Research result

Results of this study provided.

1. The results of the study on the skill level of engineering for students of the Faculty of Education program, Faculty of Education, Chiang-Rai Rajabhat University. The average skill level in engineering the overall score before the learning activity was 10.58 and the average level of skill in engineering was good. Once classified by individual find that before the learning activities. Students with the highest score were 12 points and 10 points, respectively. To analyze students' problems on the topic of engineering skills, it was found that students had the highest level of problems. The highest level of planning and development was 38.6%, followed by testing and evaluation. Presentation of results at 56.3%, the average level 40.0% of them identified issues and related searching concepts.

2. The result of the development of engineering skills using the project is base of the science students program, Faculty of Education, Chiang-Rai Rajabhat University.

2.1 There are 7 topics in students project are as follows: charcoal bark from pineapple husk herbs, chasing the ants mulberry from natural Mulberry Odor, absorber odor Pot for the world

2.2 The average of the engineering skills of the students in the group learning activities (overall) in total after the learning activity was higher than before the learning activity, with the percentage of progress being 37.57. By group after the learning activities (summed up), students with the highest

percentage of advancement were the 6th group of warriors, followed by group 7 students

2.3 The mean of the average of the engineering skills of the students before and after learning activities when classified as problem identification. It was found that the average of the engineering skills of the students, the learning activities, the quality of problem identification. Overall, after the learning activity (= 18), it was higher than before the learning activity (= 10). When classified by group find out after learning activities, which identifying problem-solving activities. The group with the highest percentage of advancement was the 3rd, 4th (50%) followed by students in the 2nd, 6th and 7th (40%).

2.4 The average of the engineering skills of the students before and after the learning activities classified by the quality of the search. It was found that the average of the engineering skills of the students, the learning activities, the classification, the quality of the search, the related concepts. Overall, after learning activities (= 17.86), higher than before learning activities (= 8.86). Find out after organizing learning activities. The group with the highest percentage of progression was the 1.4.7 (50%), followed by the sixth (45%).

2.5 Average engineering skills of students. Before and after learning activities classified by quality assessment in planning and development. It was found that the average of the engineering skills of the students, the learning activities, the classification, the quality of the planning and the development. Overall, after learning activities (= 16.42), higher than before learning activities (= 9.14) with a progressive percentage of 36.43. Planning and Development the group with the highest percentage of advancement was the 6th group students (50%), followed by the 1st students groups (45%).

2.6 Average engineering skills of students. Before and after learning activities, classified by quality, testing and evaluation. The average engineering skills of the students, the learning

activities, the quality of the tests, and the evaluation. Overall, the learning activity (= 16.71) was higher than before the learning activity (=10.86), with a breakthrough of 29.29. It was found that after the learning activities, students in the group with the highest percentage of advancement were the group of 6 (50%), followed by the third group (40%)

2.7 The average of the engineering skills of The students before and after the learning activities were classified by the quality of the presentation. It is found that the average skill of engineering students in the learning activities group, the quality of the presentation of the results. Overall, after the learning activity (= 18.29), higher than before the learning activity (= 10.86), there was a progression of 37.14. After the learning activity, you identified the results of the students with the highest percentage of advancement, including the 6th group (55%), followed by the seventh student groups (45%).

3. Comparison of engineering skills using student-based projects Faculty of Education, Chiang-Rai Rajabhat University

3.1 Engineering skills scores of students.

Before and after learning activities the average engineering skills of students before and after the activity were found. Overall, after the learning activities. Higher than before learning activities. There were 34.94 percent progression when classified by individual. Students with the highest percentage of progress are students number 3, 29, 43, 46, 55 (55%), followed by students number 19, 37, 47, 56, 63, 72. 50 (50%)

3.2 Comparison of average engineering skills of students before and after learning activities. The average engineering skills of students before and after learning activities were found. The mean scores of the students' post-learning activities were significantly different at 0.05 level. Higher than before learning activities.

3.3 Comparison an average engineering

Skills of students before and after learning activities. It was found that the average of engineering skills of

the students before and after the learning activities were statistically significant at the 0.05 level. The average score of engineering skills of the students after the learning activities. Higher than before learning activities.

3.4 Comparison an average engineering Skills of students before and after learning activities. It was found that the average of the engineering skills of the students before and after the learning activities, classified the quality of problem identification as a whole, was significantly different at the 0.05 level. After learning activities Higher than before learning activities.

3.5 Comparison an average engineering skills of students before and after learning activities, classification, and quality of search related concepts the average engineering skills of the students before and after learning activities were classified as follows. The overall score was statistically significant at 0.05. The mean scores of group research skills after learning activities Higher than before learning activities.

3.6 Comparison an average engineering. skills of students before and after learning activities, classification, quality of planning and development the average engineering skills of the students before and after learning activities were classified as follows. The overall score was statistically significant at the 0.05 level. The average score of engineering skills of the students after the learning activities. Higher than before learning activities.

3.7 Comparison an average of engineering skills for all students before and after learning activities, classification, quality, testing and evaluation. It was found that the average of the engineering skills of the students before and after the learning activities were classified by the quality of the test and evaluation. The overall score was statistically significant at 0.05. The mean scores of group research skills after learning activities Higher than before learning activities.

3.8 Comparison of the average of Engineering skills of the students before and after the learning activities. Classification, quality of presentation. The average engineering skills of the students before and after the learning activities were classified as follows: The overall score was statistically significant at the 0.05 level. The average score of engineering skills of the students after the learning activities. Higher than before learning activities.

The result of constructing the model of engineering skill development using student-based project. Faculty of Education, Chiang-Rai Rajabhat University while students work on developing knowledge, understanding, and practicing skills in science, math, and technology through project implementation. Learners must have the opportunity to apply knowledge, design methods or processes to meet requirements or solve problems in daily life. The engineering design process (NRC, 2012) is an engineering process that consists of six steps.

1) Identify problems to understand the problem or challenge. Analyze conditions or limitations of problem situations. To determine the extent of the problem. This will create assignment or solving problem.

2) Collecting information and concepts related to the problem. It gathers information and concepts in science, mathematics and technology related to problem solving and evaluation approaches. Pros and Cons

3) Design a solution. Application of information and concepts relevant to design of assignments or method to solve problems. Take into account the resources. Restrictions and conditions as prescribed.

4) Plan and implement solutions. Determine the sequence of the assignment or method. Then create a responsibility develop a solution to solve the problem.

5) Test, evaluate and correct the solution or problem. To test and evaluate the use of assignment or

method. The results may be used to improve and develop the most effective solution.

6) The solution report or assignments. In this study. The study found that the following can be discussed: Comparison Engineering skills using student-based projects. Program of Science, Faculty of Education, Chiang-Rai Rajabhat University before and after classes. There is a significant difference at .001 level. This may be because the project is an instructional program that allows learners to choose what they want to study. Set up a study or project that they are interested. Being self-study about one topic or more of the following: By learning more about the topic of the project, rather than searching the best answer from only teacher, project preparation is not often slit from the course. It should arrange activities in the integrating curriculum. Based on the scientific principles under the guidance, consultation and supervision of teachers in a systematic and process, planning thoroughly study and practice. To conclude or study results or answers. Students develop their engineering skills through learning activity. This is similar with Garrett (2007: 172) who explained that "those who are skilled in performing any activity and those who are capable of performing such activities". It has the ability to perform the task to accomplish it effectively, which it is not spending a lot of time. So who has skills, they will be accuracy and speed of action. There is consistent consistency in different behaviors.

Comparative the assessment engineering skills using student-based projects. Faculty of Education, Chiang-Rai Rajabhat University Group before and after learning activities. Classified by quality issues, quality related literature, quality planning and development, quality test and evaluation, quality presentation. The results showed that there was a statistically significant difference at .001 level. The learning process that the learner brings as a guideline for the operation. It is a process of learning that emphasizes the development of problem solving abilities by using the knowledge from training

course. [3] (136) Instructor guideline activities was provided students improves the skills as analytical study, summary information or create specifics knowledge to students such as searching information skills and reading analysis, synthesis summary information, presentation of information, discussion and academic debate and work in groups.

The students have practiced in the training course, that their engineering skills was developed. This theory are relevant to Simpson's the conceptual framework "Simpson (Instructional Model Based on Simpson's Processes for Psycho Motor Skill Development)" Simpson also said that "Skills are related to the physical development of the learner. It must interact with the feelings that occur. This skills can be developed with practice. If students have trained well and they will be accurate. Fluency Expertise and persistence the effect of behavior or action can be observed from the speed, precision, strength, and management. The process of teaching and learning of the model. [4] (227-247).

Collecting engineering skills information by using student-based projects. Faculty of Education, Chiang-Rai Rajabhat University the process thorough interviews revealed that students had the most problems about planning and developing. This is due to the development of skill-based engineering projects. The beginning with choosing appropriate concept to solve the problem, next step is to plan the implementation. The problem solver must be defined as a step-by-step process. Set up the goals and timelines for each step which are detailed and clear. The development phase involves the design and development of product result in problem solving. Akasin Limsuwan and teams (Faculty of Engineering) talk about management skills in the engineering profession. Management is critical to the success of a project, because good management helps to achieve the project's performance by achieving measurable performance and quality at every stage. Even the marketing study program engineering shows that it is a profitable project, but if you do not have a good

management and efficiency. The skills required for management such as management. There are the fulfillment of organizational objectives. Human resource management, financial management and material management.

Research Results Suggestions

Universities should have a policy that emphasizes these processes in teaching and learning in other subjects. The data indicate that:

1. Student should have a chance to learn and work with management teams in the university. The learning activities may be consists of planning and designing activities to achieve the objectives. Students will be able to manage their own problems in the future. This will reduce failure that may occur.

2. University must have guideline book provided accuracy examination and evaluation to students. They can study about the research.

Suggestions for next research.

1. Developing engineering indicator to achieve criteria for student development.

2. Creating administration skills in the curriculum that support planning skills and developing skills for student's assignments as much as possible.

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PID 02 Factors affecting the Effectiveness of the Government Fiscal Management Information System (GFMS) in The Royal Thai Arm Force

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Abstract — การวิจัยนี้มีวัตถุประสงค์ เพื่อศึกษาปัจจัยที่ส่งผลต่อประสิทธิผลระบบบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (GFMS) ของกองทัพไทย โดยใช้ระเบียบวิธีการวิจัยเชิงปริมาณ (Quantitative Research) โดยเก็บข้อมูลด้วยแบบสอบถามจากกลุ่มตัวอย่างบุคลากรกองทัพไทยที่ทำหน้าที่เกี่ยวข้องกับระบบ GFMS จำนวน 220 คน และวิเคราะห์ข้อมูลโดยใช้การวิเคราะห์การถดถอยแบบเชิงชั้น และการวิเคราะห์เนื้อหาผลการศึกษาพบว่า ปัจจัยที่มีอิทธิพลต่อประสิทธิผลของการใช้ระบบ GFMS คือ ปัจจัยด้านวัสดุอุปกรณ์ และด้านการบริหารจัดการ

คำสำคัญ : ประสิทธิภาพ, ระบบบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์, กองทัพไทย

บทนำ

รัฐบาลได้มีนโยบายปฏิรูประบบบริหารงานภาครัฐเข้าสู่รูปแบบรัฐบาลอิเล็กทรอนิกส์ (e-Government) เพื่อปรับปรุงการบริหารงานการคลังของภาครัฐให้มีประสิทธิภาพและประสิทธิผลปรับเปลี่ยนแนวทางการดำเนินงานให้มีความทันสมัยและมีประสิทธิภาพ โดยนำเทคโนโลยีสารสนเทศที่ทันสมัยมาประยุกต์ใช้เพื่อให้เป็นไปในทิศทางเดียวกับนโยบายการปฏิรูประบบราชการที่เน้นประสิทธิภาพและความคล่องตัวในการดำเนินงานด้วยการจัดทำโครงการปฏิรูประบบการบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (Government Fiscal Management Information System: GFMS) โดยให้มีการปรับเปลี่ยนระบบการบริหารอย่างคุ้มค่า และได้ข้อมูลสถานะทางการคลังของรัฐแบบถูกต้องรวดเร็วทันต่อการบริหารประเทศ โครงการดังกล่าวเริ่มใช้งานจริงเมื่อวันที่ 1 ตุลาคม 2547 โดยหน่วยงานยังต้องปฏิบัติงานตามระบบบัญชีแบบเดิมที่ทำด้วยมือ (Manual) คู่ขนานไปกับการปฏิบัติงานตามระบบการ

บริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (GFMS) ไปจนกว่าหน่วยงานจะมีความพร้อมจึงจะตัดการปฏิบัติงานแบบเดิมออกไป

โครงการปฏิรูประบบการบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (ระบบ GFMS) ประกอบด้วย 5 ระบบใหญ่ คือ (1) ระบบงบประมาณ (2) ระบบการเงินและบัญชี (3) ระบบจัดซื้อจัดจ้าง (4) ระบบการบัญชีต้นทุน และ (5) ระบบบริหารทรัพยากรบุคคล โดยระบบได้ออกแบบให้หน่วยงานในระดับหน่วยเบิกจ่ายสามารถทำงานร่วมกันในระบบเครือข่ายแบบรวมศูนย์คอมพิวเตอร์ที่ส่วนกลาง (Centralization) ซึ่งโครงสร้างของระบบงานในเบื้องต้นใช้สำหรับการปฏิบัติงาน 4 ระบบ คือ ระบบจัดซื้อจัดจ้าง ระบบรับและนำส่งเงินระบบเบิกจ่าย และระบบบัญชีแยกประเภท ซึ่งระบบเบิกจ่าย ระบบรับและนำส่งเงิน และระบบบัญชีแยกประเภทเป็นระบบย่อยของระบบการเงินและบัญชี โดยให้มีการเชื่อมโยงข้อมูลกันผ่านเครือข่ายอินเทอร์เน็ต ได้ 3 ช่องทาง คือ 1) หน่วยเบิกจ่ายที่มีการติดตั้งระบบปฏิบัติงานและได้รับจัดสรรเครื่องคอมพิวเตอร์พร้อมอุปกรณ์เครือข่าย (GFMS Terminal) จากสำนักงานกำกับและบริหารโครงการฯ ซึ่งได้แก่ กองคลังของแต่ละกรมในส่วนกลางและคลังจังหวัดหรือคลังอำเภอในส่วนภูมิภาคสามารถบันทึกข้อมูลผ่านเครื่อง GFMS Terminal จะต้องบันทึกข้อมูลผ่านโปรแกรม Excel Loader แล้วนำไป Upload เข้าระบบ GFMS ณ จุดที่มีเครื่อง Terminal และ 3) หน่วยงานที่มีระบบบัญชีของตนเองไม่ได้ใช้โปรแกรมของกรมบัญชีกลางจะได้รับเครื่อง Terminal เพื่อใช้สำหรับส่งข้อมูล Text File ที่ประมวลผลจากระบบบัญชีการเงินของตนเอง

มา Interface ในระบบ GFMS (กระทรวงการคลัง, 2560)

กองทัพไทยเป็นหน่วยงานสำคัญต่อความมั่นคงของประเทศชาติ การบริหารงานด้านการเงินการคลัง มีขั้นตอนการปฏิบัติงานที่ละเอียดอ่อน และต้องดำเนินการด้วยความถูกต้อง รวดเร็ว ทันตามกำหนดเวลา ภายใต้หลักเกณฑ์และระเบียบปฏิบัติของทางราชการ การบริหารงานจึงต้องมีความระมัดระวังรอบคอบ เพื่อมิให้เกิดผลเสียหาย กองทัพไทยตระหนักถึงความสำคัญของการใช้ระบบ และตระหนักถึงความจำเป็นในการพัฒนาศักยภาพของผู้ปฏิบัติหน้าที่ด้านการเงินการบัญชี ดังที่ได้มีการจัดโครงการฝึกอบรมเชิงปฏิบัติการ การจัดระบบการเงินตามกฎหมายและระเบียบกระทรวงการคลัง เพื่อเสริมสร้างความรู้ ความเข้าใจ ให้กับบุคลากรของกองทัพไทยเพื่อให้สามารถบริหารงานด้านการเงินภาครัฐของกองทัพไทยมีความโปร่งใส ตรวจสอบได้ และเกิดประโยชน์สูงสุดต่อทางราชการ

จากการตระหนักถึงความสำคัญของการใช้ระบบการบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (GFMS) ดังกล่าวข้างต้น ทำให้ผู้วิจัยมองเห็นความสำคัญของการศึกษาปัจจัยที่ส่งผลต่อประสิทธิผลของการใช้ระบบบริหารการเงินการคลังภาครัฐ ด้วยระบบอิเล็กทรอนิกส์ (GFMS) ของกองทัพไทย ทั้งนี้เพื่อนำผลการวิจัยเป็นแนวทางในการดำเนินงานการบริหารการเงินการคลังภาครัฐของกองทัพไทยให้ดียิ่งขึ้นต่อไป

วัตถุประสงค์

การวิจัยครั้งนี้มีวัตถุประสงค์ เพื่อศึกษาปัจจัยที่ส่งผลต่อประสิทธิผลระบบบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (GFMS) ของกองทัพไทย

วรรณกรรมที่เกี่ยวข้อง

ระบบการบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (Government Fiscal

Management Information System : GFMS) การปฏิรูประบบราชการเป็นนโยบายที่สำคัญของทุกรัฐบาล และการปฏิรูประบบบริหารการเงินการคลังภาครัฐเข้าสู่ระบบอิเล็กทรอนิกส์เป็นส่วนหนึ่งในนโยบายด้าน e-Government รัฐบาลได้มีนโยบายปรับเปลี่ยนและปฏิรูประบบการบริหารการเงินการคลังภาครัฐเข้าสู่ระบบอิเล็กทรอนิกส์ (ระบบ GFMS) โดยการนำระบบเทคโนโลยีสารสนเทศใช้ในการปรับปรุงกระบวนการดำเนินการและการจัดการภาครัฐ GFMS คือ โครงการเปลี่ยนระบบบริหารการเงินการคลังภาครัฐสู่ระบบอิเล็กทรอนิกส์ให้มีความทันสมัยและมีประสิทธิผลมากยิ่งขึ้น โดยการนำระบบเทคโนโลยีสารสนเทศมาใช้ เน้นความรวดเร็ว โปร่งใส และสามารถตรวจสอบได้ เพื่อให้ผู้บริหารสามารถใช้สารสนเทศที่ได้รับมากำหนดทิศทางการบริหารระบบเศรษฐกิจของประเทศได้อย่างมีประสิทธิภาพ โดยได้เปลี่ยนแปลงการปฏิบัติงานจากเดิมที่ใช้เอกสารเป็นหลักมาสู่ระบบอิเล็กทรอนิกส์ใน 5 ระบบงาน ได้แก่ 1) ระบบงานงบประมาณ 2) ระบบการเงิน 3) ระบบการจัดซื้อจัดจ้าง 4) ระบบการบัญชี ต้นทุน และ 5) ระบบการบริหารทรัพยากรบุคคล

ระบบ GFMS มีการบริหารจัดการแบบบูรณาการทางอิเล็กทรอนิกส์เป็นระบบครบวงจรและมีมาตรฐาน มีเครือข่ายรองรับระบบงานการเงินการคลังภาครัฐได้ทั้งระบบงบประมาณ ระบบเบิกจ่าย ระบบจัดซื้อจัดจ้าง ระบบบัญชี ระบบบริหารทรัพยากร และระบบบริหารการตรวจสอบและประเมินผล เพื่อให้เกิดความรวดเร็ว รัดกุม โปร่งใส ตรวจสอบได้ สารสนเทศที่ได้รับมีความถูกต้องแม่นยำยิ่งขึ้น เป็นการเสริมสร้างประสิทธิผลการบริหารงานการเงินการคลังภาครัฐ ขจัดปัญหาการแสวงหาผลประโยชน์อันมิชอบ ผู้บริหารแต่ละระดับ ได้แก่ นายกรัฐมนตรี รองนายกรัฐมนตรี ปลัดกระทรวง อธิบดี ผู้ว่าราชการจังหวัด ผู้บริหารด้านการเงิน มีสารสนเทศที่ใช้ในการตัดสินใจเชิงนโยบาย สามารถติดตามเป้าหมายการดำเนินงานของหน่วยงานภาครัฐแบบ Online Real-Time สามารถใช้สารสนเทศดังกล่าวในการปรับปรุง

ทิศทางเศรษฐกิจของประเทศได้อย่างมีเหตุมีผล โดยมีเป้าหมายสำคัญของโครงการ

ตัวชี้วัดประสิทธิผลของระบบ GFMIS (สำนักงานโครงการเปลี่ยนการบริหารการเงินการคลังภาครัฐสู่ระบบอิเล็กทรอนิกส์, 2547) ได้แก่

1. ความถูกต้องแม่นยำ การนำข้อมูลเข้าสู่ระบบ GFMIS ทำให้ผลลัพธ์ที่ได้ถูกต้องในทุกส่วนงาน สารสนเทศที่ได้รับจากระบบ GFMIS มีความชัดเจนถูกต้องและรัดกุม ข้อมูลและสารสนเทศที่ได้จากระบบ GFMIS เป็นเรื่องเดียวกัน แม้จะมาจากหลายแห่ง ช่วยควบคุมให้ส่วนราชการไม่ใช้หรือก่องหนผู้กักเงินยอกเงินที่ได้รับการจัดสรรอย่างถูกต้อง มีการกำหนดรหัสโครงสร้าง รหัสงบประมาณ และรหัสบัญชีเป็นรหัสกลางที่สอดคล้องกันและใช้ร่วมกันทุกส่วนราชการ สารสนเทศที่ได้ มีความถูกต้องแม่นยำและเชื่อถือได้ของผู้บริหาร

2. ความโปร่งใส มีการกำหนดมาตรฐานรหัสสินค้าและบริการภาครัฐ เพื่อใช้ในการกำหนดราคากลางของพัสดุ การวางแผนงบประมาณและการจัดซื้อจัดจ้าง ป้องกันการสร้างความสัมพันธ์ระหว่างเจ้าหน้าที่กับผู้ขาย ป้องกันการซื้อขายพัสดุราคาสูง ล้าสมัยและไม่ได้มาตรฐาน ปฏิบัติงานอย่างตรงไปตรงมา ทำให้ทราบกลางของพัสดุ เลือกลงในการจัดซื้อได้ โดยการนำราคามาเปรียบเทียบกัน

3. ความประหยัด ลดความซ้ำซ้อนของการจัดทำข้อมูล และรายงานด้านงบประมาณ บัญชีการเงิน การคลังและพัสดุ ลดการใช้แรงงานจำนวนมากโดยผลงานที่ออกมาเท่าเดิมหรือดีกว่าเดิม ลดขั้นตอนในการทำงานทำให้ลดระยะเวลาในการประสานงาน ลดเวลาในการจัดเตรียมเอกสาร ลดปริมาณเอกสารและสถานที่จัดเก็บของส่วนราชการ

4. ความรวดเร็วและทันต่อเหตุการณ์ สามารถติดตามและนำข้อมูลสารสนเทศมาใช้งานได้ทันที สารสนเทศที่ได้มีความสัมพันธ์กับสถานการณ์ปัจจุบัน และนำมาประยุกต์ใช้ได้อย่างเหมาะสม การเบิกจ่ายงบประมาณมีความรวดเร็วขึ้น ผู้บริหารสามารถติดตามเรียกดูและตรวจสอบงบประมาณที่

จัดสรรได้ตลอดเวลา รายงานที่ได้สนับสนุนการตัดสินใจที่กำลังทำในขณะนั้น

แนวคิดเกี่ยวกับประสิทธิผล

แนวคิดทฤษฎีปัจจัยการดำเนินงานแบบ 4 M's

ความหมายของปัจจัยการบริหาร คือองค์ประกอบทั้ง 4 ส่วนของการบริหาร ที่เป็นแรงขับเคลื่อนองค์การให้ก้าวต่อไป ให้มีผลผลิต ให้มีกำลังในการทำให้บริษัท เจริญเติบโต โดยทั่วไปแล้วจะมีหลักการเป็น 4 ประการคือ 1.) คนหรือบุคลากร (Man) 2.) เงินหรือเงินทุน (Money) 3.) วัสดุ หรือเครื่องจักร (Material or Machine) และ 4.) วิธีการปฏิบัติงาน (Management)

1. คนหรือบุคลากร (Man) การบริหารกำลังคน จะใช้คนอย่างไรให้เกิดประสิทธิภาพ และประสิทธิผลกับงานให้มากที่สุด

เม็กกินสัน (2538:4) กล่าวว่า “คนเป็นปัจจัยที่สำคัญที่สุดในการบริหาร ถึงแม้ว่าคุณค่าของคนจะเป็นสิ่งที่จับต้องไม่ได้ และไม่สามารถใช้หลักเกณฑ์กำหนดคุณค่าเช่นเดียวกับวัตถุหรือสินค้าอื่นได้ แต่ก็ยังถือว่าคนเป็นทรัพยากรทางเศรษฐกิจที่มีทั้งคุณค่าและเกียรติภูมิ”

รัตนารักษ์ แววกระโทก (2554) การบริหารบุคลากรมีค่าที่ใช้อยู่หลายค่า เช่น การบริหารงานบุคคล การจัดการงานบุคคล และการบริหารงานการเจ้าหน้าที่ เป็นต้น ซึ่งมีความหมายเดียวกันคือ การบริหารบุคลากร และมีผู้ให้ความหมายไว้ดังนี้

ภิญโญ สาธร (2523 : 5) กล่าวว่า การบริหารบุคลากรเป็นหัวใจ ของการบริหาร เพราะความสำเร็จของงานขึ้นอยู่กับคน บรรดาสิ่งก่อสร้าง อาคารสถานที่ วัสดุ ครุภัณฑ์ และเงิน แม้จะมีบริบูรณ์สักเพียงใด จะไม่มีความหมายเลย ถ้าคนที่ใช้สิ่งเหล่านี้ ไม่มีความสามารถเพียงพอที่จะใช้ หรือขาดขวัญและกำลังใจที่จะร่วมมือในการปฏิบัติงาน

ฟิรศักดิ์ โตคำวรพจน์ (2009) คน (Man) นับเป็นปัจจัยที่สำคัญที่สุด เพราะเป็นผู้ดำเนินการทุกอย่าง เป็นผู้คิด เป็นผู้กระทำ ต่างๆ งานจะสำเร็จ

หรือไม่ คนนับเป็นตัวแปรที่สำคัญ เพราะต่อให้มีเงินมากมาย มีอุปกรณ์พร้อม การจัดการที่ดี แต่ถ้าคน ไม่มีประสิทธิภาพ ไม่มีความรับผิดชอบ ขาดจิตสำนึก งานก็ล้มเหลว การใช้คนให้ถูกกับงานจึงเป็นเรื่องที่ควรคำนึงถึงมากๆ และบวกกับความรับผิดชอบ ความรู้ความสามารถมีแต่ขาดความรับผิดชอบ ก็ไม่ควรใช้คนแบบนี้

การจัดการทรัพยากรมนุษย์ มีความสำคัญเป็นอย่างมากสำหรับการบริหารองค์กร เพราะเป็นขั้นตอนที่ได้คัดเลือกบุคคลที่มีความรู้ความสามารถตรงกับตำแหน่งหน้าที่และเหมาะสมกับงาน ทำให้การทำงานมีคุณภาพผลงานที่ออกมาได้ทั้งประสิทธิภาพและประสิทธิผล การจัดการทรัพยากรมนุษย์ยังช่วยรักษาบุคลากรที่มีคุณภาพในการทำงานให้อยู่กับองค์กร โดยมีการพัฒนาจัดสวัสดิการให้กับพนักงาน มีการประเมินผลการทำงาน วิเคราะห์การทำงานเพื่อจัดสวัสดิการให้แก่บุคคลอย่างเหมาะสม

ทฤษฎีในการศึกษาประสิทธิผลองค์กร การนิยามประสิทธิผลเพียงมิติเดียวยังไม่เพียงพอว่า โรงเรียนหรือองค์กรมีประสิทธิผลหรือไม่ มีประสิทธิผล ยังขึ้นอยู่กับเกณฑ์ที่ถูกใช้ประเมินด้วยการจะบอกได้ว่าในเขตพื้นที่หนึ่งจะมีประสิทธิผลมากกว่าพื้นที่อื่นๆ หรือการจะใช้เกณฑ์ในการวัดประสิทธิผล เพื่อการวางแผนการเปลี่ยนแปลงองค์กร จำเป็นต้องมีรูปแบบทฤษฎีเป็นแนวในการประเมิน ซึ่ง ฮอย และมิสเกิล (Hoy & Migkel, 1991: 374-383) เสนอไว้เพื่อเป็นพื้นฐานในการทำงานให้มีประสิทธิผล ดังนี้

1. ประสิทธิผลองค์กรตามรูปแบบการบรรลุเป้าหมาย (Goal Model of Organizational Effectiveness) การให้นิยามของประสิทธิผลองค์กรโดยทั่วไปคือ ระดับของการบรรลุเป้าหมายขององค์กรไว้กว้างๆ ว่า “เป้าหมายขององค์กรเป็นภารกิจที่องค์กรพยายามทำให้บรรลุผล” องค์กรหนึ่งจะมีประสิทธิผลถ้าผลผลิตสุดท้ายบรรลุผลหรือบรรลุเป้าหมายขององค์กรมากกว่าประสิทธิผลองค์กรใน

รูปแบบของการบรรลุเป้าหมาย จะมีความแตกต่างกันของเป้าหมายในเชิงปฏิบัติการและเป้าหมายในเชิงหลักการ

2. ประสิทธิผลองค์กรตามรูปแบบระบบทรัพยากร (System Resource Model of Organizational Effectiveness) การให้คำนิยามประสิทธิผลองค์กรตามรูปแบบระบบทรัพยากร หมายถึง ความสามารถขององค์กรที่จะพิทักษ์ผลประโยชน์ขององค์กรตามสถานะแวดล้อมเป็นอยู่ และการลงทุนเพื่อให้ได้มาซึ่งทรัพยากรที่มีค่าและทรัพยากรที่ขาดแคลน ซึ่งเป็นเป้าหมายสุดท้ายของเกณฑ์ประสิทธิผล

นอกจากนี้ การนิยามประสิทธิผลยังเน้นความสำคัญของกระบวนการที่ต่อเนื่องของการแลกเปลี่ยน การแข่งขันเพื่อให้ได้มาซึ่งทรัพยากรที่ขาดแคลนและมีค่าตามรูปแบบระบบทรัพยากร โรงเรียนที่มีประสิทธิภาพมากจะทำให้เกิดความสำเร็จเติบโตโดยการทำผลประโยชน์กับผู้ปกครองและนักเรียนหรือผู้ออกกฎหมาย ดังนั้น เกณฑ์การวัดประสิทธิผลจะกลายเป็นความสามารถที่จะได้มาซึ่งทรัพยากรขององค์กร

3. ประสิทธิผลองค์กรตามการบูรณาการรูปแบบการบรรลุเป้าหมายและรูปแบบระบบทรัพยากร (An Integrated Goal and System Resource Model of Organizational Effectiveness) มีข้อตกลงเบื้องต้นที่สำคัญร่วมกันอย่างหนึ่งของทั้งรูปแบบการบรรลุเป้าหมายและรูปแบบระบบทรัพยากร คือความเป็นไปได้และเป็นสิ่งที่พึงปรารถนาที่จะนำไปสู่เกณฑ์การประเมิน 1 ชุด และนั่นก็เป็นประสิทธิผลองค์กรในรูปแบบการบรรลุเป้าหมาย ประสิทธิผลองค์กรดูจากการบรรลุวัตถุประสงค์หรือเป้าหมาย มีการจัดการกระทำกับสิ่งอำนวยความสะดวกทางกายภาพนักเรียน บุคลากร เทคโนโลยี และวัตถุอื่น ๆ เช่น เงิน เพื่อให้แลกเปลี่ยนกับทรัพยากรอื่นๆ ส่วนรูปแบบทรัพยากรเป็นระบบเปิดให้ความสำคัญเกี่ยวกับความกลมกลืน (Harmony) ขององค์ประกอบต่าง ๆ ในองค์กร ความสามารถในการปรับตัวเข้ากับสิ่งแวดล้อม และการใช้ภาวะผู้นำอย่างเหมาะสมใน

การบริหาร การตัดสินใจ การสื่อสารการกระตุ้นให้เกิดแรงจูงใจ และการนำบุคลากรในองค์กร

นักวิชาการที่ศึกษาประสิทธิภาพขององค์กรในยุคใหม่ ๆ เช่น ทริโบเดอซ์ และฟาวิลลา (Thibodeaux & Favilla, 1996: 1-2) ได้รวบรวมโมเดลสำหรับการศึกษาประสิทธิภาพขององค์กรไว้ 5 โมเดล เช่นเดียวกันแต่มีความแตกต่างในรายละเอียดของการศึกษาในบางประเด็น โดยมีรายละเอียดของแต่ละโมเดล ดังนี้คือ

1. โมเดลที่ให้ความสำคัญกับเป้าหมาย (Goal Model) เป็นโมเดลที่ให้ความสำคัญกับความสำเร็จตามเป้าหมายที่องค์กรตั้งไว้ โมเดลนี้เป็นการประเมินประสิทธิภาพขององค์กรในยุคแรก ๆ ของการศึกษา คือ ประมาณในช่วงทศวรรษที่ 30 แต่ก็ยังนำมาใช้กันอย่างแพร่หลาย จวบจนปัจจุบัน โมเดลนี้เน้นการบรรลุเป้าหมายขององค์กร มองลำดับความสำคัญของเป้าหมายมากกว่าวิธีการ ดังนั้นในโมเดลนี้ การกำหนดเป้าหมายจะมีความสำคัญมาก ซึ่งการกำหนดเป้าหมายผู้บริหารจะต้องมีการคำนึงถึงสภาพแวดล้อมทั้งภายในและภายนอกองค์กร จะต้องกำหนดเป้าหมายไว้หลายประการ และให้นำหนักความสำคัญของแต่ละเป้าหมาย เป้าหมายที่กำหนดขึ้นก็เป็นแนวทางในการดำเนินการขององค์กร การประเมินประสิทธิภาพตามแนวคิดนี้ จะประเมินเป้าหมายในเชิงปฏิบัติมากกว่าเป้าหมายที่เป็นทางการซึ่งมีลักษณะเป็นนามธรรมและวัดได้ยาก โมเดลนี้จึงเหมาะสำหรับองค์กรที่มีเป้าหมายการดำเนินการที่ชัดเจน

2. โมเดลที่ให้ความสำคัญกับระเบียบ (Legitimacy Model) เป็นโมเดลที่ให้ความสำคัญกับเนื้อหาการสัดส่วนประกอบของงานและการจัดการสิ่งแวดล้อมเพื่อการปฏิบัติงานขององค์กร

3. โมเดลที่ให้ความสำคัญกับกระบวนการ (Process Model) โมเดลนี้ให้ความสำคัญกับกระบวนการการดำเนินงานขององค์กร ซึ่งประกอบด้วยระยะกิจกรรมการดำเนินการ ระยะการกำหนดกิจกรรม ระยะหาความจำเป็นที่ต้องประเมิน

ระยะการสำรวจเป้าหมาย ระยะการพัฒนาเกณฑ์การประเมิน ระยะการออกแบบประเมินผล และระยะการใช้เครื่องมือประเมินและการวิเคราะห์ข้อมูล

4. โมเดล ที่ให้ความสำคัญกับกลุ่มผลประโยชน์หรือกลุ่มบุคคล (Constituency Model) โมเดลนี้ให้ความสำคัญกับการใช้ประโยชน์จากการประเมินองค์ประกอบต่าง ๆ ซึ่งเกี่ยวข้องกับการประเมินองค์การ ให้ความสำคัญกับเกณฑ์การประเมินมาก โมเดลนี้จัดอยู่ในกลุ่มโมเดลเชิงกลยุทธ์-กลุ่มบุคคล

5. โมเดลที่ให้ความสำคัญกับทรัพยากรเชิงระบบ (System Resource Model) หรือกลุ่มโมเดลที่เน้นระบบทรัพยากรตามการแบ่งของ คาเมรอน โมเดลนี้เป็นรูปแบบที่ได้รับการพัฒนาขึ้นมาในยุคที่สองของการศึกษาเกี่ยวกับประสิทธิภาพขององค์กร คือ ในช่วง ค.ศ. 1950 และถูกนำมาใช้ในงานวิจัยเกี่ยวกับองค์กรอย่างแพร่หลายในระหว่าง ค.ศ. ที่ 1960-1970 พื้นฐานของแนวคิดนี้อยู่บนทฤษฎีแบบระบบเปิด (Open Theory) กล่าวคือ องค์กรถือเป็นระบบเปิดซึ่งต้องมีกระบวนการเปลี่ยนแปลงทรัพยากร เพื่อให้ได้ผลผลิตโดยที่องค์กรต้องรักษาความสมดุลและความมั่นคงขององค์กร ในโมเดลนี้ มุ่งเน้นที่เกณฑ์ใด ๆ ที่ช่วยให้องค์กรสามารถดำเนินงานได้อย่างต่อเนื่องในระยะยาว เน้นการมีปฏิสัมพันธ์ระหว่างองค์กรกับสิ่งแวดล้อมภายนอกองค์กร มองเห็นความสำคัญของตัวทรัพยากรและความสามารถขององค์กรที่จะนำมาซึ่งทรัพยากรที่จำเป็นต่อองค์กรการศึกษา ในโมเดลนี้จะเน้นและให้ความสำคัญกับวิธีการที่จำเป็นจะทำให้เป้าหมายขององค์กรบรรลุความสำเร็จและพิจารณาในระยะยาว

วิธีดำเนินการวิจัย

ประชากรและกลุ่มตัวอย่าง

ประชากร (Population): เป็นบุคลากรจากกองทัพไทยที่ทำหน้าที่เกี่ยวข้องกับระบบบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (GFMS) ของ

กองทัพไทย ทั้งในระดับผู้บริหารและระดับปฏิบัติการ ซึ่งมีจำนวนบุคลากรทั้งสิ้น 456 คน

กลุ่มตัวอย่าง (Sample) : เป็นบุคลากรจากกองทัพไทยที่ทำหน้าที่เกี่ยวข้องกับระบบบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (GFMS) ของกองทัพไทย ทั้งในระดับผู้บริหารและระดับปฏิบัติการที่ถูกสุ่มมาเป็นตัวอย่าง หายขนาดของกลุ่มตัวอย่างโดยการอ่านค่าจากตารางของ เครจซีและมอร์แกน (Krejcie and Morgan, 1970) ได้จำนวนตัวอย่าง 222 คน

วิธีการสุ่มตัวอย่าง (Sampling Technique) : สุ่มตัวอย่างด้วยวิธีการสุ่มแบบชั้นภูมิ (Stratified Sampling) โดยให้ประเภทของเหล่าทัพแทนชั้นภูมิในการสุ่ม สุ่มตัวอย่างจากทุกชั้นภูมิ หรือในที่นี้คือสุ่มจากทั้ง 3 เหล่าทัพ จากนั้นจึงกำหนดจำนวนบุคลากรที่จะสุ่มตัวอย่างจากแต่ละเหล่าทัพ ด้วยวิธี Proportional to Size

เครื่องมือที่ใช้ในการวิจัย

เครื่องมือที่ใช้ในการวิจัยเป็นแบบสอบถามที่ให้นักบุคลากรในกลุ่มตัวอย่างตอบด้วยตนเอง โดยแบบสอบถามมี 5 ตอนดังนี้

ตอนที่ 1 แบบสอบถามเกี่ยวกับข้อมูลส่วนตัว ได้แก่ หน่วยงาน เพศ อายุ ระดับการศึกษาสูงสุด สถานภาพการทำงาน อายุราชการ ตำแหน่งงาน ปัจจุบัน การได้รับความรู้เกี่ยวกับระบบ GFMS และระดับของการปฏิบัติงาน

ตอนที่ 2 แบบสอบถามเกี่ยวกับปัจจัยที่มีผลต่อประสิทธิผลของการใช้ระบบการบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (GFMS) ของกองทัพไทย ประกอบด้วยปัจจัยในด้านต่าง ๆ ดังนี้

- 1) ด้านเศรษฐกิจ
- 2) ด้านสังคม
- 3) ด้านบริหารราชการแผ่นดิน
- 4) ด้านการเมือง

แบบสอบถามตอนที่ 2 เป็นแบบสอบถามแบบประมาณค่า 5 ระดับ (5 points rating scale)

ตรวจสอบคุณภาพแบบสอบถามด้วยการประเมินค่าความตรงเชิงเนื้อหา (Content validity) โดยผู้ทรงคุณวุฒิ 5 คน ผลการตรวจสอบจากพบว่าแบบสอบถามมีค่าดัชนีความสอดคล้องหรือค่า IOC (Index of item objective congruence) เกิน 0.5 ทุกข้อคำถาม ซึ่งถือว่าอยู่ในเกณฑ์ที่ยอมรับได้ จากนั้นจึงนำไปตรวจสอบความความเที่ยง (reliability) โดยการนำแบบสอบถามไปทดลองใช้ (try out) กับบุคลากรจำนวน 30 คน ในหน่วยงานที่มีลักษณะใกล้เคียงกับกลุ่มตัวอย่าง และนำแบบสอบถามมาวิเคราะห์หาค่าความเที่ยง โดยใช้ค่าสัมประสิทธิ์ความเที่ยงของครอนบาค Cronbach alpha coefficient) พบว่าแบบสอบถามแต่ละองค์ประกอบมีค่าสัมประสิทธิ์ความเที่ยงของครอนบาคอยู่ระหว่าง 0.869 - 0.971 แสดงว่าแบบสอบถามมีค่าความเที่ยงอยู่ในเกณฑ์ที่ยอมรับได้ ทุกองค์ประกอบ เนื่องจากเกณฑ์การพิจารณาค่าความเที่ยงที่ใช้ได้ควรมีค่าไม่ต่ำกว่า 0.7 (ศิริชัย กาญจนวาสี, 2545) จากนั้นจึงนำแบบสอบถามไปใช้เก็บรวบรวมข้อมูลกับกลุ่มตัวอย่างจริง

การวิเคราะห์ข้อมูล

ก) ใช้สถิติเชิงบรรยาย (Descriptive Statistics) เพื่อบรรยายลักษณะทางประชากรศาสตร์ของบุคลากรในกลุ่มตัวอย่าง บรรยายตัวแปรปัจจัยที่มีอิทธิพลต่อประสิทธิผลของการใช้ระบบการบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (GFMS) ของกองทัพไทย และประสิทธิผลของการใช้ระบบการบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (GFMS) ของกองทัพไทย สถิติที่ใช้ ได้แก่ ค่าร้อยละ ค่าเฉลี่ย และส่วนเบี่ยงเบนมาตรฐาน

ข) ใช้สถิติเชิงอ้างอิง (Inferential Statistics) ใช้การวิเคราะห์การถดถอยพหุแบบเชิงชั้น (Heirarchical Multiple Regression Analysis) เพื่อทดสอบสมมติฐานว่าปัจจัยใดบ้างที่มีอิทธิพลต่อประสิทธิผลของการใช้ระบบการบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (GFMS) ของกองทัพไทย

วิเคราะห์ข้อมูลด้วยโปรแกรมสำเร็จรูปทางสถิติ

ผลการวิจัย

จากการวิเคราะห์ข้อมูลพบว่า บุคลากรในกลุ่มตัวอย่างเป็นบุคลากรในกองทัพบก ร้อยละ 48.6 นอกจากนี้ เป็นบุคลากรจากกองทัพเรือ และกองทัพอากาศในจำนวนที่ใกล้เคียงกัน เป็นเพศหญิงมากกว่าเพศชาย (เพศหญิง ร้อยละ 62.7 เพศชาย ร้อยละ 37.3) ส่วนใหญ่เป็นผู้ที่มีอายุ 30 – 40 ปี (ร้อยละ 42.3) ส่วนใหญ่จบการศึกษาในระดับปริญญาตรี (ร้อยละ 69.5) โดยกลุ่มตัวอย่างเป็นผู้ที่ทำหน้าที่เกี่ยวข้องกับการใช้ระบบ GFMIS ซึ่งประมาณครึ่งหนึ่งของกลุ่มตัวอย่าง (ร้อยละ 53.2) เป็นผู้ที่มีตำแหน่งงานเป็นเจ้าพนักงานการเงินและบัญชี ที่เหลือเป็นผู้ที่มีตำแหน่งงานอื่น เช่น เจ้าพนักงานธุรการ นักวิชาการเงินและบัญชี และนักวิชาการพัสดุ กลุ่มตัวอย่าง ร้อยละ 70.7 เคยได้รับความรู้เกี่ยวกับระบบ GFMIS จากการอบรมสัมมนามาก่อนที่จะมาปฏิบัติงาน

การวิเคราะห์ปัจจัยที่มีอิทธิพลต่อประสิทธิภาพของการใช้ระบบ GFMIS ของกองทัพไทย จากการวิเคราะห์การถดถอยพหุแบบเชิงชั้น (Heirarchical Multiple Regression Analysis) เพื่อทดสอบว่า ปัจจัยใดบ้างที่มีอิทธิพลต่อประสิทธิภาพของการใช้ระบบการบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (GFMIS) ของกองทัพไทย โดยมีตัวแปรที่เกี่ยวข้องดังนี้

ตัวแปรตาม คือ ประสิทธิภาพของการใช้ระบบการบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (GFMIS) ของกองทัพไทย

ตัวแปรอิสระ ได้แก่ ปัจจัยที่มีผลต่อประสิทธิภาพของการใช้ระบบ GFMIS ประกอบด้วย

- ปัจจัยด้านบุคลากร
- ปัจจัยด้านงบประมาณ
- ปัจจัยด้านวัสดุอุปกรณ์
- ปัจจัยด้านการจัดการ

เพื่อศึกษาว่า ตัวแปรอิสระในลำดับต่าง ๆ ข้างต้นมีอิทธิพลต่อตัวแปรตามประสิทธิภาพของการใช้ระบบ GFMIS อย่างไร เมื่อมีการเพิ่มกลุ่มย่อยของตัวแปรอิสระลงในสมการถดถอย ตัวแปรอิสระที่เพิ่มเข้าไบนั้นมีอิทธิพลต่อค่าความแปรผันของตัวแปรตามประสิทธิภาพของการใช้ระบบ GFMIS มากน้อยเพียงไร ผลการวิเคราะห์ข้อมูลแสดงดังตาราง

จากรายการผลการวิเคราะห์การถดถอยแบบเชิงชั้นประสิทธิภาพของการใช้ระบบการบริหารการเงินการคลังภาครัฐด้วยระบบอิเล็กทรอนิกส์ (GFMIS) ของกองทัพไทย ที่ระดับนัยสำคัญ 0.05 ตาม Model 1 พบว่า ปัจจัยภายในที่มีอิทธิพลต่อประสิทธิภาพประสิทธิภาพของการใช้ระบบ GFMIS ได้แก่ ปัจจัยด้านวัสดุอุปกรณ์ และปัจจัยด้านการจัดการ โดยปัจจัยด้านการจัดการ มีอิทธิพลต่อประสิทธิภาพของการใช้ระบบ GFMIS มากกว่าปัจจัยด้านวัสดุอุปกรณ์ ด้วยค่าสัมประสิทธิ์การถดถอยมาตรฐาน ($\beta = 0.449$, sig = 0.000) ปัจจัยภายในด้านบุคลากรและด้านงบประมาณ ไม่มีอิทธิพลต่อประสิทธิภาพของการใช้ระบบ GFMIS ทั้งนี้ ตัวแปรอิสระกลุ่มปัจจัยภายในสามารถอธิบายความผันแปรของตัวแปรตามประสิทธิภาพของการใช้ระบบ GFMIS ได้ร้อยละ 48.0

กล่าวโดยสรุปคือ ปัจจัยที่มีอิทธิพลต่อประสิทธิภาพของการใช้ระบบ GFMIS ของกองทัพไทย คือ ปัจจัยด้านวัสดุอุปกรณ์ (หน่วยงานมีคอมพิวเตอร์ที่ติดตั้ง Software พร้อมใช้งาน) และด้านการบริหารจัดการ (หน่วยงานมีการกำหนดภารกิจขององค์กรเพื่อสนับสนุนการดำเนินงานของระบบ GFMIS ไว้ชัดเจน มีคำสั่งแต่งตั้งคณะทำงานรับผิดชอบระบบ GFMIS และมีการกำหนดสายการบังคับบัญชาไว้ในโครงสร้างของระบบ GFMIS อย่างชัดเจน) สำหรับปัจจัยภายนอกที่มีอิทธิพลต่อประสิทธิภาพของการใช้ระบบ GFMIS ประกอบด้วย ปัจจัยด้านการเมือง (GFMIS ช่วยนำนโยบายของฝ่ายการเมืองหรือรัฐบาลไปสู่การปฏิบัติได้จริงตามวัตถุประสงค์) และด้านบริหารราชการแผ่นดิน

(GFMS ช่วยให้การบริหารจัดการภาครัฐเป็นไปด้วยความถูกต้อง โปร่งใส ตรวจสอบได้, GFMS เป็นระบบที่ช่วยให้ข้าราชการฝ่ายการเมืองหรือรัฐบาลใช้บริหารหรือควบคุมกำกับข้าราชการประจำเพื่อให้มีการเบิกจ่ายงบประมาณเป็นไปตามนโยบาย)

อภิปรายผล

1. จากผลการศึกษาพบว่า ปัจจัยภายในที่มีอิทธิพลต่อประสิทธิผลของการใช้ระบบ GFMS คือ ปัจจัยด้านวัสดุอุปกรณ์ หมายถึง การวัสดุอุปกรณ์ เช่น มีคอมพิวเตอร์ที่ติดตั้ง Software พร้อมใช้งาน จะทำให้การใช้ระบบ GFMS ของกองทัพไทยมีประสิทธิผลมากขึ้น ซึ่ง สอดคล้องกับผลการศึกษาของ นพวรรณ นาคะ และคณะ (2555) ที่ศึกษาปัจจัยภายในที่มีอิทธิพลต่อประสิทธิผลของการนำระบบ GFMS มาใช้ในกรมทางหลวง พบว่า ความเหมาะสมของระบบเทคโนโลยีที่นำมาใช้ มีส่วนในการสนับสนุนการใช้ระบบ GFMS ให้เกิดประสิทธิผลมากขึ้น

จากผลการศึกษาพบว่า ปัจจัยภายในที่มีอิทธิพลต่อประสิทธิผลของการใช้ระบบ GFMS คือ ปัจจัยด้านการบริหารจัดการ กล่าวคือ หน่วยงานมีการกำหนดภารกิจขององค์กรเพื่อสนับสนุนการดำเนินงานของระบบ GFMS ไว้ชัดเจน มีคำสั่งแต่งตั้งคณะทำงานรับผิดชอบระบบ GFMS และมีการกำหนดสายการบังคับบัญชาไว้ในโครงสร้างของระบบ GFMS อย่างชัดเจน สอดคล้องกับผลการศึกษาของ นพวรรณ นาคะ และคณะ (2555) ที่ศึกษาประสิทธิผลของการนำระบบ GFMS มาใช้ในกรมทางหลวง พบว่า การอำนวยความสะดวก การบริหารจัดการใช้ระบบ GFMS ที่ดี มีผลช่วยเพิ่มประสิทธิผลของการใช้ระบบ GFMS และสอดคล้องกับผลการศึกษาของ นิภาพร มนชม ธนสุวิทย์ และคณะ (2559) ที่ศึกษา การใช้ระบบบริหารการเงินการคลังภาครัฐแบบอิเล็กทรอนิกส์ (GFMS) ของหน่วยงานที่เบิกจ่ายเงินกับสำนักงานคลังจังหวัดระนอง พบว่า ปัจจัยด้านแรงสนับสนุนจากองค์กร หรือหน่วยงาน

ของผู้ปฏิบัติงานด้านบัญชี มีผลต่อประสิทธิภาพในการปฏิบัติงานด้านบัญชีด้วยระบบ GFMS ในสำนักงานคลังจังหวัดระนอง

ข้อเสนอแนะ

1. เนื่องจาก ปัจจัยภายในที่มีอิทธิพลต่อประสิทธิผลของการใช้ระบบ GFMS คือปัจจัยด้านวัสดุอุปกรณ์ ซึ่งหมายถึง ระบบคอมพิวเตอร์ ทั้ง Hardware และ Software พร้อมใช้งานกับระบบ GFMS ดังนั้นเพื่อสนับสนุนการใช้งานระบบ ให้เกิดประสิทธิภาพยิ่งขึ้น กองทัพอากาศควรปรับปรุงอุปกรณ์ระบบคอมพิวเตอร์ ทั้ง Hardware และ Software ให้ทันสมัยอยู่เสมอ

ปัจจัยด้านการบริหารจัดการมีอิทธิพลต่อประสิทธิผลของการใช้ระบบ GFMS ดังนั้น กองทัพอากาศควรมีการประชุมเพื่อวางแผนงานร่วมกันทั้งผู้บริหารและผู้ปฏิบัติการที่เกี่ยวข้องกับระบบ เพื่อให้แผนงานการบริหารจัดการเป็นไปในทิศทางเดียวกัน ซึ่งจะส่งผลให้การใช้ระบบ GFMS ของกองทัพไทยมีประสิทธิผลมากขึ้น

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PID 03 Problems and Needs Analysis in English Use of Staff at the International Airports in the South of Thailand

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Abstract — Having been a member of ASEAN of Thailand in 2015 results in the increasing communication among ASEAN countries because people in these countries have to communicate and exchange information regarding investment, business, and technology (Onwimon, 2012). The cooperation among ASEAN countries helps create a stronger and more reliable power of the ASEAN members in the world stage. Thailand as one of the ASEAN members also gains benefits in international trade, especially international tourism. Each year more and more foreign tourists come to Thailand; therefore, it is necessary for Thai people to use foreign languages for communication. Among those languages, English is important since it is the language of the ASEAN countries. Although Thai people realize on the importance of English, they fail to use it effectively for their communication (Ministry of Tourism & Sports, 2017). The 2016 record by EF Education First showed that Thai people's English proficiency is very low as ranked at No.56 out of 72 countries. Furthermore, the latest survey in September 2017 revealed that Thai people possess a very low English proficiency with the 53rd rank from the total of 80 (ef-denmark.dk, 2017). This English deficiency leads to an ineffective communication. Additionally, English becomes more important because it has been set by International Civil Aviation Organization (ICAO) as the main language for communication among airports

all over the world. Clark (2017) also points out that the English ability of non-English aviators and air traffic controllers is lower than the standard defined by ICAO. Therefore, inadequate English proficiency can cause air traffic mistakes. Barkhordari and Chalak

(2017) also propose that English is a very important medium between airport staff and foreign passengers. While airport staff working in the customer service department at Iran airport need English speaking and listening for their communication with foreign passengers, those working in the baggage department have to read and write a report in English. Likewise, Cahayani and Draji's (2017) stated that airport staff in Indonesia need English in communicating with passengers in order to help them check-in or find the lost stuff. Despite the needs in using English for working, it was found that the staff of the airports had difficulties in using English in communication, especially speaking and listening skills. Pitakpongpan's (2016) reported that the ground staff working at Phuket International Airport encountered speaking and listening problems when communicating with passengers. Similarly, Uraipan 's (2011) study revealed that different accents from passengers caused listening problems for Thai Airways' flight attendants. Nevertheless, considering the number of studies in English usage of the international airport staff in terms of problems, needs and wants in improving English skills, there seems to be a very limited number of studies concerning international airport staff's problems and needs in English use conducted in Thailand. Hence, it is necessary to analyze their needs and problems in using English as the results will provide essential information for creating the right content for in-service training course in order to increase the capacity of staff at the international airports so that they can communicate with foreign passengers efficiently in their workplace.

II. LITERATURE REVIEW

A. Needs and Needs Analysis

Needs is the ability to comprehend and/or produce the linguistic features of the target situation. In addition, needs can be referred to as wants and preferences or expected requirements for the future. (Dudley-Evans & St. John, 1998; Hutchinson & Waters, 1987). Needs are divided into target needs and learning needs. Target needs are what the learners need to do in the target situation. Learning needs are what the learner needs to do in order to learn. "Needs are divided into two parts: target needs and learning needs: target needs refer to what the learners need to do in a target situation and learning needs refer to what the learners need to do in order to learn." (Hutchinson and Waters, 1987). Moreover, target needs, which in practice contain a number of important distinctions, can be categorized into three parts: necessities, lacks and wants.

- Necessities (also called 'objective needs') are the type of needs determined by the demands of the target situation. Necessities are the language that a person has to know in order to work proficiently in a target situation.
- A Lack is the gap between the target proficiency and the existing proficiency of the learners (what the learners know already).
- Wants (Also called 'Subjective Needs') are a learner's awareness of their needs".

Dudley-Evans and St. John (1998) offered concepts of needs analysis in many aspects. However, for this study, all points presented below are related to needs analysis of staff.

A. Professional information about the learners: the tasks and activities learners are/will be using English for – *target situation analysis* and *objective needs* B. Personal information about the learners: factors which may affect the way they learn, such as previous learning experiences, cultural information, reasons for attending and expectations of a course, and attitude toward English – *wants, means, subjective needs*

C. English language information about the learners: what their current skills and language usage are – *present situation analysis* – which allows us to assess

D. The learners' lacks: the gap between (C) and (A) – *lacks*

E. Language learning information: effective ways of learning the skills and language in (D) – *learning needs*

F. Professional Communication Information about (A): Knowledge of how language and skills are used in the target situation - Linguistic analysis, discourse analysis, genre analysis. According to Nunan (1988), in language program planning or any language curriculum development, needs analysis serves three main purposes. Firstly, it provides a mechanism for obtaining a wider range of input into the content, design, and implementation of a language program through involving such people as learners, administrators, and staff in the planning process. Secondly, it identifies general or specific language needs that can be addressed in developing goals, objectives, and the content for a language program. Lastly, it provides data that can serve as the basis for reviewing and evaluating an existing program. He also stated that the aim of needs analysis is to know learners as people, as language users and as language learners; to know how language learning and skills learning can be maximized for a given learner group; and finally to know the target situations and learning environment so that we can interpret data appropriately. Hence, the needs and needs analysis theories were applied to the benefit of this research.

B. Related Studies

Chalak and Barkhordari (2017) examined English skills used in workplace of Iran Air airport services personnel at Isfahan Airport, the level of basic language skills in performing jobs, and their attitude toward English professional course. The results indicated that English language is highly used in staff's job. Plus, speaking is the most important skill for the Ramp Control; and Baggage Services staff

while reading and writing are the most important skills for Baggage Services staff.

Pitakpongpan (2016) investigated the needs of four English skills of 30 AirAsia ground staff at Phuket International Airport. The research instruments consisted a questionnaire and an interview. The study revealed that the ground staff considered speaking skill as the most important one followed by listening skill, reading skill and writing skill, respectively. They could performed speaking skill better than other skills. Limprasert&Witthawassamrankul (2016) studied English communication problems between passengers and flight attendants. He stated that speaking and listening were the most important skills for the career. In addition, accents and pronunciation were considered to be the essential problems among flight attendants as pronunciation is the basic of listening skill and this skill has often been neglected in general English teaching in Thailand.

Cahyani and Drajadi (2017) conducted a research on English communication problems and needs from social engagement perspective as experienced by airport passenger-handlers. Questionnaire and semi-structured interview were the research instruments. The results indicated that listening and speaking were the problems faced by the passenger-handlers in English oral communication. Moreover, the staff need to gain more knowledge about aviation vocabulary, general basic English, and job procedures.

Koparan (2018) analyzed the needs of the 40 Civil Aviation Cabin Services students who are working in the aviation industry in terms of vocabulary used in an aircraft and daily life. The research instruments were needs assessment scale and focus-group interview. It was not a problem for students to find appropriate vocabulary in communication; however, they encountered problems in using specialized vocabulary for specific purposes. In addition, speaking and reading difficulties were caused by the lack of confidence when using unknown words.

III. RESEARCH METHODOLOGY

This study was a survey study and was carried out at four international airports in the south of Thailand: Krabi, Phuket, Hatyai and Surat Thani. Only staff who have chances to communicate in English with passengers were selected as the participants of this research. The research method that used in this research were a combination of quantitative and qualitative methods.

A. Participants

By means of purposive sampling, 200 airport staff from the four international airports in the south of Thailand: Krabi, Phuket, Hatyai and Surat Thani participated as subjects of the study

B. Research instruments

A questionnaire consisting of four parts as follows:

Part 1 aimed to ask about personal information, such as gender, age, education level, workplace, duration of work, English usage and English ability.

Part 2 was related to airport staff's attitude toward problems in using English at work. There were seven Likert's scale items which required participants to rate: 5 = the highest, 4 = high, 3=moderate, 2=low and 1=the lowest. There were also 4 open-ended items which allowed participants to fully express their opinions about problems in listening, speaking, reading and writing in English.

Part 3 contained six Likert's scale items which inquired about participants' attitude toward their need in using the four skills of English at work. The questions in this part were divided into two main categories: the importance of English at work and the ability to use each skill of English for further comparison to obtain information about how important English was for them at their workplace.

Part 4 had 10 questions, six of which were multiple-choice aiming to get information about the participants' needs in improving English usage, for example, needs for English courses, styles of the courses, etc. Another three questions were open-

ended, and one last question was in a Likert's scale style.

The questionnaire were distributed to the participants by the researchers and upon completion of the questionnaires, it was requested that they be returned directly to the researchers.

Interview

An interview was also administered to get in-depth information. Twenty airport staff, five from each international airport, participated in the interview by means of convenience sampling. Each airport staff was asked three questions below:

1. How do you think about your ability to use English?
2. What are your problems in using English?
3. Do you want to improve your English? If yes, how will you want to improve it?

Prior to the actual data collection, the reliability of the questionnaire was tested using Cronbach's Alpha Coefficient, and the reliability is 0.98 which means that the questionnaire was reliable. Moreover, a pilot survey was carried out with 21 airport staff at Nakhon Si Thammarat Airport to determine whether a questionnaire and an interview were advantageous to the present study.

C. Data Collection Procedure

The data collection procedure comprised two stages.

Stage 1: The researchers distributed questionnaires to participants. They were given some times to complete the questionnaires. After that, the questionnaires were collected by the researchers.

Stage 2: Five airport staff from each international airport were interviewed. Each interview took about 10 minutes. The information given by each airport staff was recorded by a tape recorder for further interpretation.

D. Data Analysis

An analysis of data was done according to the information styles which could be divided into four groups. The first group which was about the participants' personal information was analyzed using frequency and percentage. The second one about the participants' attitudes toward the problems in using

English, the English ability and the needs in using English at work was analyzed to get means and standard deviations. The third group of information regarding the differences between the importance of English at work and the participants' English ability was analyzed using paired sample t-test. The mean difference was interpreted as follows: 0.01-0.33 = low, 0.34-0.66 = moderate, and 0.67-1.00 = high (Pochakorn, 2012). The last one which was the information from the interview using open-ended questions was interpreted, categorized and analyzed using content analysis.

IV. ANALYSIS AND RESULTS

The questionnaires were distributed to 200 international airport staff and all of them were returned to the researchers and used for the study. The interview was conducted with twenty staff from four international airport. The results of the study were attempted to answer the following questions;

1. What English use problems do the international airport staff have?

2. What English Language skills are necessary for the international airport staff?

3. What do the international airport staff want to improve their English skills?

The data obtained from questionnaire and interview are presented in the following tables.

TABLE I.

Item	Mean s (\bar{x})	SD	Feedback Level
Listening	3.07	.84	moderate
Speaking	3.04	.77	moderate
Reading	3.00	.84	moderate
Writing	3.04	.90	moderate
Using relevant and irrelevant vocabulary for work	3.09	.86	moderate
Grammar usage	3.17	.94	moderate
Correct pronunciation according to the English pronunciation principle	3.12	.93	moderate
Total	3.08	.67	moderate

^a. The opinions of international airport staff in the southern region towards the problems of using English for work in general

The international airport staff in the southern region in general expressed their opinions towards the problems of using English at the moderate level ($\bar{x} = 3.08$, $SD = 0.67$). There were 7 problems in using English at the moderate level in terms of grammar usage ($\bar{x} = 3.17$, $SD = 0.94$) which was mostly found, followed by pronunciation in English ($\bar{x} = 3.12$, $SD = 0.93$), using relevant and irrelevant vocabulary for work ($\bar{x} = 3.09$, $SD = 0.86$), listening ($\bar{x} = 3.07$, $SD = 0.84$), speaking ($\bar{x} = 3.04$, $SD = 0.77$), writing ($\bar{x} =$

international airport staff in the southern region. Considering each item, it was found that international airport staff in the southern region needs listening skills at the high level for 1 item in terms of listening to a training or meeting in English ($D = 0.67$ and a moderate need for 5 items in terms of listening to complaints from foreign customers about airport services, such as delayed flights and unclean toilets ($D = 0.60$, listening to questions or concerns from foreign customers about airport services, such as purchasing air tickets, changing transportation and asking for directions to shops ($D = 0.52$, listening to the supervisor's instructions in English ($D = 0.52$, listening to inquiries about the route and location of the places for foreign customers in need ($D = 0.44$, and listening to announcements in English at the airport ($D = 0.37$, respectively. It shows that international airport staff in the southern region require the need to listen to training or meetings in English at the high level. As such, the airport staff should be emphasized to practice this matter more.

Need of English for Listening Skills	Significance	Ability	Difference	T-test	Sig.
1. Listening to questions or concerns from foreign customers about airport services, such as purchasing air tickets, changing transportation and asking for directions to shops	4.06	3.54	0.52	8.74	.000
2. Listening to complaints from foreign customers about airport services, such as delayed flights and unclean toilets	3.93	3.33	0.60	9.52	.000
3. Listening to inquiries about the route and location of the places for foreign customers in need	3.92	3.48	0.44	6.83	.000
4. Listening announcements in English at the airport	3.90	3.53	0.37	5.68	.000
5. Listening to the supervisor's instructions in English	3.75	3.23	0.52	8.25	.000
6. Listening to training or meetings in English	3.68	3.01	0.67	8.73	.000

TABLE III.

3.04, $SD = 0.90$) and reading ($\bar{x} = 3.00$, $SD = 0.84$), respectively. It was clear that the grammar usage was the major problems for international airport staff in the southern region.

TABLE II

^bThe need of using English language skills in listening in the work of international airport staff in the southern region
 Tables 2 shows the difference between the importance and the ability to use English for listening skills of

Need of English for Speaking Skills	Significance	Ability	Difference	T-test	Sig.
1. Answering questions or concerns from foreign customers about airport services, such as purchasing air tickets, changing transportation and asking for directions to shops	4.02	3.48	0.54	8.95	.000
2. Answering or explaining complaints from foreign customers about airport services, such as delayed flights and unclean toilets	3.93	3.26	0.67	10.36	.000
3. Introducing the route and location of the places for foreign customers in need	4.06	3.55	0.51	8.01	.000
4. Apologizing foreign customers if their speech is incomprehensible and incommunicable	4.01	3.49	0.52	8.31	.000
5. Asking foreign customers to speak slowly.	3.96	3.51	0.45	7.39	.000
6. Presenting ideas in training or meetings in English	3.77	3.04	0.73	9.84	.000

^c The need of using English language skills in speaking of international airport staff in the southern region

The need of using English language skills in speaking of international airport staff in the southern region consists of 6 questions. According to Table 3, international airport staff in the southern region requires a high need for English speaking skills at work for 2 items which are presenting ideas in training or meetings in English ($D = 0.73$) and answering or explaining complaints from foreign customers about airport services, such as delayed flights and unclean toilets ($D = 0.67$). There are 4 items which are answering questions or concerns from foreign customers about airport services, such as purchasing air tickets, changing transportation and asking for directions to shops ($D = 0.54$), apologizing foreign

customers if their speech is incomprehensible and incommunicable ($D = 0.52$), introducing the route and location of the places for foreign customers in need ($D = 0.51$) and asking foreign customers to speak slowly ($D = 0.45$) respectively with a moderate need for English speaking skills at work. It is noteworthy that international airport staff in the southern region need to practice the speaking skills for presenting their ideas in training or meetings in English and for answering or explaining complaints

TABLE IV.

Need of English for Reading Skills	Significance	Ability	Difference	T-test	Sig.
1. Reading manuals or documents related to the operation	3.87	3.28	0.59	9.41	.000
2. Reading other unrelated-to-work reading materials, such as English newspapers or notices	3.77	3.21	0.56	8.22	.000
3. Reading traffic signs and signs at airports	3.84	3.43	0.41	6.67	.000
4. Reading documents used during the work, such as forms	3.84	3.40	0.44	7.60	.000
5. Reading documents of foreign customers in need, such as passport, flight ticket, details of hotel or accommodation booking	3.90	3.47	0.43	6.73	.000
6. Reading maps and places written in English, such as the route and location of places, to foreign customers in need	3.85	3.42	0.43	7.28	.000

^d The need of using English language skills in reading of international airport staff in the southern region

Table 4 shows 6 items of need of English for reading skills of the international airport staff in the southern region. When considering each item, it was found that international airport staff in the southern region require a moderate need for 6 items of reading skills in English. The English language needs for working in descending order are as follows: reading manuals or documents related to the operation ($D = 0.59$), reading other unrelated-to-work reading materials, such as English newspapers or notices ($D = 0.56$), reading documents used during the work, such as forms ($D = 0.44$), reading documents of foreign customers in need, such as passport, flight tickets,

details of hotel or accommodation booking ($D = 0.43$), reading maps and places written in English, such as the route and location of places, to foreign customers in need ($D = 0.43$), and reading traffic signs and signs at airports ($D = 0.41$), respectively. The data reveals that international airport staff in the southern region require a moderate need for English reading skills at work.

TABLE V.

Need of English for Writing Skills	Significance	Ability	Difference	T-test	Sig.
1. Writing descriptions or suggestions for foreign customers in need, such as details about the trip	3.79	3.19	0.60	8.42	.000
2. Writing to guide, give directions and locations of places for foreign customers in need	3.79	3.24	0.55	8.27	.000
3. Writing email with correct grammar	3.71	3.02	0.69	8.19	.000
4. Writing warning notice at the airport	3.79	3.03	0.76	9.50	.000
5. Writing profession-related documents such as meeting notes or agenda	3.63	2.88	0.75	9.29	.000
6. Writing summary of daily work process or report of work	3.57	2.88	0.69	9.02	.000

^aThe need of using English language skills in writing of international airport staff in the southern region

As displayed in Table 5, the need of English for writing skills of international airport staff in the southern region consists of 6 items. Considering each item, there is a high need for 4 items of writing English skills in descending order as follows: writing warning notice at the airport ($D = 0.76$), writing profession-related documents such as meeting notes or agenda ($D = 0.75$), writing summary of daily work process or report of work ($D = 0.69$), and writing email with correct grammar ($D = 0.69$). There is a moderate need for 2 items: writing descriptions or suggestions for foreign customers in need, such as details about the trip ($D = 0.60$) and writing to guide, give directions and locations of places for foreign customers in need ($D = 0.55$), respectively. Based on the results, it can be seen that international airport staff in the southern region are highly required to write warning notice at the airport, profession-related documents, email, and

daily work process. Thus, the practice of writing skills in such matters needs to be more emphasized.

TABLE VI.

Items	Mean (\bar{x})	Standard Deviation (SD)	Level of opinions
Listening	4.32	.89	High
Speaking	4.34	.85	High
Reading	4.00	.86	High
Writing	3.82	.93	High
Related-and-unrelated-to-work Vocabulary Usage	4.18	.84	High
Grammar Usage	3.83	.98	High
English Grammatical Pronunciation	4.22	.91	High
Total	4.10	.72	High

^f Levels of opinions of international airport staff in the southern region with the needs of English skills improvement in general

The international airport staff in the southern region showed their opinions towards the needs to English language skills development in general at the high level ($\bar{x} = 4.10$, $SD = 0.72$). Considering the items, it was found that international airport staff in southern region had 7 items of high needs to English language skills and the highest one is speaking ($\bar{x} = 4.34$, $SD = 0.85$), followed by listening ($\bar{x} = 4.32$, $SD = 0.89$), English grammatical pronunciation ($\bar{x} = 4.22$, $SD = 0.91$), related-and-unrelated-to-work vocabulary usage ($\bar{x} = 4.18$, $SD = 0.84$), reading ($\bar{x} = 4.00$, $SD = 0.86$) grammar usage ($\bar{x} = 3.83$, $SD = 0.98$) and writing ($\bar{x} = 3.82$, $SD = 0.93$), respectively. Speaking skills at work needs to be developed the most because such skills must be used when communicating with foreign tourists.

Interview results

Based on an analysis of the data obtained from the interview from the staff of 4 international airports, 5 staff each, 20 staff in total, can be divided into three categories as follows:

1. Current characteristics of using English of international airport staff

All international airport staff answered that they highly needed listening and speaking skills to perform

tasks every day. They rarely had chances to use reading and writing skills.

2. Problems of using English

The staff of all 4 international airports indicated that sometimes they could not communicate with foreign passengers due to their limitations to master the language.

3. Needs of English skills development

All staff of the international airports indicated that the training in listening and speaking English skills from a native speaker is a must to have together with Thai teachers to help clarify and explain the content for better understanding.

V. DISCUSSIONS, LIMITATIONS AND FUTURE DIRECTIONS

Based on the findings, the discussions of the study are presented below.

4.1 Airport staff's problems in using English at work

The findings indicated that the staff's problems in using English was at a moderate level ($\bar{x}=3.08$, $SD=0.67$), and the most problematic issue was incomplete grammar knowledge ($\bar{x}=3.17$, $SD=0.94$) and not be able to pronounce correctly ($\bar{x}=3.12$, $SD=0.93$). These findings are in line with the findings of Limprasert and Witthawasaramrankul (2016) which confirm that flight attendants had problems in pronouncing English words because in Thai, final sounds are not pronounced, and there is no stress and intonation system. These findings are, moreover, in correspondence with those from Sornnui and Thapphrom (2017) which report that the problems in using English of ground staff at Nakhon Si Thammarat Airport was at the moderate level. Most of them could not speak English fluently and pronounce English words clearly. All in all, these findings show that English pronunciation and intonation are necessary for airport staff since incorrect pronunciation and intonation can result in miscommunication between the staff and foreign passengers (Barkhordari and Chalak, 2017). In addition, the airport staff also purposed other problems in English speaking, listening, reading and

writing. For listening, they reported that they were not able to understand some accents, especially British and Indian accents. They also had problems in speaking, reading and writing English due to their lack of grammar knowledge and English vocabulary. These findings are similar to the results of Uraipan (2011) which indicated that flight attendants could not pronounce English words correctly, and they did not understand some foreign passengers' accents. Likewise, this result is in line with the study of Cahyani and Drahati (2017) which reported the problems of ground staff at Indonesia Airports. Clark (2017), therefore, purposed that a training course relating to the problems. For example, English pronunciation and intonation should be conducted. Privorova (2016) also purposed that a course focusing on English grammar and vocabulary can help airport staff to overcome these problems. To conclude, problems in using English of the airport staff were pronouncing English words, reading manuals and writing grammatically-correct sentences. To assist these airport staff to communicate better in English, an English course providing the above-mentioned knowledge should be organized.

4.2 Airport staff's needs in using English at work

According to the obtained information, it was found that the international airport staff participated in this study needs English listening skill when they attended meetings and seminars held in English ($D=0.67$). For speaking skill, they had to use English when they expressed their opinions in meetings or seminars ($D=0.73$) and when they talked to passengers about various services in an airport ($D=0.67$). However, their needs in English speaking was at a moderate level (0.51) when they gave directions, made suggestions and explained locations to passengers. This moderate level of needs can also be seen in English reading skill. The airport staff mentioned that English was moderately needed when they read work manuals or other documents relating to their work. Surprisingly, English was highly required for all works, such as writing professional

documents ($D=0.75$), writing reports ($D=0.69$) and writing e-mails ($D=0.69$). These findings corresponded with the results of Cahyani and Drajiati (2017) which indicated that airport staff at Indonesia airports needed fundamental English, such as giving directions and vocabulary for their job. These findings are in accordance with Barkhordari and Chalak (2017) who reported that airport staff working in the customer service section in Iran airport required English speaking and listening skills while the staff in the baggage section needed English reading and writing skills. Likewise, Pitakpongpan (2016) reported that Air Asia ground staff at Phuket International Airport had to speak English when giving flight details to foreign passengers, listened to passengers' complaints in English, read tickets, passports and visas, and wrote a daily report in English. Besides, they needed speaking and listening skills more than reading and writing ones. In addition, Pitakpongpan (2016) and Barkhordari & Chalak (2017) pointed out that English courses corresponding with these requirements were highly needed. Ting (2010) also purposed that a course for ground staff should include contexts about giving directions, trip advice, assets loss management and other related topics for effective communication between airport staff and foreign passengers.

In summary, speaking and listening are the most essential skills of the airport staff participating in this present study. However, the findings from this study have some limitations as it explored airport staff's needs in English usage in general. Future studies should investigate English needs of airport staff working in different sections due to various needs of English skills (Barkhordari and Chalak, 2017; Cutting, 2012).

4.3 Airport staff's needs in English development

Analysis of the data showed that the airport staff would like to develop their English speaking skill the most ($\bar{x}=4.34$, $SD=0.85$), followed by listening ($\bar{x}=4.32$, $SD=0.89$), pronunciation ($\bar{x}=4.22$, $SD=0.91$), English vocabulary ($\bar{x}=4.18$, $SD=0.84$), reading (\bar{x}

$=4.00$, $SD=0.86$), English grammar ($\bar{x}=3.83$, $SD=0.98$) and writing ($\bar{x}=3.82$, $SD=0.93$), respectively. Most of them wanted the airport to organize a two-hour English course taught by a native speaker of English at least two times per week after work. This finding indicates that speaking and listening are essential for them since they really need these two skills at work (Pitakpongpan, 2016). Moreover, the airport staff reported that they wanted to improve their pronunciation because they wanted to pronounce English words correctly. This finding fits well with Khamkhien (2010) who pointed out that wrong English pronunciation negatively affected the ability to use the four skills of English. The airport staff also mentioned that they would like to improve their English words, especially those relating to their work. This interpretation is in line with the finding of Korapan (2018) who reported that airport staff wanted to study more about English vocabulary used in aviation industry. Consequently, a course focusing on English pronunciation and vocabulary should be provided to airport staff. Furthermore, the airport staff suggested that English songs and soundtrack movies could help them improve their English, and they would like to attend a training on using English every month. Interpreters and English signs were also needed to clarify information in case of urgency. These findings correspond with the result of Lee's (2015) study which indicated that roleplaying or simulation in the real-life situation could help improve airport staff's English communication. Multi-language signs and interpreters were also necessary for a more effective communication between staff and foreign passengers.

In short, the airport staff would like to improve their speaking and listening skills, English pronunciation and English vocabulary used at work. To achieve this improvement, a two-hour English course with an English native speaker or after work is needed. Multi-language signs and interpreters are important factors that cannot be overlooked.

4.4 Airport staff's opinions toward their English ability, problems and needs in using English

The information from the interview reveal that English speaking and listening are important to the airport staff because they had to use these two skills whenever they are on duty. The information in this part also agrees with what have been found from the questionnaires in that the staff had problems in pronouncing English words, had limited English vocabulary, and did not understand some English accents. Uraipan (2011) also reported that flight attendants could not listen and speak English very well and had limited English grammar knowledge and vocabulary so this caused miscommunication with their passengers. Baroto et al. (2016), therefore, purposed that English manuals were necessary for flight attendants. Since the interview was carried out with only 20 airport staff, the information obtained may not be suitable for generalization. More participants should be interviewed to obtain more information on their problems and needs in English use.

Limitations

This study has limitations in several aspects which the researchers proceed as follows;

1. The samples used in the study of problems and needs in using English were international airport staff in the southern region. The study results may not be applicable to other international airports in other regions of Thailand due to the differences of the airport staff in terms of their problems and needs of using English language.
2. The researchers collected data using questionnaires and interviews but did not measure the English language ability of the staff of the airports through the TOEIC test, resulting in a lack of information about the real language capabilities of such staff. As such, the measurement of the real language capabilities of the staff needs to be done in order to enhance their language skills.
3. Some international airport staff have limited time to provide information because of different working

schedules. Some staff are pleased to provide information while others spend most of the time serving foreign passengers, resulting in the limited time spent on the interview. As a result, data collection may not cover all issues of the international airport staff in the southern region.

Future Directions

1. Observation should be included in further studies to gain in-depth information about needs and problems in English usage of the airport staff.
2. Test of English for International Communication (TOEIC) may be incorporated to reveal real English ability of the airport staff. The results will be useful for designing a more suitable English course.
3. A study on this topic with the airport staff working at other international airports in other regions of Thailand should be considered because these airport staff may have different problems in using English, and they may need to develop their English ability in certain language areas.
4. English manuals and courses providing the English language used in real-life situations should be organized to help the airport staff communicate with foreign passengers effectively.

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PID 04 Gesture-based Operation System for Robot Arm and Electric Wheelchair

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Abstract — Many physically disabled people who cannot freely move their extremities are forced to travel by electric wheelchairs or become bedridden. To assist them, we have developed a 7-DOF robot arm called “Udero”, which has a versatile design that allows attachment to either wheelchairs or bedsides. However, with manual operation using a joystick, there is a problem that the arm takes time to reach a target. Therefore, we propose an operation system which is based on gesture. Also, different operating interface will be used if we innovate a new kind of operating system. Therefore, we are considering a new operating system which could operate both robot arm and wheelchair by gesture. Finally, we demonstrated effectiveness by a comparison experiment between the joystick and proposed method.

Keywords: Robot arm, Electric wheelchair, Gesture, Interface

II. INTRODUCTION

TABLE I. About 50% of handicapped people in Japan have a physical disability [1]. People with upper limb dysfunction such as cervical cord injury (CCI) are often forced to live in a wheelchair, and experience difficulties with the actions of everyday life, such as "grabbing objects in front", "opening doors" and "moving objects falling on the floor". They therefore,

we need help in performing such actions. Welfare robot arms that support the lives of people with upper limb dysfunction have been attracting serious attention. Users learn to operate the welfare robot arms, which are attached to an electric wheelchair or bedside, instead of their own arms, as shown in fig. 1. If people with upper limb dysfunction can freely manipulate the robot arm, it is possible to perform various daily activities without further support, thus improving quality of life.

Several welfare robot arms are currently in the research and development process [2-4]. For example, conventional robotic arms for welfare include the iARM by Exact Dynamics, JACO² by Kinova Robotics and RAPUDA by the National Institute of Advanced Industrial Science and Technology. In general, these can be operated using a keypad or a joystick. However, since there are many buttons on the keypad, it is difficult to memorize the layout. In addition, it is necessary to switch operation modes frequently when using a joystick. For these reasons, daily operations using the robot arm can take time and burden the operator [5]. In order to solve these problems, we aim to develop an interface that can operate the robot arm quickly, without switching operation modes and requiring many buttons. Also, we focus on the development of interface of electric wheelchair. Generally, electric wheelchairs using the

joysticks as the operating interfaces. Therefore, when a new operating interface for robot arm was developed, it is necessary to use two different interfaces to operate robot arm and electric wheelchair. For this reason, we are considering that to operate both wheel chair and robot arm with only one interface.

First, we describe the details of the robot arm developed in this research and explain the composition of the system. Next, we propose a new robot arm manipulation method and an electric wheelchair operation method. Finally, we perform comparative experiments between conventional interfaces and the proposed method to demonstrate the effectiveness of this research.



Fig. 1. Robot arm attached to electric wheelchair.

III. THE DEVELOPED ROBOT ARM

Table 1 lists the basic specifications of the seven degree-of-freedom (7-DOF) robot arm “Udero” developed in this research. Udero has a compact root part that can be attached to an electric wheelchair. In addition, since its structure becomes thinner from the root to the finger like a human arm and hand, it is designed to work well in familiar surroundings.

b. SPECIFICATIONS OF THE ROBOT ARM.

DOF	4(Arm) + 3(Wrist) + 1(Hand)
Max. Reach [mm]	885
Max. Total weight [kg]	6.0
Max. Payload [kg]	1.0
Max. Speed [mm/s]	200

A. Joint structure of robot arm

The robot arm has a structure in which adjacent joint axes are orthogonal to each other. The seven joints of the robot arm are called J_1 to J_7 in order from the root. Also, we can use orthogonal joints from J_1 to J_3 and J_5 to J_7 to resemble ball joints $J_{1,2,3}$ and $J_{5,6,7}$. If these joints are compared to the human arm, $J_{1,2,3}$, J_4 and $J_{5,6,7}$ are equivalent to the shoulder, elbow and wrist joints, respectively. As shown in fig. 2, the movable region of each joint has a wider range of motion than the human body in regions where physical interference does not occur. The length of each link is designed with reference to the length of human hands, forearms and upper limbs [6], and the lengths of $J_{1,2,3}$, J_4 , and $J_{5,6,7}$ from the tip of the hand are 190 mm, 470 mm and 750 mm, respectively. The total length is 850 mm. Also, since the device must be able to lift a cup onto the table at the hand, the payload amount is 1 kg at the maximum reach.

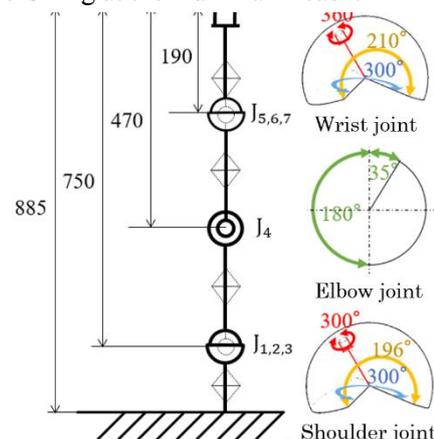
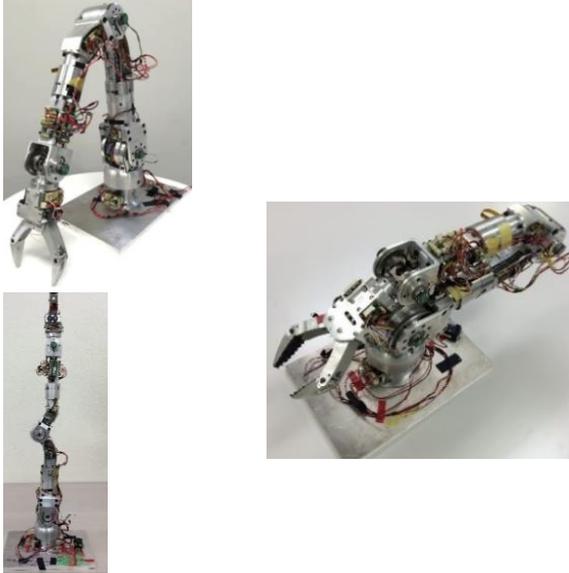


Fig. 2. Structure of the robot arm.

B. Folding structure considering size reduction and design

In the case where the upper arm link and forearm link of the robot arm are on the same straight line, since the elbow joint has a rotation axis orthogonal to the two links, the links tend to interfere with each other and the range of motion becomes small. Therefore, an offset is provided between the upper arm link and the forearm link so that the elbow joint can be bent 180 degrees. Fig. 3 shows the developed robot arm. As may be seen in the figure, with the offset, it is not only possible to

fold the robot arm compactly, but also to pick up items located directly underneath it.



(a) Unfolding state.

(b) Folding state.

Fig. 3. 7-DOF robot arm "Udero".

C. Basic control method

In order to calculate the angle of each joint we use inverse kinematics from the current hand position to the target. PID control is used to control each joint.

There are two modes of operation method. The first is an automatic control mode that moves based on a pre-generated trajectory. The second is a manual control mode operated by input from the interface. Since various actions are required to support individuals with upper limb dysfunction, we focus on the problems with manual operation in this research.

IV. DEVELOPMENT OF GESTURE-BASED INTERFACE SYSTEM

To solve the problem of long operation time, we develop an interface that does not require many buttons or switching of operation modes. In this research, we focus on people who cannot move their fingers, as in CCI with upper limb dysfunction. Therefore, we use an infrared camera for the interface, which does not require fingers movements. It is designed to operate the robot arm according to the movement of the operator's hand. For the infrared camera, we used Leap Motion, which can recognize

the 3-dimensional (3-D) position of the fingertip or hand joint by a maximum of 0.01 mm, in fig. 4.



Fig. 4. Leap Motion used as an infrared camera.

We perform position control of the robot hand using the above interface. As the operation system, a threshold ϵ is taken with respect to the deviation $|X_{Li} - X_{L0}|$ between the coordinates X_{Li} of the current palm and the initial coordinate X_{L0} of the palm read by the Leap Motion. When the deviation is $|X_{Li} - X_{L0}| > \epsilon$, the target coordinate of the robot hand is represented as equation (1).

$$X_r = X_p + X_v v dt \quad (1)$$

Here, X_p is the current coordinate of the robot hand, which changes with displacement $X_v v dt$; v is the moving speed of the robot hand, which varies between 0.05-0.08 m/s depending on the norm of the deviation; and dt is the sampling time. X_v is the direction vector of the normalized deviation and is represented as equation (2).

$$X_v = \frac{X_{Li} - X_{L0}}{|X_{Li} - X_{L0}|} \quad (2)$$

Also, when the deviation is $|X_{Li} - X_{L0}| \leq \epsilon$, the target coordinate of the robot hand is represented as equation (3).

$$X_r = X_p \quad (3)$$

At this time, the position of the wrist of the robot arm does not change. When the robot arm is stationary, it is possible to open and close the hand. In order to allow people with CCI to operate the robot arm, the motion of the arm must correspond to their possible movements. In this study, we detect the angle between the vector perpendicular to the palm and the z-axis of the reference coordinate system, read from the infrared camera. As shown in fig. 5(b), the inclination angle of

the hand corresponds to the opening and closing operations of the robot hand.

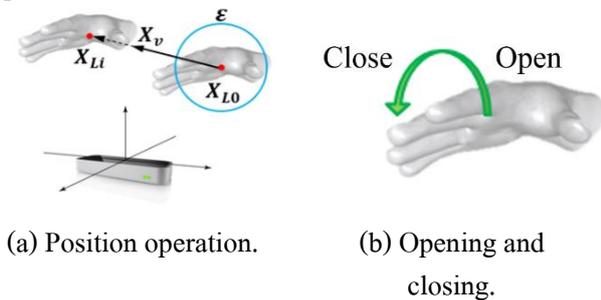


Fig. 5. Image of proposed gesture interface.

Next, in order to unify the interface, we will examine the operation method of electric wheelchair by gesture. Because we operate the electric wheelchair with a surface manipulation, so that the input of direction and speed is important. Among them, we think that it is important to input the direction smoothly which can be performed to avoid obstacles. It is also important to be able to stop emergently when an accident such as a collision with a wall is about to happen. From the viewpoint above, we innovate an operation method to associate the movement direction of the electric wheelchair with the movement direction of the operator's hand. To stop the electric wheel chair, the user puts his hand on the infrared camera or move his hand of the operator outside the detection range of the infrared camera. The speed adjustment is proportional to the amount of movement of the hand, and the ratio is adjusted by the individual.

V. COMPARATIVE OPERATION EXPERIMENT

After the text edit has been completed, the paper is ready for the template. Duplicate the template file by using the Save As command, and use the naming convention prescribed by your conference for the name of your paper. In this newly created file, highlight all of the contents and import your prepared text file. You are now ready to style your paper; use the scroll down window on the left of the MS Word Formatting toolbar.

A. Experimental Outline of robot arm operation

In order to verify the effectiveness of the gesture interface system, we conducted experiments comparing the joystick and buttons operation to the

Leap Motion operation. The experimental task was an operation to transport a cup from point A to point B three times for each interface. Point A was located 250 mm forward from the base of the robot arm and 160 mm to the left; point B was 100 mm forward of the point A, 300 mm to the right, and 150 mm above. The experimental procedures were as follows.

1. Exercises using Leap Motion
2. Experiment with Leap Motion
3. Exercises using joystick and buttons
4. Experiment with joystick and buttons

Participants in the experiment were three healthy persons (two males, one female). The experimental environment for the interface is shown in figs. 6 and 7. As may be seen in figures, subjects operated the system from a position where the robot arm could not reach, for safety.

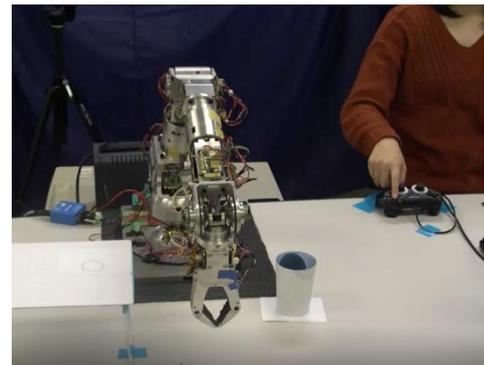


Fig. 6. Experimental setup of joystick and button.

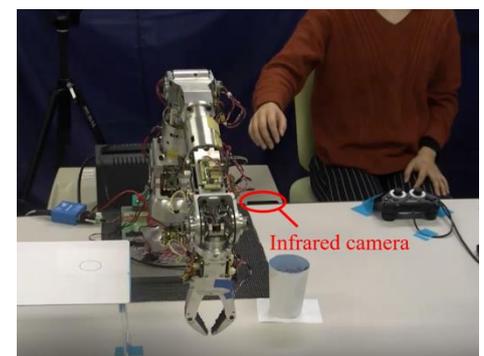


Fig. 7. Experimental setup of infrared camera operation.

B. Experimental result of robot arm operation

Figs. 8 and 9 present the experimental results of the operation using the joystick and button, and the Leap Motion. As shown in fig. 8, the average times for

each subject's operation were 22.6 s, 20.6 s and 22.6 s. Subjects were unable to achieve the operation in less than 20 s. On the other hand, in fig. 9, the average time of operation for each subject was 18.3 s, 17.6 s, 14.0 s, all less than 20 s. These results confirmed that the operation time was reduced in all subjects by using the proposed operation method. In the operation using the joystick and button, it was necessary to switch between the up and down operations and the horizontal operation of the hand. However, in the proposed method, since the robot arm is operated by the hand movement of the operator, it is possible to manipulate the robot arm three-dimensionally. Therefore, the operator can easily recognize the operation of the robot arm. This is considered to be one of the reasons why operation time was shortened. In addition, we compared the number of operations required to operate the joystick and button and the infrared camera. Here, the number of operations is defined as the number of times it is necessary to switch the movement of the robot arm. In the case of the joystick and button, the number of operations corresponds to the number of times the hand had to leave the interface. In the case of the operation by the infrared camera, it corresponds to the number of times that the deviation between the current coordinates of the palm and the initial coordinates becomes smaller than the threshold value. Table 2 shows the number of operations using the joystick and buttons, and Table 3 the number of operations using the infrared camera. Data in the tables confirm that the number of operations to achieve the goal was reduced in all subjects with the proposed method. From this, it can be considered that the operation time was shortened, since the number of operations was reduced. From the results of this study, it is considered that the proposed manipulation method leads to a reduction in operation time, and suggests adaptation to upper limb dysfunction can be expected.

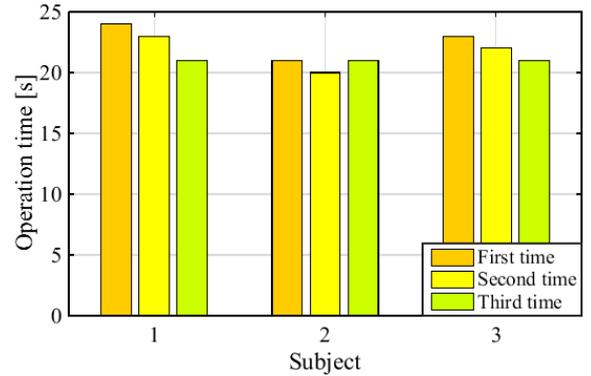


Fig. 8. Operation time with joystick and button.

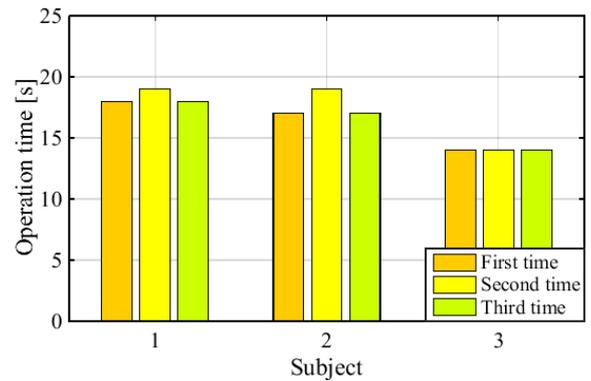


Fig. 9. Operation time with Leap Motion.

NUMBER OF OPERATIONS WITH JOYSTICK AND BUTTON.

	First	Second	Third	Average
Subject1	11	14	10	11.7
Subject2	11	11	12	11.3
Subject3	15	14	12	13.7

NUMBER OF OPERATIONS WITH LEAP MOTION.

	First	Second	Third	Average
Subject1	9	8	9	8.7
Subject2	8	7	8	7.7
Subject3	5	5	5	5.0

C. Experimental Outline of electric wheelchair operation

Next, in order to verify the effectiveness of the electric wheelchair operation by the gesture, we conducted experiments by comparing the joystick operation with the Leap Motion operation. For the electric wheelchair, we used EMC - 250 of IMASEN ENGINEERING CORPORATION. Table 4 shows the specifications of electric wheelchairs. The experimental tasks was to run the specified course

three times for each interface. Since it is running in a narrow place, the running speed was 2.5 km/h. Fig. 10 shows the running course in this experiment. Participant in the experiment was one healthy person. The experiment was conducted after the participant was accustomed to the operation sufficiently.

c. OPERATION TIME OF EACH INTERFACE

Size [mm]	1010 (length) / 600 (width) / 955 (height)
Drive system	Front wheel caster Rear wheel direct drive system
Speed [km/h]	2.5 / 4.5 / 6.0

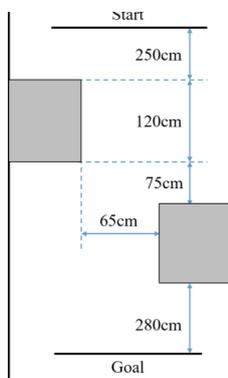


Fig. 10. Course layout.

D. Experimental Outline of electric wheelchair operation

Table 5 shows experimental results by each interface. As shown in this table, the average time of operation with the joystick was 14.7s, and the average time of operation by Leap Motion was 14.9s. The difference in operation time was as little as 0.2s. From this result, it can be said that even with the use of Leap Motion, the electric wheelchair can be operated without problems.

d. OPERATION TIME OF EACH INTERFACE

	First	Second	Third	Average
Joystick [s]	14.75	14.41	14.83	14.7
Leap Motion [s]	14.64	14.88	15.18	14.9



(a) Joystick operation.



(b) Leap Motion operation.

Fig. 11. Comparative experiment of electric wheelchair operation.

VI. CONCLUSION

People with upper limb dysfunction such as CCI need various forms of support in their daily lives. Welfare robot arms are one possible form of support that has been attracting attention. However, existing interfaces, require frequent switching of operation modes and manipulation of many buttons, which takes time to operate. Therefore, it is difficult to smoothly incorporate the robot arm into daily life routines. In this research, in order to shorten operation time, we developed a gesture-based interface that does not require operations with multiple buttons or switching operation modes. We then conducted an experiment to compare the joystick operation with the proposed operation. The experiments of robot arm confirmed a reduction in operation time and complexity, and as well as the effectiveness of proposed method. Also, in experiment of the electric wheelchair, since it was possible to operate without problems, we consider that it can be replaced with the operation by the gesture. In future research, we plan to conduct comparative experiments with the system on cervical spinal cord injured persons.

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PID 05 New Academia Learning Innovation Strategy used in Undergraduate and Postgraduate Programs at UTM

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Abstract — The purpose of this study was to investigate the implementation of NALI among students at UTM. The study explores the educational approaches employed through NALI to produce highly skilled 21st century graduates. A mixed-method research approach was used to develop the insight to stakeholders' perspectives: students and educators. The study used multiple instruments such as survey questionnaires and semi-structured interview protocol (focused on lecturers). The samples of the study involved 170 students of technical and engineering education, including 167 students and 3 lecturers. The data generated represents a comprehensive review through case study. These data was analyzed and sorted out using statistical analysis (SPSS software). The data and results present the stakeholders' views and the participant voice. Data identified similar themes in developing the quantity and quality of knowledge students acquire because of NALI engagement. The findings provided insights on stakeholders' view on the implementation of NALI; commiserating with the development of students that are capable of interacting and communicating freely with anybody and at anywhere on the globe. In addition, it also inculcates the training of students with abilities on creative knowledge, critical thinking,

problem solving skills, higher thinking order and confidence. The key issues include teachers becoming more like facilitators using SCL approaches, modern training facilities, relevance of curriculum content, and the collaboration between educational institutions and industry. Recommendations of the study proposed to improve institutional approaches in student learning. It is recommended that a further study would involve participant-observation as a key research strategy for future program development.

Keywords—NALI; student centered learning; strategy; 21st education

I. INTRODUCTION

Universities are created to impact knowledge and skills to individuals with a view to make them secure a job or become self-reliant. In recent years, the universities' role in the society has become a focal point of debate. The pedagogy has shifted from the old traditional teacher centered approach to a student-centered approach. For this reasons, the role of the educator (1), has shifted from that of a didactic teacher to that of a facilitator of learning. Therefore, there is the need to implement strategies that will strengthen learning to meet the requirement of a 21st century

student centered task based education like the new academia learning innovation (NALI) at Universiti Teknologi Malaysia.

The global economy and its emerging industries and occupations, offers great opportunities for everyone who has skills to take advantage of it. (2) States that the current public education system is not preparing all students for the economic, work force and citizenship opportunities and demands of the 21st century.

Based on the above, the classroom is no longer a place where the teacher (expert) pours knowledge into passive students, who wait like empty vessels to be filled. In this 21st century, the students are encouraged to be actively involved in their own process of learning. The teacher functions more as a facilitator who coaches, mediates, prompts, and helps students develop and assess their understanding, and thereby their learning. One of the teacher's biggest jobs becomes 'asking good questions' thereby spurring both teachers and learners to acknowledge the dynamism of learning just as the world we live in.

Incidentally, this coincide more with the globally integrated economy in which processes of learning and knowledge generation are widely seen as key to competitive advantage. Skills that support innovation, including creativity, critical thinking and problem solving are in great demand. In view of this, (3) states that, currently many new courses are being developed to assist in growing thinking skills. These programs focuses on a combination of underlying skills, knowledge and abilities that are identified to be lacking in in the education system. The tertiary institutions are hitherto well placed to provide this new knowledge through practiced research based activities.

Furthermore, (4) enumerates that the university modernization agenda, the heart of the knowledge triangle and the significant player in knowledge economy is urging member states (EU) to introduce reforms of university degree structures and financing, new curricula, meeting the demands of a knowledge

society, new management concepts for universities and incentives to encourage closer cooperation between education and industry.

Similarly, (5) posited, we need to recognize that a 21st century education is the bedrock of competitiveness-the engine, not simply an input, of the economy. This challenge has resulted in the higher education sectors acting reactively to adapt to movements, following situational pressure, as well as scientific and sociocultural development in education, while higher institutions are expected to remain relevant in terms of impact and reputation. With regard to this challenges, (6) noted that knowledge is the ability to: gather information and facts that are relevant to a specific subject: hence, the value of knowledge can be seeing in the society and that education alone does not necessarily lead to better thinkers. That is why educational attainment is no longer a guarantee of either academic or skills proficiency.

For these reasons, (7) posited that, the academic situation looked to innovation for assistance. The key to educational advancement in this century is hinged on technology for the transformation the world so desire to achieve. In the same vein, (8) enumerates on the current systems of university education that the skill requirement that define this generation and the characteristic traits are expected to be critical and significant in today's knowledge as a prerequisite for collegiate programs, contemporary workplaces and careers.

For these reasons, NALI framework focuses on results that matter. The 21st century education that is tied to outcomes. Students are prepared to think, learn, work, solve problem, communicate, collaborate, and contribute effectively throughout their lives. (9) explained that, students want to be involved, crave attention from mentors and want meaningful work in the forms of feedback and guidance, which will enable them, grow and adopt the use of 21st century digital resources for use in their day-to-day activities. Furthermore, (9 & 10) explained the characteristics of

21st century educational and human means of interaction with the technology of the day.

In line with Malaysia's New Economic Model, aimed at producing graduates that can contribute to the economy, Universiti Teknologi Malaysia has planned and executed programs that improve entrepreneurship education. This is aimed at exposing students from various fields and background to acquire the training in respect of entrepreneurship, job creation and life long career. The new academia learning innovation (NALI) has numerous teaching strategies that conform to 21st century education. The varieties, such as teaching and learning approaches enhance the improvement of entrepreneurial skills of the students through NALI courses. In addition, Students are actively involved in discussion and knowledge generation with the coaches and expert facilitators of learning in the school.

Furthermore, awareness of globalized collaborative learning, peer group, multi-racial and multidimensional education is encouraged. On the broader issue of technological innovation (11) states, the academia learning has endorsed harnessing the advantages that technology offers in respect of enabling talent-development capacity building without boundaries.

TABLE II. To this end, studies revealed that the impact of new academia learning innovation has not only affected the national level but also the international level in terms of scholarly contributions, human capital generation impact to the Malaysian and regional innovation, economy and premium academic brand. This clearly shows that linking of new academia learning model to academic excellence of the graduates of UTM is truly a local strategy with a global impact that should be sustained and even improve upon. More so, it is pertinent to note that, one of the objectives of the institution is to build a higher learning institution surpassing its own goals and local arenas by placing UTM on the global academia map standing tall with other knowledge institutions, which have been on the lips of academicians and scholars.

TABLE III.

A. Objective of the study

Identify lecturers using NALI strategy at both undergraduate and postgraduate programs at UTM.

B. Significance of the Study

This study is a contribution to the institutions program planners, administrators and teachers. The study explores the perception of the impact of NALI on students at UTM. The result of the study will provide and strengthen the evidence that knowledge of student's perspective will not only be helpful but useful for the improvement of future programs at UTM. Therefore, the findings are going to help the institution for future development and other endeavors with the student's perception, interest and satisfaction taken into consideration.

III. METHODOLOGY

A. Research design

This research design employs mixed method, combining quantitative and qualitative data. This method is referred to as mixed method (12 & 13). This type of mixed method research is referred to as sequential explanatory design (14). The sequential explanatory design involves, first, collecting the quantitative data and followed by collecting the qualitative data to help explain or elaborate on the quantitative result (14). The reasons for using this design are that the quantitative data and the results provide a general picture of the research problem: more analysis, specifically through qualitative data collection, is needed to refine, extend, or explain the general picture.

B. Population and sampling of the Study

This research was conducted in UTM main campus at Johor Bahru, Johor. The population of this research for the quantitative data collection comprised of all the 167 respondents made up of 97 undergraduate students and 70 postgraduate student of department of technical and engineering education. The technical and engineering education department was chosen because of its adoption and

implementation of NALI teaching and learning methods. More so, NALI strategies are by design largely for technical, engineering and entrepreneurial training. Lastly, 3 lecturers of the above-mentioned department were selected for the population for the qualitative data collection. These lecturers are specialist in technical and engineering subjects and have been in the field for between 10-20 years of active service.

C. Instrument for Data Collection

Data can be collected accurately using different techniques depending on the nature of the research. The data resources for this research were structured questionnaire developed by the researcher after reviewing literatures on NALI for students of UTM and interview protocol for the lecturers. The survey questions were split into two sections that comprises demographic of respondents and subsections representing the four Research Questions of the study labelled A-D on NALI for easy identification. The questionnaire adopted 5-point Likert scale ranging from 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), 5 (strongly agree). The respondents indicate their level of agreement or disagreement with the statement.

D. Method of Data Analysis

In this study, data was analysed using mean and standard deviation with the aid of SPSS statistic 22-version software and thematic coding for interview. The justification of using mean and standard deviation in this research was to measure the amount of variation or dispersion of the research data values with a view to expressing variability of the population.

IV. RESEARCH FINDING

TABLE 1: Mean and Standard Deviation of the Respondents' Responses on the lecturers of UTM using NALI strategies in delivering lectures.

N O	ITEM	S D	D	N	A	S A	Mea n	SD
1	Lecturers in UTM utilizes student	-	4	7	8	7	4.23	.67 3

	centered learning approach as embedded in NALI to deliver lectures							
2	Lecturers uses blended learning practices which combines both online and face-to-face experiences	2	1	5	8	42	4.21	.67 5
3	UTM lecturers uses traditional teacher-centered learning method	18	4	2	4	13	2.97	1.2 4
4	Entrepreneurship training is one of the strategies of NALI learning modes the lecturers are using in teaching	-	2	1	7	44	4.17	.68 7
5	Teaching/learning is conducted with the aid of modern technology as prescribed by NALI.	-	1	1	8	47	4.25	.61 5
6	UTM lecturers are not under strict adherence to the use of NALI strategies in teaching and learning	7	7	5	-	-	2.36	.57 7
7	Teachers are still grappling with the understanding of NALI approaches	5	8	4	-	-	2.30	.53 1
8	NALI learning modes are meant for the teaching of undergraduates only	16	7	5	-	-	2.24	.64 7
9	Lecturers cover large	-	1	8	8	42	4.23	.58 1

	curriculum content with ease when they use NALI strategy							
10	Every lecturer is mandated on use of NALI mode	-	4	9	68	58	4.30	.717

Note: Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), Strongly Agree (SA), Mean and Standard Deviation (SD).

Table 1 reveal that the respondents agreed in 6 out of 10 items on lecturers using NALI strategies in delivering lectures. Meanwhile 4 of the items where disagreed due to the fact that those items favor the traditional way of teaching which does not conform with modern teaching methods. The agreed items promote the active learning strategy found in NALI. The mean responses of the respondents in all the six items ranged from 4.16-4.29 are greater than the cut-off point of 3.50. The standard deviation of the items ranged from 0.57-1.32, which indicated a consensus by the respondents.

A. Qualitative Data Analysis

The interview questions used during the interview session were as thus:

What are those NALI teaching methods that are suitable for the training of Technical and Engineering students of UTM?

TABLE 2: Coding and Categorization

Participants	Theme 1 NALI methods used for TVET training	Theme 2 Entrepreneurial training	Theme 3 Knowledge generation	Theme 4 Students enrolment and dropout rate
L1	SBL & SL	Using the right NALI method	Critical thinking, high thinking order	Motivation & target setting

L2	SL	Engagement in case study method	Problem solving & job creation	Constraint: money, time & overload
L3	PBL & project based learning	By the use of generics	Confidence breeds communication	Use of active learning

The highlights of the interview underpin the position of the respondents as regards to the questions asked. The comments were drawn directly from interview data after transcribing, coding and categorization. The respondents held on similar views about NALI. The reasons behind its adoption and the underlying benefit to education and training. Interview data highlights that the student generates more knowledge other than from the lecturers, which confirms the assertion of NALI being a student centered learning method. When asked about the best NALI method for the teaching of technical and engineering courses. The three (3) respondents gave examples of diverse methods that they consider most appropriate in their views. The first said Scenario Based Learning (SBL) and Service Learning (SL), the second said SL and the third said Problem based Learning (PBL) and Project based learning (PoBL). Meanwhile, all the above listed strategies are good for the teaching of technical and engineering courses, the differences is in the choices made by the lecturers and how these methods are ranked.

When asked to assess the goodness of NALI to students of UTM. The interview data found that, NALI strategy reduces the burden on teachers from that of didactic traditional teachers to 21st century globalized mediating, coaching and facilitating knowledge builders, a statement to which all the lecturers involved with the interview attests. Furthermore, they confirmed that NALI inculcate in the students the spirit of volunteerism, cooperation and collaboration when engaged in teaching and learning. The NALI teaching methods engages the students outside the school environment to the

community to implement their knowledge and skills and to increase their problem solving skills in methods such as SL.

Even though the statistic for dropout rate in UTM has not been ascertained, all the lecturers agreed to the statement that dropout rate of students has reduced drastically. One lecturer out of the three stated that when a lecturer is not conversant with a particular NALI strategy, he may overstretch the students thereby increase burden on them unnecessarily, which may lead to discouragement and consequently dropout. Other lecturers point out that even though students are constantly complaining about money constraints, time constraints and academic overload it is not enough for a record dropout rate in the institution. The study reveals that lecturers are confident that students are satisfied with NALI due to the fact that it breeds confidence, with confidence comes communication and collaborations with other fellow students from varying backgrounds. As students are engaged in active learning where the learning process is all about the student and what they learn. Lecturers concluded by saying NALI are the best thing that has ever happened to UTM. To sum up the findings on how lecturers of UTM are using NALI strategies in teaching there are:

1. Lecturers in UTM utilize student centered learning approach as embedded in NALI to deliver lectures.
2. Lecturers use blended learning practices that combine both on-line and face-to-face experiences.
3. Entrepreneurship training is one of the strategies of NALI learning modes the lecturers are using in teaching.
4. Teaching/learning is conducted with the aid of modern technology as prescribed by NALI.
5. Lecturers cover large curriculum content with ease when they use NALI strategy.
6. Every lecturer has the mandate to use NALI mode in teaching.

V. DISCUSSION

The study found that lecturers of UTM since the inception of NALI strategies in the institution are using student-centered learning approaches embedded in NALI. This finding is in line with the recommendation made by (1) that there is a pedagogy shift, from the traditional teacher centered approach to a student-centered approach, in which the emphasis is on students and what they learn. The teacher functions more as a facilitator who coaches, mediates, prompts, and helps students develop and assess their understanding, and learning. Similarly, respondents during interview commented that, NALI has student centered learning strategy embedded in it, with so many fascinating 21st century teaching and learning methodologies for the new generation students, who desire 21st century skills. The findings also buttress that lecturers utilize blended learning practices in teaching. (9) pointed that through NALI: programs are implemented using blended learning approaches: it is the practice of combining both online and face-to-face experiences, were 30-80 percent of the course contents are delivered online. During the interview, it was revealed that, all the 3 respondents (lecturers) have similar views about NALI, its importance and benefits to education as it utilizes both online and face-face approach in its training as a means of effective teaching and learning.

Furthermore, (5) revealed that the NALI Job Creation strategy allow students to exercise their true entrepreneurial practices, hence, students are trained on how to establish a company, complete the project and through a tender method provided by UTM for acquisition. In addition, the findings according to (15) in (5) explained that, the students have to master the knowledge and skills including generating business model, capital accumulation, build networking, work culture, the establishment of downstream companies, copyright and professional membership. The above statement is in fulfillment of NALI's main objective of the Job Creation strategy.

The advent of NALI innovative learning technologies such as eLearning and other digital resources prompted (16) to state that learning is taking place at everywhere and at any time. Learning is now in the hands of the student and at their disposal. The lecturer's responsibility is to guide and facilitate the process. In line with this findings, (9) states that, the medium of the 21st century education is technology. This is because students prefer to communicate through e-mail and text messaging rather than face-to-face contact. They prefer online technology to traditional lecture-based presentations, there is no doubt that ICT use in the classroom-increased student's motivation to learn, engage in learning and give independence in learning.

The findings of the study actually confirms that all UTM lecturers utilize NALI methods in their engagement with students as mandated by the institution. In a clarification (9 & 15) maintained that UTM lecturers are using the NALI methods that are most suitable at a given time for a given purpose. The study revealed that the NALI strategy is actually yielding the result it was meant to achieve.

VI. RECOMMENDATION

The recommendations reveal some important suggestions to improve future programs in UTM. These recommendations will encourage the program planners and school administrators to ensure that programs commensurate with the standard and requirements of stakeholders and beneficiaries. The recommendations have significance for all stakeholders, including students, lecturers, industry, employers, training institutions, and so on. The recommendations are hereby presented thus:

- 1 UTM lecturers should be encouraged to use the variety of teaching/learning strategies provided by NALI during student engagement.
- 2 UTM lecturers should be made to strictly implement and adhere to the use of NALI strategies in teaching and learning.
- 3 Lecturers who are still grappling with the understanding of NALI approaches, should be trained and retrained for effective course/content delivery.
- 4 Teacher-centered teaching method should be abolished for student-center task-based teaching strategy that is most suitable for the 21st century education.

VII. CONCLUSION

Ultimately, the aim of this research was to add value to education and improvement to NALI as the UTM action pack teaching and learning strategy. It also preparing graduates with skills, higher thinking order, creativity, confidence and creative thinking in technology, engineering and entrepreneurial education. The research outcome targets to improve future programs, pedagogy and the stakeholders as well.

Frankly, the quality of these efforts will be measured by how well UTM training system balance the consideration of program implementation, industry requirements, and labor market demands while moving towards a consolidated position as a developed, sustainable and well-articulated program (NALI) for the training of UTM graduates

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PID 06 Scenario Based Learning : A Technical Review

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Abstract — Educators always believe that learning and teaching activities in their classrooms should closely represent what is happening in business and industry sectors. After an extensive literature review on active learning approach, researchers found that Scenario Based Learning should be incorporated in today's classrooms. Scenario Based Learning is one of the active learning approaches which adopt an industrial environment into the classrooms. This study used qualitative research approach to gather information from reputable journals and experts in the attempt to understand the concept of the scenario based learning approach.

Keywords : Scenario based Learning, Active Learning I

I. INTRODUCTION

By its nature, SBL is sometime synonymous to problem based learning PBL, because the interrelatedness of the terms 'problem' and 'context' (Dahlgren & Öberg, 2001). SBL however focuses on the use of scenarios to supplement the learning of contents that require critical thinking on the subject contents delivered to students earlier through lecture approach (Thomsen et al., 2010).

Scenario-Based Learning (SBL) is defined as a teaching approach which is to promote deep learning and awareness by involving participants in realistic critical incidents where they are forced to consider a wide range of factors, make decisions and reflect on the outcomes and what they have learned from their classroom (What is scenario based learning, 2018). Errington (Errington, 2003; 2011) defined SBL as any educational approach that involves the intentional use or dependence upon scenarios to bring about desired learning intentions. SBL approach was developed on the premise of situated learning theory which advocates learning in 'contextual' form. This involves seeing learning as an everyday life that incorporate creating knowledge and learning simultaneously in interaction with the social and material aspect of the lived-in- world (Fox, 1997).

III. RESEARCH QUESTIONS

There is one main objectives of this study. The research objective is to determine the main concept of scenario based learning.

III. METHODOLOGY

The information in this study was collected from document analysis of relevant journal articles written

by scholars in the area of Scenario Based Learning. Thus, qualitative research design was utilized to conduct this study. Document analysis technique was used to analysis the data and the data are presented in a meaningful way. The content of the documents were read and analyzed by the researchers. Majority of the papers were downloaded through Universiti Teknologi Malaysia (UTM) library website (www.utm.my/psz).

IV. THE DISCUSSION AND CONCLUSION

The definition of SBL highlights four important concepts which are (a) Learners; (b) Reality; (c) Decision making and (e) Reflection. Learners are the locus of SBL approach; they will involve in the construction of their knowledge; participate actively in the learning process, which employs in near reality situations (contextual), make appropriate decisions and reflects on what was learnt related to their professional practice. Moreover, SBL organize learning into context of the expected functions, problems, relationships, norms and values that are found within the learners' real-life profession (Errington, 2011). Far more important, the SBL approach engages students in active learning where interactive and persuasive learning skills are delivered (Hans, Kövi & Spiro, 2013). The stages involved in integrating SBL systems are similar to the stages of basic instructional design (ID) process. They are summarized into five based on the literature (Errington, 2011; Hans & Spiro, 2013; Rashid & Ventura-Medina, 2012), which are: planning, design, development, delivery and evaluation stages.

Learners who engaged thorough SBL approach will be oportuned to discover realities of their profession (Jackson, 2010), perform 'work-oriented roles' and engage in critical thinking activities using professionally approved means of communication (Errington, 2011). SBL is considered an outstanding learner-centred approach based on its focus on learners' active involvement in knowledge construction as pre-requisite to professional practice.

The approach is suitable and relevant in preparing learners for professional practice and motivation role in school-to-work transition.

Approaches that place emphasis on student-centeredness are locus to active learning. The use of hands-on activities and other learning approaches that engage students' professional development also play major role in the delivery of course contents geared toward smooth school-to-work transition (Caltabiano, 2010). SBL gets learners to involve with real world problems and is regarded as an example of authentic pedagogy (Meldrum, 2010); it uses task and projects that address understanding of conceptual problems, enable critically thinking and transfer of ideas into real-world situation. SBL has been reported to portray a positive impacts in learning and motivation (Hwang & Kim, 2006) and been successfully implemented in various fields including nursing (Cant & Cooper, 2010; Lisko & O'DELL, 2010; Mikkelsen, Reime, & Harris, 2008; Nagle, McHale, Alexander, & French, 2009; Stout, Wholeben, & Pope, 2011) and engineering/technology (Carroll, 2000; Hernández, Asensio, & Dimitriadis, 2006; Rashid & Ventura-Medina, 2012). Other fields include software technology (Robertson et al., 1994), information system (Liu & Yu, 2004, 2006) as well as teacher training (Yetik, Akyuz, & Keser, 2012), and genetic analysis (Breakey, Levin, Miller, & Hentges, 2008) knowledge and abilities that are identified to be lacking in in the education system. The tertiary institutions are hitherto well placed to provide this new knowledge through practiced research based activities.

Significant evidences concerning SBL in various disciplines integrating SBL strategies has proved the importance of having SBL as one of the teaching approach. It assists in developing future professionals with ability to solve various problems and tasks in their careers. SBL elements such as collaborative creation, innovativeness, enabling creativity, learning engagement, focus on task and practicality are among the unique characteristics to be

adopted in various skill-based preparation programmes. Consequently, the outstanding contribution the SBL provides on learners decision making, judgement, issues exploration and knowledge application makes it as a useful strategy in the modern classroom.

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PID 07 A Review of Moore Transactional Distance Theory

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Abstract — TD theory has practical applications, such as providing an analytical framework for understanding distance education systems [4]. [5] posited that TD theory, developed over the course of several decades by Moore [2], [5], [6], [7], [8] and [9] is one of the major theories for distance teaching and learning, because it proposes that the concept of distance is a pedagogical concept, a virtual space to be crossed from a psychological and communications viewpoint, rather than actual distance in space and time [2].

TD theory proposes a way to classify curricula that differ in the separation between teacher and students, whose classification relies on two dimensions: autonomy of the learner and the pedagogic dimension that characterizes the curriculum. Distant teaching and learning that occur within the unique characteristics of distant teaching

environments, whether in synchronous or asynchronous modes, lead to unique teaching and learning behaviors Moore [5], [6], [8] and [9] and [10]. TD theory has been dialogue, course structure, and learner autonomy in online education [9] among others.

THEORY OF TRANSACTIONAL DISTANCE- MICHAEL G. MOORE

[7] created a theory that investigate two variables in the program of distance learning: student's autonomy, and the student and the teacher's distance [11]. The last one has become known as '**Transitional Distance**', mainly describes the relationship with the learner and the educator/teacher. Two elements are the core of distance for Moore, with two-way dialog communication, and the responsiveness level as structure to the student or students' requirements [11]. Moore's understating of transactional distance is essential for the reason of the concept's grounds of distance learning in a social framework, not in its traditional interpretation. The second element to Moore's theory involved the autonomy of the student, for the distance between him/her and his/her teacher, and in this procedure, the student must adopt this responsibility for this procedure. Moore categorizes distance learning programs into two categories, (1) student's determination or autonomous, (2) teacher's determination or non-autonomous. For the determination of the autonomy's degree, Moore used the following questions:

1. Are the learning objectives selection in the program lies in the responsibility of the student of the teacher (Autonomy in goal setting)?
2. setting)?
3. Is the selection of the person's resources and its use of bodies and other materials and media, lies with the teacher's decision or the student's (Autonomy in study methods)?

applied to topics such as teleconferencing and highly interactive telecommunications media in distance education [2], and the role of interactivity, including

Most Distance	-D-S	Courses with no dialogue and no structure.	Independent reading-study courses of the self-directed kind.
	-D+S	Courses with no dialogue but with structure.	Communications are radio or TV.
	+D+S	Courses with dialogue and structure.	Courses using correspondence method.
Least Distance	+D-S	Courses with dialogue and no structure.	Tutorial courses negotiating nature.

4. Are evaluation's method and standards decisions, made by the instructor or the student (autonomy Evaluating)?

Transactional distance's term indicates the geographical space between the student and instructor. Based on the learning understanding, which happens through learner's interaction with his environment. This theory considers the role of each of these elements (Student's autonomy, Dialogue, and class structure).

[12] notion of 'transactional distance' adopt the distance that exists in all relations in education. The distance in the theory is mainly specified the dialogue's amount which happens between the student and the teacher, and the structure's amount in the course design. Moore started "transactional distance" term in the 1980's. He merged this thought into educational methods.

YE DIALOGUE, STRUCTURE, AND AUTONOMY IN TELECONFERENCE INSTRUCTION

Since the Transactional Distance theory [7] was put in paper, the most significant part of distance learning was

and is the development of telecommunications media, in this field such as; interactive networks, graphical audio, video networks, etc. Their utilization made it possible for more dialogue that is effective with the instructor. These tools provide less structured courses or print-interactive media. This method of media made possible for new way of dialogue 'Inter-student dialogue'. This way happens between the students in the course, by audio-conference, videoconference, with groups that are able to be educated through interaction with each other.

Viewing [7], there are highly important implications in this potential, in every process of teaching. Such dialogue by student to student within and between groups makes it possible for distance students to share the knowledge creation. This engagement of the 'collective intelligence' is what may be defined as the third and most developed kind of instruction. Virtual groups and basic groups also provide opportunities for practices aimed at analysis developing skills, structure and reviews of knowledge. In particular, the personal computer is opening new opportunities through its combined synchronicity and relative lack of structure. Not only every individual can interact with the thoughts of other student in the course, but also this can be in his /her own time, at his/her own pace, and speed. This is something that does not found in either distance learning or traditional one. It promises to give all students the benefit of shared learning but to reduce the confusions experienced by many students in the traditional education, since learner manages to engage as well as the quicker learner and more affable.

The teleconference media permit students to practice and to give presentations to classes in order to develop their autonomy. Such participation develops motivation, including self-direction. Being able to share the teaching activities, the teacher can reach various activity. Teleconference can provide a friendlier and -supportive atmosphere than less dialogic forms of teaching, and even the traditional environments. It was a consistently spotted

phenomenon that students view their enjoyment at the interdependence and connection developed in teleconferencing. Instructors in teleconference mode must not over structure about keeping control of the dialogue details those students develop among each other. Academic often over structure and miss the idea that the used media are powerfully dialogic, therefore allowing everyone's involvement. Teachers or pedagogue must give everyone periodic opportunities to be part with the involvement [7].

A THEORY OF INTERACTION

[14] described three types of interaction in distance learning as he summarized the distance learning interaction:

- i. Student and the study subject or content interaction.
- ii. Interaction between the student and the educator.
- iii. Interaction between one student and other students, individually or in-group, with the presence of the educator or without it.

Moore's interaction theory was adopted and extended. [15] included another form of interaction: "learner-interface interaction is a process of manipulating tools to accomplish a task". [16] on the other hand included yet another form that she formed as an indirect interaction. 'Indirect interaction occurs when a certain learner supervises actively a certain interaction between two other learners or between another learner and the instructor'. With online learning growth, the adoption and extension of interaction theory states the influence and impact of Moore upon technology researches in education.

THE NEED OF MOORE THEORY

Different types of theories have been around since 1840s, along with field's leading scholars that made huge efforts at theoretical demonstrations in distance learning for many years. Yet, the requirement for a certain theory of this field has not been fulfilled as the scholars expected.

Moore mentioned his doubts about distance learning progress, which was being hindered, and suffered from the lack of attention. He stated the desire to define distance learning at a whole, to distinguish its different elements. Keegan stated the same desire for a promised theory for this field, one that can be essential and fundamental at the same time. [17] categorized distance learning theories into autonomy- independence, teaching industrialization, and communication- interaction. A fourth part needs to define distance learning through the composition of present communication theories. In addition, theoretician's objective is to locate explanatory theories, in which characterizing a structural object, also allows us to conclude the effects to be explained. Distance learning has been featured by the approach of trial and error, with not much consideration given to a theoretical basis for decision-making, and that distance learning theoretical foundations are weak. More importantly, distance learning as distinguished form of education.

The researchers believe what causes teachers in a distance the challenge is the theoretical discussions, putting them against deciding how to go through this process with confidence. Such explanation is resulted with the condition that thesis's can be developed to distortion attempts. This can be seen as what to expect in distance learning under what conditions and circumstances, thus providing the enhanced practical application. However, the place of Moore as a pioneer in distance learning is clear, along with his contributions, also as the main founder of distance learning. Practitioners of educational technology in distance learning have important access for scholarly communication. Moore's theories related to distance learning, his contributions to scholarship and practice, have influenced many educational technologists in valuable ways. Distance learning has grown exponentially in the last few decades. Between fall 2012 and 2013, online student enrollment grew by 5.2%, growing at a higher rate than overall student enrollment [18]. The global growth potential of online learning has

been noted by many, as the researchers also points out that more than 553 million people worldwide having Internet access, with the prediction of the emergence of distance learning opportunities explosion in Africa, Asia and South America. Of course, these opportunities stem from the efforts of hundreds, if not thousands, of educational technology professionals around the world. As these developments evolve, Moore's work and theories can be recognized increasingly as both pioneering and meritorious.

AN OVERVIEW OF DISTANCE LEARNING THEORIES

TABLE 2 Distance Learning Theories

LITERATURE REVIEW

Discussing the studies conducted in the field of distance learning using Moore transactional distance theory, enrich this paper's literature for many reasons. (1) Obtaining and knowing better perceptions on the history of distance learning. (2) To provide the criticisms needed for providing future studies, as the urgent necessity to have researches and practices for distance learning high quality.

[19] studied connection between six psychosocial scales; educator support, student interaction and collaboration, personal relevance, authentic learning, active learning, and student autonomy. He found a modest level of connection among the variables of the researcher. The predictors of the learners' satisfaction were educator's support, authentic learning, and personal relevance, whereas the only predictor of academic success was authentic learning.

Similarly, [20] stated that satisfaction was positively connected with interaction, self-efficacy and self-regulation without significant gender variations. [21] examined the relationships between the learners' perceived teaching, social, and cognitive element. In addition, the satisfaction, constant academic performance, and achievement using a revised form of the CoI survey instrument. The researchers found a relationship between

Authors	Theory	Central Concept	Primary Focus
Otto Peters (1983)	Theory of distance education as the most industrialized form of education	Industrial and postindustrial	Industrialized education
Michael Graham Moore (1983)	Theory of transactional distance and learner autonomy	Transactional distance; dialogue and structure, learner autonomy	Distance
Börje Holmberg (1983)	Guided didactic conversation theory	Motivation; empathy, non-contiguous communication, learner autonomy, interpersonal communication	Distance
Desmond Keegan (1986)	Theory of reintegration of the teaching and learning acts	Reintegration inter subjectivity, two-way communication	Communication
Randy Garrison (1985; 1987)	Theory of communication and learner control	Inseparability of technology, collaborative, educational transaction, self-directed learning, adult education	Communication

the three elements of the CoI framework (i.e., social, teaching, and cognitive) and students' satisfaction and academic achievement). The cognitive factor had an explicit connection with constant academic performance and satisfaction.

The achievement was mainly related to satisfaction with learning except for learners with the highest satisfaction ratings. Learning was most effective with high satisfaction, high cohesion, and low friction. The review

of literature showed mixed relationship of satisfaction and achievement in a distance-learning environment.

[22] concluded that a learners' autonomy-supportive environment provides these learners with adoption of a more aims guiding leading to more learning achievements. It is why autonomy is desired in in the system of distance learning for both individuals' development and more achievement in academic environments. The researchers also indicate in their research that while autonomy support outcomes in goals and aims guiding, educators' practices mainly lead in goals which necessary cannot adapt. For that, supportive-autonomy learning process need to be designed with affective elements consideration as well.

However, [23] methodically reviewed 71 experimental studies on the effects of autonomy supportive teaching on learner's motivation and discovered a clear positive relationship. As in attribution theory, the relationship between learner control and motivation entails the chance of learners altering their own motivations, for instance, learners may be capable to change self-determined extrinsic motivation to intrinsic motivation [24]. [25] also argues that autonomy is an ability to govern the learners, especially in the process of making decisions and set the learners' own course and think for the learners' actions. Autonomy's emotions result in many positive ways like sensitivity reduction to negative influences, increased popularity among peers and increased connection with the educational establishments and educators [25].

Yet [26] further indicated that the learners will not reach the same of level autonomy without the help that they should collect of learner's autonomy insights, reflect on their learning experiences, share these experiences and reflections with other learners, and realize the elements influencing all these processes, and the process of learning as well.

The researchers showed the results of many conducted studies with its majority on comparing the

traditional courses to the courses of distance learning, which showed similar findings. In addition, the researcher viewed various studies on the learners' satisfaction, how it can affect the educational process along with the learners' results and achievements. Moreover, the studies conducted to share their perspective on the learners' autonomy. These studies showed how can the educational establishments improve such quality by the result in which these studies concluded. The researchers also point out that there are many critiques on the comparative research, which were conducted in this field. It is essential to discuss these criticisms and its facts to help expounding the destination of the field of distance learning, to address the practices of the research, and where will be in the future.

CONCLUSION

Transactional Distance theory can be a useful alternative for students' learning [27], which is intended to mainly concentrate on critical thinking and creation. However, distance learning materials and contents are commonly dictated by the technology [28]. In addition, they all also designed more for the online system's convenience with its technology. To improve and develop intellectual rigidity and the development of informed and individual perspectives, further research should explore and determine how to implement transactional distance theory to engage learners in multiple and ongoing dialogues in a variety of online courses. Further investigation is needed to determine how group designs can influence social interaction and the sense of a learning community considering group members' different personalities, learning styles and levels of skill. With the advancement of technology these days, more studies and researches need to explore the roles of Moore transactional distance theory that different technological elements play in engaging more effective social interaction and learning community increase and growth, for example, audio and/or video

conferencing via Google Hangout and Skype, social network media, and virtual reality environments.

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PID 08 The Use and Acceptance of Virtual Learning Environment in Melaka Primary School.

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Abstract — VLE Frog had been used by teachers in Malaysia since December of 2011. This study is to find out the usefulness of using VLE Frog for improving teachers' performance in teaching process and the factor that led teachers to use VLE Frog. The samples of the study are the 30 teachers who have experience on using VLE Frog in primary school at Jasin, Malacca. The objectives of the study are: find out the teachers' performance in their teaching life after the use of VLE Frog, find out the factors that led the teachers to use VLE Frog, find out the new model factor for VLE Frog. The survey design is used in this study. Samples are required to answer the questionnaire. Descriptive statistics, correlations, regression to test the model. From the result of data, the teachers' performance got no improvement for "save time and effort" and "collaborates and connects".

Keywords: FROG VLE, Malaysian teacher online, Online learning

INTRODUCTION

According to National Education Philosophy, "Education in Malaysia is an ongoing effort towards further developing the potential of individuals in a

holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonic, based on a firm belief in and devotion to God. Such an effort is designed to produce Malaysian citizens who are knowledgeable and competent, who possess high moral standards and who are responsible and capable of achieving high level of personal well-being as well as being able to contribute to the harmony and betterment of the family, the society and the nation at large." Now a day, the world is full of competitive. Besides the need of food, clothing, and shelter, education become the 4th need in our life, which can't be separate from our life.

If there are any problems, then education is the solution for it; education can promote good habits, values and awareness towards anything like terrorism, corruption and much more. Education is the quality to a people and education is a need for a people. Now a day, technology plays an important role in continuing the communication of education through known and unknown peoples. It is the only fundamental way by which a desired change in the society can be taken into effect.

A virtual learning environment (VLE) is a Web-based platform for the digital aspects of courses of study, usually within educational institutions. VLE

typically: allow participants to be organized into cohorts, groups and roles; present resources, activities and interactions within a course structure; provide for the different stages of assessment; report on participation; and have some level of integration with other institutional systems [1]. With the VLE, students may get many advantages in the teaching and learning process [2]. The teaching and learning process is not just only happen in the class or in the school. Students may learn the new knowledge in home or whenever place with just using this VLE platform. Besides that, students also can collaborate with other students or professionals to increase their content knowledge, but not depend on the teacher in the classroom.

Malaysian Ministry of Education (MOE) has been carrying out the project to apply it to 10000 schools in Malaysia. All the school under the project are given the equipped with 4G high-speed internet access. YTL Communication also provides the virtual learning platform to all school, the entire member in the school have an opportunity to serve the net to a world-class Integrated Learning Solution. This Virtual Learning Environment (Frog VLE) a huge change to the teaching and learning environment [6]. It allows integrating the technology into the teaching learning. Teaching style can change by using this. VLE also allow the collaborative teaching learning; at the same time learning happen in anywhere with an Internet connection (Yes 4G Internets).

Frog Virtual Learning Environment (Frog VLE) is a tool that can help to build up a social space for school online. It is a web based learning platform where help to organize holistic learning experience [9]. By using the (Frog VLE), teachers can assign the lesson, activities and examinee the learning process more easily. it is also an idealistic tools for parents where they can observe and check their kids learning progress. Parent also can know the school programs by log in to the web, because the (Frog VLE) have a platform to show to family about school activities and notices. The Frog VLE is a user-friendly platform where is convenient to use virtual learning platform. Frog VLE had been introduce in UK at least 13 year track record. From the study of UK, people found that

frog is a good tool to enhance teaching, it also helps teaching and learning becomes simpler [8]. Google Apps for Education and the Khan Academy permeate in the platform too and it's taking teaching and learning further.

The main focus of the frog which introduce to school is to help teaching learning process become simpler, works hand-in hand with local educators and education organization by the frog to help to deliver a world-class learning environment. Beyond the technology, an emphasis is placed on equipping and mentoring schools in the usage of Frog as a tool to improve the school as a whole. The aim of the Frog VLE was to create a new Malaysians generation where are empowered to take ownership of their education and are prepared to compete in a global knowledge-based economy.

The success of a virtual learning environment (VLE) depends to a considerable extent on student acceptance and use of such an e-learning system [3]. But, is it all the users know their IDs, and all the users are given the training and the knowledge about the FROG VLE? How the usage going in the school? What is the view from the users about Frog VLE? These are the main problems that researcher is going to find out.

To find it out, researcher will use the Technology acceptance model in this study. Followings are the objectives proposed for this study

- i. Investigate the teachers' performance in their teaching life after the use of VLE Frog base on:
 - a. Find out the view of the teacher that VLE Frog save teachers' time and effort in teaching.
 - b. Find out the view of the teacher that VLE Frog provides connect and collaborate for teachers in teaching.
 - c. Find out the view from teacher that VLE Frog make student engage in learning.

METHODOLOGY

This study is a survey design, which is quantitative design. Researcher wishes to find out the surface information about the use of the VLE Frog.

Teacher who is selected from 2 schools were given the research survey. Before answering the questionnaire, teachers were briefly instructed on how to complete the questionnaire. They were also informed of their participation rights (participation was based on voluntary consent). The survey took approximately 30-40 minutes to complete. The subjects for this study were 30 teachers of Malacca primary school teacher. The teachers are randomly selected from the school in Jasin area. Of the 30 subjects, 60% (18) were from urban school and 40% (12) were from rural school. All participants voluntarily participated in this study and were assured that their responses would be anonymous and confidential.

In this study, there will be two instruments. One instrument: questionnaire with linked scale from 1 to 5 will use for getting result for research question 1: Are teachers' performance increase after the use of VLE Frog? The questionnaire adopted 5-point Likert scale ranging from 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), 5 (strongly agree). The respondents indicate their level of agreement or disagreement with the statement.

Another instrument developed by [4] was adopted as a data conducting tool. The instrument has 18 items. Data were conducted from primary school (rural and urban) in Jasin, Malacca. Descriptive statistics, correlations, regression to test the model and Cronbach Alphas to check the reliability were carried out.

In this study, data was analyzed using mean and standard deviation with the aid of SPSS statistic 22-version software and thematic coding for interview. The justification of using mean and standard deviation in this research was to measure the amount of variation or dispersion of the research data values with a view to expressing variability of the population.

RESEARCH FINDING

Table 1 showed teachers' overall perception about the teachers' performance after the use of VLE Frog. Mean of save time and effort is 2.83, which in the middle level. Mean of collaborate and connect is 2.00, which in the low level. The highest mean is the

mean of compel and engage, which is $m=3.72$. The overall mean of teachers' performance after the use of VLE Frog is 2.85.

TABLE 1: Mean of teachers' performance after the use of VLE Frog

No	Item	Mean
1	Mean of save time and effort	2.83
2	Mean of collaborate and connect	2.00
3	Mean of compel and engage	3.72
Mean of overall		2.85

TABLE 2: Analysis of each item for teachers' performance (save time and effort)

Item	1	2	3	4	5	Mean
Frog VLE save my time for preparing lesson	33.3%	20.0%	26.7%	20.0%	0.0%	2.33
I can reuse the lesson for future.	10.0%	23.3%	20.0%	16.7%	30.0%	3.33

Table 2 shows the mean of the each item from the questionnaire on teachers' performance (save time and effort). There are 10 teachers, which are 33.3% from the sample strongly disagree that "Frog VLE save my time for preparing lesson". 6 teachers, which are 20% disagree that "Frog VLE save my time for preparing lesson". 8 teachers, which are 26.7%, keep neutral that "Frog VLE save my time for preparing lesson". 6 teachers, which are 20% agree that "Frog VLE save my time for preparing lesson". There are no teachers strongly agree that "Frog VLE save my time for preparing lesson". The mean for this item is 2.33. For item 2, "I can reuse the lesson for future", there are 3 teachers, which are 10% strongly disagree on that statement. There are 7 teachers, which are 23.3% disagree on that statement. There are 6 teachers, which are 20% keep neutral on that statement. There are 5 teachers, which are 16.7% agree on that statement.

There are 9 teachers, which are 30% strongly agree on that statement. The mean for this item is 3.33.

TABLE 3: Analysis of each item for teachers' performance (collaborate and connect)

Item	1	2	3	4	5	Mean
I can discuss idea with other teacher through VLE Frog	43.3%	40.0%	16.7%	0.0%	0.0%	1.73
I can share the teaching material at the VLE Frog	33.3%	23.3%	26.7%	16.7%	0.0%	2.27

Table 3 shows the mean of the each item from the questionnaire on teachers' performance (collaborate and connect). There are 13 teachers, which are 43.3% from the sample strongly disagree that "I can discuss idea with other teacher through VLE Frog". 12 teachers, which are 40%, disagree that "I can discuss idea with other teacher through VLE Frog". 5 teachers, which are 16.7%, keep neutral that "I can discuss idea with other teacher through VLE Frog". There are no teachers agree and strongly agree that "I can discuss idea with other teacher through VLE Frog". The mean for this item is 1.73.

For item 2, "I can reuse the lesson for future", there are 10 teachers, which are 33.3% strongly disagree on that statement. There are 7 teachers, which are 23.3% disagree on that statement. There are 8 teachers, which are 26.7% keep neutral on that statement. There are 5 teachers, which are 16.7% agree on that statement. There are no teachers, which are 0% strongly agree on that statement. The mean for this item is 2.27.

TABLE 4: Analysis of each item for teachers' performance (compel and engage)

Item	1	2	3	4	5	mean
Student feel enjoyable	0.0%	3.3%	23.3%	56.7%	16.7%	3.87

when use VLE Frog	1	2	3	4	5	mean
VLE Frog make student active in learning	6.7%	3.3%	36.7%	33.3%	20.0%	3.57

Table 4 shows the mean of the each item from the questionnaire on teachers' performance (collaborate and connect). There are no teachers, which are 0% from the sample strongly disagree that "Student feel enjoyable when use VLE Frog". 1 teachers, which are 3.3%, disagree that "Student feel enjoyable when use VLE Frog". 7 teachers, which are 23.3%, keep neutral that "Student feel enjoyable when use VLE Frog". There are 17 teachers, which are 56.7% agree that "Student feel enjoyable when use VLE Frog". There are 5 teachers, which are 16.7% strongly agree that "Student feel enjoyable when use VLE Frog". The mean for this item is 3.87.

For item 2, "VLE Frog make student active in learning", there are 2 teachers, which are 6.7% strongly disagree on that statement. There is 1 teacher, which are 3.3% disagree on that statement. There are 11 teachers, which are 36.7% keep neutral on that statement. There are 10 teachers, which are 33.3% agree on that statement. There are 6 teachers, which are 20% strongly agree on that statement. The mean for this item is 3.57.

DISCUSSION

Discussion on teachers' performance after the use of VLE Frog

From the data analysis, the overall of teachers' performance after the use of the VLE Frog is at the low medium of the level, which is 2.85. From this data, we can say that most of the teachers think that teachers' performance is not increase or become better after the use of VLE Frog. The performance that researcher mention in this study is the benefit of save time and effort, collaborate and connect, compel and engage. Researcher will focus on this 3 element for the discussion later.

Discussion on teachers' performance (save time and effort)

Most people sure will think that technology will save the time and effort in our life, especially in teaching. For VLE Frog, most of the teachers think that VLE Frog did not save their time and effort in the teaching and learning process. From the item of questionnaire: "Frog VLE save my time for preparing lesson", the mean is 2.33. This show that teacher is spending more time preparing lesson by using VLE Frog. This result is supporting by research from [2] that saying the virtual learning environment may bring about unanticipated costs both in time and money disadvantages.

For item "I can reuse the lesson for future", the mean is 3.33. These mean teachers are agreeing that the lessons that create on the VLE Frog can be reuse for the next coming lesson. From this 2 item, we can know that the time for preparing the lesson by using VLE may be taking more time, but it may save the time for the future instead of reuse for the future.

Discussion on teachers' performance (collaborates and connects)

VLE Frog stated that by using VLE Frog, teachers can collaborate and connect with the other school teachers. Teachers can gain the experience from the other teachers sharing about the lesson plan. Teachers also can share their teaching material in VLE Frog to other teacher. From the finding of data, most of the teachers stated that they are not discuss idea with other teacher through VLE Frog, the mean for this item is 1.73, which is the lowest mean from all the item. For sharing teacher material, the teachers' respond also at the low level which is $m=2.27$.

Researcher believes that this phenomenon will occur because there are varieties of social media in this world. To collaborates with other teachers, teachers may use the social media such as Facebook, Whatsapp, Wechat, or forum to get the information from the other teachers. Maybe VLE Frog is a good platform for student to collaborate in learning process, but not for teacher.

Discussion on teachers' performance (compel and engage)

From the data, VLE Frog help a lot in making the classroom become compel and engage. Most of the

teachers' respond for this construct is the highest mean, which is $m=3.72$.

Teachers respond that student feel enjoyable when use VLE Frog, which is $m=3.87$. Teachers also respond that student active in learning when using the VLE Frog, which is $m=3.57$. VLE Frog is a platform that let student learn by themselves. By using VLE Frog, the classroom will be more student center. Students need to complete the assignment with the discussion within students, or they may ask the help from teacher. The classroom is not more like feeding class or traditional classroom. This result is supporting by the research from [5] that saying the virtual learning environment can enhancing learners' interactions with others.

CONCLUSION

As the conclusion, VLE Frog has a medium level on improving teachers' performance for the overall from the data that find. Data show those teachers need to use a lot time to use VLE Frog and learn to use VLE Frog. But for making engagement learning for students, VLE Frog can be use to do that.

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PID 09 Curriculum Evaluation of the Master of Arts in Aviation Management, B.C.2017 and the Developmental Approaches

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Abstract — This research aimed to evaluate the curriculum of Master of Arts in Aviation Management for the academic year of 2017 by using CIPP model. The CIPP model, which was developed by Daniel I. Stufflebeam, was used as the evaluation frame for analyzing the 4 aspects as 1) Context (C), 2) Input (I), 3) Process (P) and 4) Product (P) of the Master of Arts in Aviation Management. The research instruments were questionnaires, which were collected in April, 2018. The respondents were 12 current students and 8 graduated students. Descriptive statistics such as percentage, mean, and standard deviation were used to analyze the collected data. In addition, the researcher used an interview with 20 employers and peer review with 5 academicians. The content analysis was used for these qualitative methods. The results of the evaluation under the CIPP model (Context, Input, Process and Product) were rated at a high level (Mean is more than 3.50). The result of interview found that the employers were satisfied with the benefits of course content towards the use in aviation industry. The result of peer review showed that the instructors should encourage a variety of topics regarding graduate researches. In addition, the students in graduate school should be able to conduct and present the research either independent study or thesis by themselves. The students can combine their experience and develop practical researches which help their studies and careers. Peer review also suggested that the instructors should put diverse activities in the courses, such as research-based instruction, seminar, study tour, case studies, project-based learning (PBL), etc. and some courses should provide verification.

Keywords: Curriculum evaluation, CIPP model, Aviation management

INTRODUCTION

The curriculum evaluation is a major task and needed once the curriculum has been implemented in a Thai higher education for more than 5 year [1]. However, the curriculum should be evaluated every year since this implies quality assurance (QA) of the curriculum. A good curriculum should be evaluated based on various indicators, such as academic and research aspects, instruction quality and equipment, graduates' jobs. Therefore, the evaluation should include the stakeholders who involve with the curriculum such as the current students, graduated students, instructors and potential employers. The evaluation framework should consist of the necessary factors in the whole process of study.

A curriculum evaluation of Master of Arts in Aviation Management (Graduate Study), Aviation Personnel Development Institute, Kasem Bundit University has opened since 2011. Till the year 2016, the curriculum has admitted more than 65 students [2]. The curriculum aimed to provide knowledge and education on aviation management, which includes AM5101 Aviation Industry Management, AM5202 Human Resource Management, AM5103 Marketing in Aviation Industry, AM5104 Airline Strategic Management, etc.

Even though the curriculum evaluation in 2015 was satisfied by Commission of Higher Education (CHE) (Aviation Personnel Development Institute, 2016), the curriculum evaluation is still important since the curriculum has to be developed and modified due to the trends of aviation technology and labor market demands. Therefore, the researcher did the research to evaluate the curriculum of Master of Arts in Aviation

Management by using CIPP Evaluation Model to study the curriculum from the perspectives of stakeholders and find development approaches.

RESEARCH OBJECTIVES

1. To evaluate the curriculum of Master of Arts in Aviation Management by using CIPP Model
2. To find the developmental approaches based on the curriculum evaluation.

SCOPE OF THE RESEARCH OBJECTIVES

1. The researcher used CIPP model (Stufflebeam's) to evaluate the curriculum of the Master of Arts in Aviation Management for the academic year 2017.
2. Key informants and respondents of the curriculum evaluation are the stakeholders in the Master of Arts in Aviation Management, Aviation Personnel Development Institute

SIGNIFICANCE OF THE STUDY

1. The result of the study can be used for developing the education quality.
2. The results of the study can be used for modifying the curriculum to meet the stakeholders' demands as the current students, graduated students, instructors and potential employers.

THE CIPP EVALUATION MODEL BY STUFFLEBEAM AS AN EDUCATIONAL FRAME

There are numbers of curriculum evaluation such as Stake's Model, Tyler's Model, Kirkpatrick's Model and Roger's Model. Each model has different perspective and factors to consider. The model can focused on students' progress towards objectives such as Tyler's Model, some focused on level of education such as Kirkpatrick's Model (Reaction, Learning, Transfer, and Result). Some model focused on intend and actual and procedures of whole process such as CIPP evaluation model, which is a transformation process [3].

The CIPP evaluation model was developed by Daniel's Stufflebeam in 1960s [4]. CIPP consists of C-Context, I-Input, P-Process and P-Product. This model is a transformation process based for evaluating a higher education curriculum such as Bachelor or Master Degree curriculum. The CIPP model was created from analytic and rational basis for programmed decision-making [5]. It analyzes resource utilization and efficiency in the transformation process.

The examples of the CIPP evaluation model (Witthawassamrankul, 2018) are:

Context (C): Philosophy, Objectives, Structure, Content

Input (I): Instructor, Student, Classroom and Learning Equipment

Process (P): Learning Management, Measurement and Evaluation

Product (P): Graduated Students, Benefits, Reputation

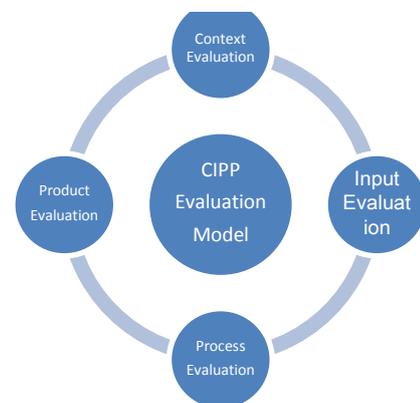


Fig.1. CIPP Evaluation Model (Stufflebeam's)

RESEARCH METHODOLOGY

The researcher used mixed methods to evaluate the curriculum of Master of Arts in Aviation Management under the frame of CIPP evaluation model. The mixed method included the questionnaires, interview and peer review.

A. Questionnaire as a Quantitative Instrument

The questionnaire was a quantitative instrument used to analyzed descriptive statistics such as

frequency, percentage, mean and standard deviation. The questionnaires indicated 5 levels based on Likert's Scale ranging from highest (5) to lowest (1). The questionnaires, which consisted of 35 questions, were proven its content validity by 3 experts and its reliability analysis was more than 0.85 after a tryout of 30 sets of questionnaire to the similar program. The researcher distributed questionnaires to 20 respondents. There were 12 current students and 8 graduated students (sampled current and graduated students were more than 90% of population). The current students were asked to rate every question. The score ranges and meaning of questionnaire were as below:

4.21-5.00	Highest
3.41-4.20	High
2.61-3.40	Moderate
1.81-2.60	Low
1.00-1.80	Lowest

B. Interview as a Qualitative Method

Interview was done with employers of the graduated students. Interview questions asked the knowledge and abilities of the graduates and what the employers expected from the graduated students of this curriculum. Five types of employers or interviewees work in the aviation (20 key informants) as:

- Thai Airways International Company, Ltd.
- Thai Low Cost Airlines
- Airport of Thailand (AOT)
- National Airlines
- Non-Thai Low Cost Airlines

C. Peer Review as a Qualitative Method

Peer Review is a method which academicians, scholars and researchers use to find solution and developmental approaches. It gathers opinion and criticism of academicians, scholars and researchers from the meeting. In this study, there were 5 reviewers who hold doctoral degrees and academic titles from Aviation, Tourism, Service Industry and Business Management. They were 2 Associate Professors, 2 Assistant Professor and 1 Lecturers with Ph.D. in Business Management

DATA COLLECTION AND ANALYSIS

The researcher distributed the questionnaires to the current students who completed the coursework and are currently doing independent studies or theses. In addition, he gave the questionnaires to the graduated students who work in the aviation organizations more than 1 year. He analyzed descriptive statistics as frequency, mean, percentage, standard deviation.

The researcher interviewed 20 key informants or employers of the graduates and then used content analysis to analyze the information. The researcher established the meeting for peer review.

The reviewers discussed the curriculum matters under the CIPP evaluation model. The researcher also asked the developmental approaches for the curriculum.

RESEARCH RESULTS

The researcher divided the results into 3 parts based on the instrument and the methods used in CIPP Evaluation Model (Context, Input, Process and Product).

A. The Questionnaire Results Based on CIPP Evaluation Model

1. Context (C):

1.1 Philosophy: The overall scores was at a high level (mean = 4.60)

The philosophy clearly defines characteristics of the graduated students (mean = 4.73)

The philosophy covers the purposes of the curriculum (mean = 4.62),

The philosophy aims to develop aviation personnel (mean = 4.69),

1.2 Objectives: The overall scores was at a high level (mean = 4.59)

The long-term objectives for developing students' potential (mean = 4.47)

The objectives related with economic situation (mean = 4.33)

The objectives aligns with learning management (mean = 4.43)

1.3 Content: The overall scores was at a high level (mean = 4.63)

The content meets the demands of the students (mean = 4.55)

The content meets demand of aviation industry market (mean = 4.61)

The content helps the students to work in aviation industry (mean = 4.31)

2. Input (I):

2.1 Instructors: The overall score was at a high level (mean = 4.61)

Instructors give advices and are helpful (mean = 4.64)

Instructors are professional in aviation industry (mean = 4.61)

Instructors develop students' abilities in learning (mean = 4.66)

2.2 Students: The overall score was at a high level (mean = 4.62)

Students have good attitude towards aviation industry (mean = 4.44)

Students engage with class activities (mean = 4.12)

Students would like to participate in the class (mean = 4.45)

2.3 Learning Equipment: the overall score was at a high level (mean = 3.90)

Enough equipment for learning (mean = 3.86)

Fast internet and networking (mean = 3.71)

Technology and IT are used in classroom (mean = 3.68)

3. Process (P):

3.1 Learning Management: The overall score was at a high level (mean = 4.58)

The curriculum encourages practical experience such as internship (mean = 4.01)

The curriculum offers alternative ways of learning (mean = 4.45)

The curriculum increases students' skills for occupation (mean = 4.55)

3.2 Administration and Services: The overall score was at a high level (mean = 4.47)

Administration and Supporting service for education (mean = 4.66)

Introduction for registration and studying (mean = 4.50)

Fast system for admission and documentation (mean = 4.38)

3.3 Measurement and Evaluation: The overall score was at a high level

(mean = 4.23)

Measurement and evaluation are fair (mean = 4.10)

Measurement and evaluation meet the course objectives

(mean = 4.65)

Measurement and evaluation follow the determined structure (mean = 4.25)

4. Product (P):

4.1 Graduated Students: The overall score was at a high level (mean = 4.61)

The students can work in the aviation industry after graduating (mean = 4.80)

The students have enough knowledge in workplace after they graduate (mean = 4.42)

Students can tolerate to work and deal with difficulty (mean = 4.60)

B. The Interview Results from the Employers who used the Graduated Students

The interview results of the employers who use the graduated students showed that they were very satisfied with the graduated students. The knowledge which the graduated students gain can be used in their organizations, particularly management. The graduated students know about marketing and management in aviation industry. The organizations like the curriculum which can develop people.

C. The Peer Review Results from the Academicians, Scholars and Researchers

The peer review results showed the curriculum met the CIPP evaluation as:

1. Context (C) of the curriculum was useful and practical for people who work in aviation industry. The curriculum has been prepared for the students in both operational and management levels. The diverse contents which cover major area of marketing, management, accounting and finance, operation and research were important for the graduated students who would like to further themselves in aviation industry and the related field, such service industry.

2. Input (I) of the curriculum was good since the instructors were from the reputable aviation organizations from both airlines and airports. The instructors hold both academic degrees and experiences in aviation fields such as pilots, senior flight attendants, purser, directors of aviation organizations and marketing managers. In addition, materials which used in the classes were relevant to the career in aviation organizations.

3. Process (P) of the curriculum was flexible for working persons, particular schedule and block courses. The main academic functions were properly followed such as preparing course syllabus, instruction management. Registration and payment is also simple for the students. In addition, it is easy to access information from IT and e-services in the program at any time.

4. Product (P) of the curriculum was good. The students can apply the knowledge they studied in the class in their real workplace. The students were satisfied with experience from the study. They keep contact with their alumni.

CONCLUSION AND RECOMMENDATION

The research results found that context and input was rated at the highest level. The curriculum meets the philosophy and objectives, particularly to develop the knowledge and abilities in aviation management. Philosophy: The overall scores was at a high level (mean = 4.61) and input as the instructors who hold academic degree and experienced in aviation industry (mean = 4.60). Overall, based on the study, the students and stakeholders were satisfied with the curriculum. However, regarding peer review, the reviewers recommended the developmental approaches as:

1. The instructors should encourage the students to do and present the researches. The reviewers suggest that to study in graduate level, the students must have ability to study and to do researches. The topics of the researches can help the students' work and develop the students. In order to provide the diversities of research, the instructors and researchers should synthesize the independent studies

and theses of the students. Furthermore, the students should be able to publish in journals or present in national or international conferences.

2. The reviewers suggested that the instructors should put some activities into the courses, such as research-based instruction for AM5105 Research Methodology in Aviation, AM5201 Seminar in Aviation Industry, study tour for AM5206 Airport Management, case studies for AM5104 Airline Strategic Management, project-based learning (PBL) for AM5103 Marketing in Aviation and problem-solving AM5213 Law in Aviation Management etc. and at least 25% of the courses of the curriculum taught should provide verification such as a retest to ensure the quality assurance.

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PID 10 Trajectory Estimation of Table Tennis Ball by Aerodynamics Model considering Translational and Rotational Speed

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Abstract — In order to introduce robots into sports, trajectory estimation techniques are required. The purpose of this research is to identify aerodynamic model for trajectory estimation. The parameter within the drag and lift coefficient were identified from the trajectory data and the validity of the result was verified. We also proposed a trajectory prediction method that is updated at each time point as a location estimation method from a single trial. We confirmed the effectiveness from the error falls within the range of the racket.

Keywords: Trajectory estimation, Table tennis

INTRODUCTION

Due to the remarkable development of robot technology in recent years, the place where robots used is not limited to the industrial field. There is the fields where robot technology is advancing, such as sports. When the robot performs sports, the robot needs to know information on the surrounding environment such as self-position recognition, grasp of the coat's range, position recognition of the opponent, and it is necessary to perform control to select and execute the most suitable action from the obtained information. Generally, there are various types of sports, many types of them are ball games. In ball sports, there are the trajectory of the ball in the game, the position of the opponent (all members in the case of plural). By using these information, actions such as which side should be returned the ball can be decided. In this study, we focus on the estimation of the ball's trajectory. This is because the appearance of flight varies greatly depending on the translation speed and rotation speed of the initial stage of the flight of the ball. It is difficult for the robot to execute the hitting

action if there is no prediction of the trajectory in advance. The trajectory estimation is performed by acquiring the movement information of surrounding objects with a visual sensor.

In addition, we choose table tennis as the ball sports in this study to do the trajectory estimation. The reason for this is the table tennis ball trajectory changes greatly due to the influence of the angular and translational velocity from the state of the initial flight, therefore the effect of the robot's hitting performance by the estimation is large. Table tennis is also because the interval of the rally during a game is very short, which is why estimation in a very short time is necessary.

PREVIOUS RESEARCH

The table tennis robot "FORPHEUS" developed by Omron has the goal of "continuing the rally". This is performing three-dimensional measurement of the table tennis ball at a sensor and performing trajectory prediction and robot control in every 1 ms. Also, taking into consideration the position of the opponent and the racket, the ball is hit back at the returning spot according to the opponent's way of hitting. However, although the trajectory prediction performed in FORPHEUS had a return ball accuracy of about ± 10 cm at the initial stage. As a solution, using deep learning with AI leads accuracy of ± 5 cm.

Y. Zhao, R. Xiong, Y. Zhang, "Model Based Motion State Estimation and Trajectory Prediction of Spinning Ball for Ping-Pong Robots using Expectation-Maximization Algorithm" [1] showed that the extended continuous motion model (ECMM) was derived by dividing the trajectory into a plurality of categories by using the k-means method and fitting each by using a Fourier series. Based on the ECMM,

they proposed a new motion state estimation method using the Expectation-Maximization (EM) algorithm. As a result, accurate trajectory prediction was made. It was possible to further improve the performance by using the Drag coefficient and the Magnus coefficient as the coefficient of the Fourier series, but this will make the calculation complicated and it is considered as a future problem.

M. Pan, I. Mizuuchi, "Three-Dimensional Rotation of Ball Rotation And Orbit Prediction Method For Table Tennis Robot" [2] showed the equations of motion with gravity term, lift term and drag term as in this research on the trajectory estimation of table tennis balls, and derived the equation of change of rotation speed by air friction.

C. Liu, Y. Hayakawa, A. Nakashima "Racket Control for a Table Tennis Robot to Return a Ball" [3] measured the position and speed of a flying ball from the catapult with a high-speed camera on the opponent coat at table tennis, and the trajectory of a ball was estimated from this and the aerodynamic or table repelling model. From this estimation result and the racket repulsion model, they estimated the posture and speed of the racket suitable for returning the ball to the target landing position in the opposite coat at the predetermined translational / rotational speed. In this study, in order to decrease time calculation for solved the aerodynamic model, the approximate aerodynamic model was estimated instead of the aerodynamic model and the motion of ball returning was controlled. The aerodynamic model used in this study has been identified under the assumption that the rotational speed was always constant.

Y. Hayakawa, A. Nakasima, S. Itoh, Y. Nakai, "Ball Trajectory Planning in Serving Task for Table Tennis Robot" [4] showed that it controlled the robot arm which attached the racket and made a serve task to bounce once at each one of coat. Here, the aerodynamic model, the racket repulsion model, and the table repelling model were used for position estimation of the ball. In this study, the state of the ball (position, translation speed, rotation speed) was predicted after the second rebound and the racket motion was determined from the simulation result.

Besides this, there is a conventional study such as [5] to [10].

PURPOSE OF RESEARCH

In this study, we identify the aerodynamic model for the estimation of the ball trajectory. In the previous research has various problems.

1. The values of drag and lift were constant from the values obtained from the experiment.
2. Control at 1 ms intervals was necessary for precise trajectory estimation.

Therefore, in this study, by setting the drag and lift as a function of initial velocity and angular velocity, it is possible to obtain the ball trajectory by measurement interval larger than 1 ms estimation from the data is performed. For estimation calculation, we use MATLAB by MathWorks. First, we capture the ball from the ball launch machine with a high speed camera. We obtain the position, translation speed, and rotation speed from the obtain camera data. Here, we refer the aerodynamic model to be used from the previous study [4].

$$m\ddot{p} = -mg - \rho C_D S_b \|\dot{p}(t)\| \dot{p}(t) + \rho C_M V_b \omega \times \dot{p}(t) \quad (1)$$

$p(p_x, p_y, p_z)$: Ball position [m]

$g(0, 0, g)$: Gravitational acceleration [m/s]

$\omega(\omega_x, \omega_y, \omega_z)$: Angular velocity [rad/s]

ρ : Air density [kg/m³]

m : Ball mass [kg]

r : Ball radius [m]

C_D : Drag coefficient

C_M : Lift coefficient

$$S_b = \frac{1}{2} \pi r^2 [\text{m}^2]$$

$$V_b = \frac{4}{3} \pi r^3 [\text{m}^3]$$

We identify C_D and C_M in equation (1), and regard it as an estimation equation of the trajectory of the ball.

In this study, the spin parameter is used to identify the lift coefficient C_M and the drag coefficient C_D . Here, the spin parameter SP is expressed by the following equation (2).

$$= \frac{r \|\omega \times \dot{p}(t)\|}{\|\dot{p}\|^2} \quad SP(\dot{p}, \omega) \quad (2)$$

The drag coefficient C_D and the lift coefficient C_M are polynomials of the spin parameter as follows.

$$\sum_{i=0}^{n_d} a_{Di} [SP(\dot{p}, \omega)]^i \quad C_D = \quad (3)$$

$$\sum_{i=0}^{n_m} a_{Mi} [SP(\dot{p}, \omega)]^i \quad C_M = \quad (4)$$

$a_{Di}, a_{Mi} : \text{constant}$

Where n_d, n_m are degrees of the polynomial. The purpose of this research is to estimate the parameters in the equations to find the trajectory of the above table tennis ball.

COEFFICIENT ESTIMATION

D. Estimation method

The parameters to be estimated are the drag coefficient C_D , the lift coefficient C_M , and the rotation angle. The data used for the estimation are the position of the ball photographed by the camera and the number of shooting frames. The frame rate of the camera used this time is 150 [fps].

For this time, parameters that minimize the following evaluation function are estimated from data of nine types of ball trajectories.

$$f_p = \sum_{k=1}^K \frac{1}{n_k} \sum_{i=1}^{n_k} \left(\|p_i(a, x^{(k)}, \omega^{(k)}) - p_{mi}^{(k)}\|^2 \right) \quad (5)$$

$a : a_{Di}, a_{Mi}$

x : Initial speed [m/s]

ω : Angular velocity [rad/s]

p_i : Ball position by simulation [m]

p_{mi} : Ball position by camera [m]

K : Number of trials

k : Trial number

n_k : Number of position data at the k th time

We estimate the parameters within the drag and lift coefficient such that the evaluation function f_p based on the square error between the ball position according to the simulation result and the ball position actually measured by the camera is minimized.

E. Estimation result

As an actual estimation method using this equation, we create a program at MATLAB to calculate the aerodynamic model and evaluation function, and estimate it. An example of the trajectory estimation result is shown in Fig.4.1 to Fig.4.3. The angular velocity estimates for each trial are shown in Table 4.1 and the parameter estimation results are shown in Table 4.2.

In this study, each axis is defined as follows and shown in Fig.4.4.

x axis : long side direction of the table-tennis table

y axis : short side direction of the table-tennis table

z axis : height direction

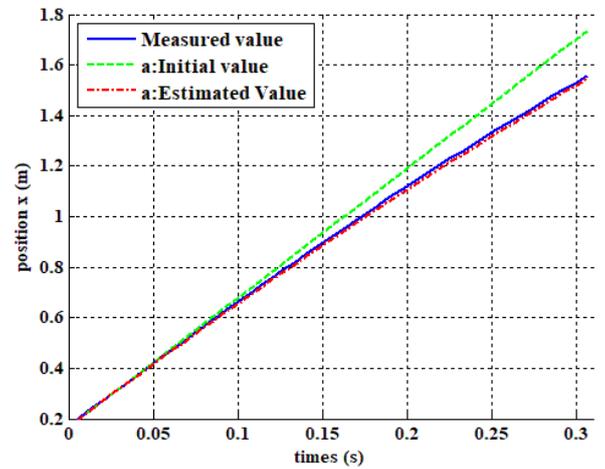


Fig.4.1 X axis direction estimation result

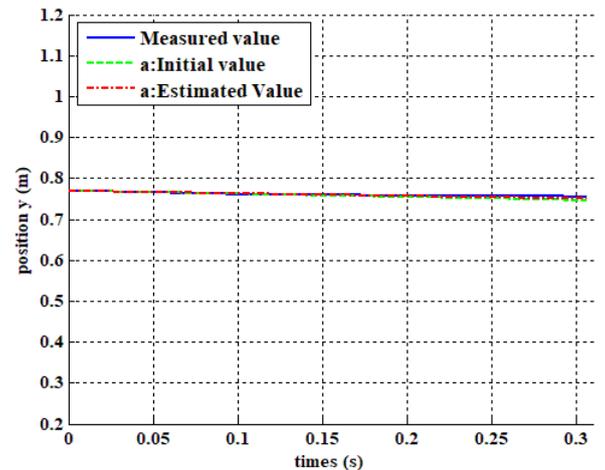


Fig.4.2 Y axis direction estimation result

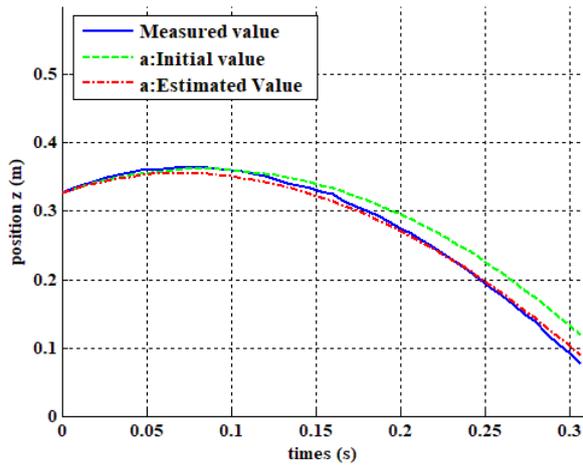


Fig.4.3 Z axis direction estimation result

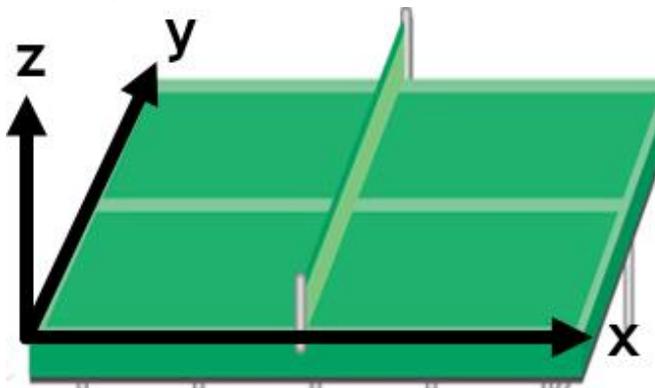


Fig.4.4 Definition of each axis

Table 4.1 Estimation results of angular velocity in each trial

	ω_x (rad/s)	ω_y (rad/s)	ω_z (rad/s)
Data1	-6092.8	2903.5	1584.6
Data2	-321.1	3015.3	129.4
Data3	4255.0	-3251.5	-983.9
Data4	-3924.5	-3888.0	666.0
Data5	-126.3	-4087.8	52.8
Data6	4932.9	-3894.3	-849.5
Data7	660.4	2841.3	-195.4
Data8	-727.0	-218.7	77.9
Data9	862.1	-331.8	-172.8

Table 4.2 Estimation results of drag coefficient and lift coefficient parameters

a_{D1}	7.31×10^{-1}
a_{D2}	3.68×10^{-3}
a_{D3}	-2.13×10^{-2}

a_{M1}	-5.45×10^{-1}
a_{M2}	7.51×10^{-1}
a_{M3}	-2.33×10^{-1}

The estimated position after the coefficient estimations compared with the estimated position before coefficient estimation is closer to the actual measurement value. In addition, the average error and the standard deviation of between measured value to the estimated value at the data final point are -0.036 ± 8.1 [mm] in the x-axis direction, -0.74 ± 1.5 [mm] in the y-axis direction and 0.60 ± 8.72 [mm] in the z-axis direction. Since this value is within the range of 150×150 [mm] which is the size of general table tennis racket, it is reasonable value. From the results, it is considered that the estimated parameter within the drag coefficient and the lift coefficient is a reasonable value.

POSITION ESTIMATION FROM A SINGLE TRIAL

F. Estimation method

In the previous section, the parameters in the drag and lift coefficients and the angular velocity were estimated from the plurality of ball trajectory data. The estimation result is considered to be reasonable, but it takes so much time. In this section, we consider the method of estimating the destination of the ball more quickly during one trial. As an estimation method, we use the aerodynamic model (1) and find the angular velocity that minimizes the following evaluation function (6).

$$f_{\omega} = \frac{1}{n_k} \sum_{i=1}^{n_k} (\|p_i(a, x, \omega) - p_{mi}\|^2) \quad (6)$$

For the parameters within the drag coefficient and lift coefficient, we use the values which estimated in the previous section. The estimation method of this section is not a method of estimating from the whole data obtained. First, estimates the initial velocity and angular velocity from the values from several points before the initial point with the position measurement value at a certain point as the initial point. By using

the obtained initial velocity and angular velocity, we predict the trajectory from the initial point to a certain time. After that, the initial point is changed to next point and we perform similar prediction. It repeats the method until a predetermined final point becomes the initial point.

G. Estimation result

Estimation is performed using the data of the past 3 points and 5 points from the initial point. We use the trial data used in the previous section. This time, we choose the end time which ball flying is 0.3 [s], and trajectory estimation at the initial points 0.1 [s] and 0.2 [s]. Evaluation is performed by comparing the measured value with the estimated value. The estimation results using the data of the past 3 points are shown in Table 5.1 and 5 points are shown in Table 5.2.

From the results, the estimation result of the past 3 points using the data of 0.1 [s], and the estimation result of the past 5 points using the data of 0.1 [s] resulted in a large error in the z axis direction. Also it can be seen that the estimation result at the past 3 points using the data of 0.2 [s] shows larger error than the estimation result at the past 5 points using the data of 0.2 [s].

This is due to the fact that the measured values had errors, we conceive the influence of the measured error are greater when estimate the initial speed and angular velocity using the data of the past 3 points than estimate that using the data of the past 5 points. Therefore, the initial speed and the angular velocity are assumed to be obtained by using the past 5 points for this estimation.

Next, estimation examples of ball trajectories based on estimation results from the past 5 points are shown in Fig. 5.1 to Fig. 5.3. As a consideration from Table 5.2, large error appears in the z-axis direction in the estimation from 0.1 s, but as the initial point of the estimation approaches 0.3 [s], which is the end point, this error becomes small. However, as an exception, there were also places that depart from the actual trajectory. This is considered to be due to errors in the measured data. Also, the error in the estimation from

0.2 [s] will be within the range of the table tennis racquet, so it can be estimated by this method.

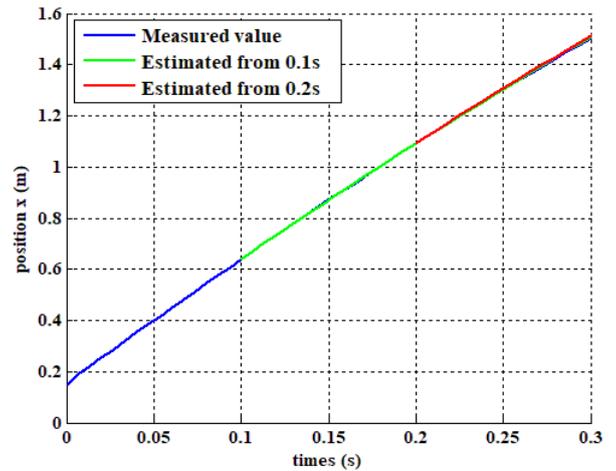


Fig 5.1 X axis direction estimation result from past 5 points

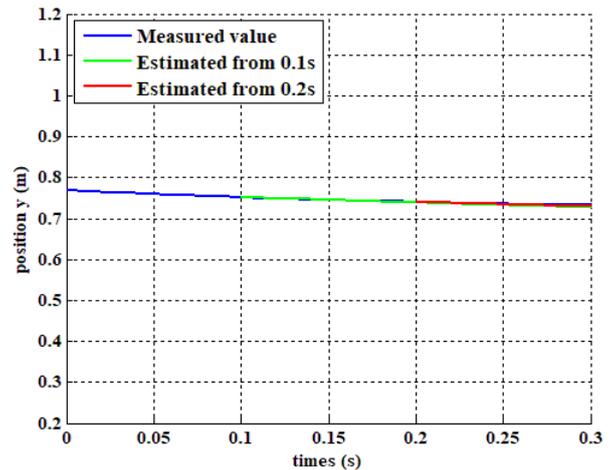


Fig 5.2 Y axis direction estimation result from past 5 points

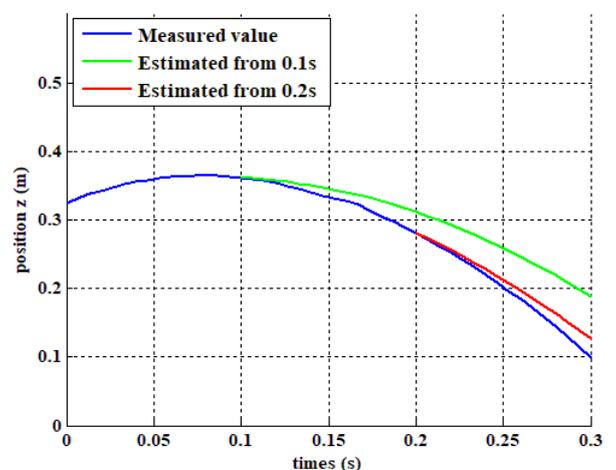


Fig 5.3 Z axis direction estimation result from past 5 points

Table 5.1 Estimated result from past 3 points

	0.1s		0.2s	
	Mean error (mm)	standard deviation (mm)	Mean error (mm)	standard deviation (mm)
x	7.360	4.890	2.817	23.636
y	-11.126	13.685	-100.977	291.227
z	75.396	20.412	94.376	218.345

Table 5.2 Estimated result from past 5 points

	0.1s		0.2s	
	Mean error (mm)	standard deviation (mm)	Mean error (mm)	standard deviation (mm)
x	9.575	3.843	12.044	4.815
y	-8.825	8.691	-0.433	2.702
z	99.255	12.278	23.662	8.697

CONCLUSION

In this study, the flight trajectory of the table tennis ball was actually measured at a low frame rate, and the parameter in the drag coefficient, the parameter in the lift coefficient and the angular velocity were estimated from the obtained plural data. We investigated the position estimation in one trial using obtained parameters in the drag and lift coefficient.

As a result, values of lift coefficient and drag coefficient according to estimation result of angular velocity were close to those in other study [10]. The error obtained by comparing the estimation result and the measured data fell within the range of the table tennis racquet. As a future prospect, we consider the method of estimating in real time from estimation method on the position estimation of a single trial. In order to realize this, it is necessary to further improve the calculation speed. Moreover, it can be applied to controlling table tennis robots by using real time estimation. In addition to the table tennis robot, it can use incorporating a destination estimate technique into a robot that is active in other societies.

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PID 11 The Design of a Learning Activity by using Constructionism Approach through Social Network Improving Team base Learning.

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Abstract — Synthesis of the conceptual framework for modeling is a process used to document theories, theories, and research to form the basis for the design of creative learning. Constructionism. It consists of theoretical and theoretical analyzes, including theories of learning, namely, the theory of Constructionism, teaching theories, media, information technology. Social Networking teamwork And contextual conditions related to teaching and learning. Including how to create a record to be used as a basis for creating a synthesis record. The conceptual framework of the synthesis of the conceptual framework is based on theoretical frameworks. The synthesis is a conceptual framework consisting of: 1) stimulating creative learning with wisdom; 2) supporting the use of online social networks; 3) promoting teamwork; 3) creating synthesis notes; based on the conceptual framework and conceptual synthesis in the second paragraph. 4) Bring the synthesis notes to the conceptual framework. And consistency between issues. In the design record, the model with the conceptual framework for creating a recording and applying the feedback to the editor. And 5) application of synthesis notes, conceptual frameworks, models, proposed measurement and evaluation experts to evaluate the quality of the recordings by checking the accuracy. And consistency between issues in model design notes, conceptual frameworks for recording and recommendations. Based on the synthesis of conceptual frameworks and principles in design, creation of creative learning activities through the use of social networks to promote teamwork. The eight main components are: 1) Problem Situation 2) Teamwork Learning to Promote team base learning. 3) case studies

4) sources of information through social networks 5) learning resources 6) social communication tools 7) expert counseling centers 8) centers for developing creative learning activities.

Keywords: Design of learning, Constructionism, Social network, Team base learning

1. INTRODUCTION

Currently, Thai education is focused on the use of technology for education through learning through social networks, which is the introduction of theoretical knowledge. Constructionism Applying Information Technology for everyday use and teaching. It also includes the application of Internet technologies in various ways to create information retrieval methods. Can be published. Or, freely exchange online learning. In order to practice, technology can be used to study, study, have moral, ethical in living and can live together with others. The study of concepts and theories. Finding the Learning Theory for Creativity Constructionism is the doping or creation of things that Professor Seymour Papert developed in 1960. It is based on the theory of self-knowledge. Constructivism of Piaget (Jean Piaget) .There are concepts and models of activities that can be used to develop work pieces or projects. Students need to think and evaluate their ideas at all times. Both in the planning and preparation stages. The process of work and the process of evaluating the work is that in creating the workpiece, the student develops the idea. In addition, the creation of work pieces encourages students to create knowledge, as learning occurs when students engage in

meaningful work with students and when students create work pieces knowledge. The teaching and learning based on the principles of Constructionism, learning by doing to achieve the project of the interests of the students through media and technology to learn on the Computer network based learning with concrete. In addition, the learner also learns the integration of knowledge in a variety of ways. There is a mentor, a consultant, and a learner, between the learner and the instructor and the learner with the learner. Students will be able to learn by themselves. Constructionism Developed in the thinking system. The development of higher education in Thailand is moving towards the era of web-based instructional learning. It is a model that supports teaching methods based on theories of Constructionism is a well-formed and independent.

2. CONTEXTUAL STUDIES

Based on the contextual study of students to create creative learning activities through their social networks, to promote teamwork that is appropriate to the learning process leading to model design. This is a great way for students to participate in their own learning. The principles and theories used in this research are:

- Constructionism.
- Based on the study of team base learning.
- Social Network.

Contextual study Constructionism Apply the principles and theories of Seymour Papert [3] has four stages

1) Explore, organize good learning activities. Students should have the opportunity to study, explore information, self-study and good learning activities should exchange information. The experience of other members.

2) Experiment. Learning should be involved in the design of the experiment to be consistent with the hypothesis that it needs to be tested for longer experience and recall. The learning activity should be recorded in the form of a recorded design.

3) Learning by doing, learning activities of learners. Encourage learning by doing, which will make accessing the resources easier.

4) Doing by learning. Learning should focus on learning. Can learn self until the motivation to think. Learning activities should be encouraged so that knowledge can be practiced and applied to everyday life.

Measurement and evaluation awareness of creative learning activities through the social network to promote team base learning in each stage of the team is 5 steps.

1) Forming most students has the opinion that the grouping should be based on the aptitude and interest of the team members, with 4-5 members in each team. Number of males, females, and grades are good, moderate and weak. This will be based on the results of the previous semester and the team members will choose the team leader. Deputy Chief Team Secretary

2) Storming. Brainstorming should listen to the opinions of others. It allows members to express their ideas freely and freely express themselves freely.

3) Norming. In order to set rules, members of the group should not post messages or content that is a criticism or a reference to the monarchy and the royal family. Do not post messages or content related to illegal or immoral things.

4) Performing to achieve common goals should have clear objectives and goals, mutual visibility and confrontation, problem solving, and auditing. Review the work and how it works.

5) Adjourning. Dispatch from the team. All members should summarize the details and discuss all the work. Validation to achieve that goal both. By evaluating the team's performance or evaluating the performance of the team.

The study of the context of social networks uses the principles and theories of Lev Vygotsky [2] to synthesize a conceptual framework for the research of a learning activity by using constructionism approach through social network improving team base learning. This is based on

the concept of research. The theory is a guideline to practice. The design of ICT learning processes used in learning activities is as follows

1) Levels of media use by students. The level of use of Facebook, line, Instagram, Twitter and Email respectively.

2) Use of appropriate technology and links between students. Students use Facebook, Line, and Email respectively.

3) Place to access the media, students can access the media from the residence. From the university and from the public respectively.

Based on the synthesis of conceptual frameworks in research creation of a learning activity by using constructionism approach through social network improving team base learning. Which shows the relationship between the theoretical principles and implementation by transcribing ideas from the research framework, designing a creative learning model of a learning activity by using constructionism approach through social network improving team base learning as follows

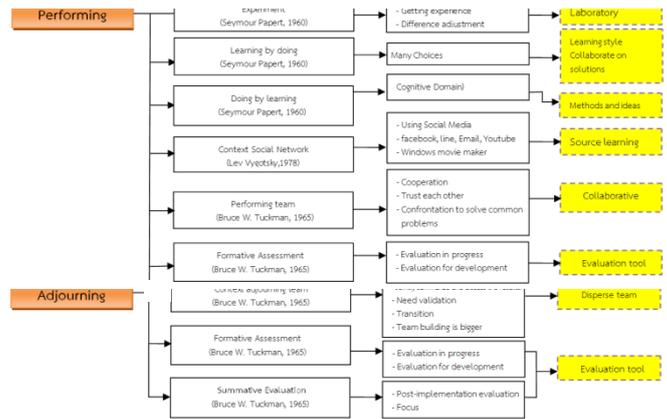
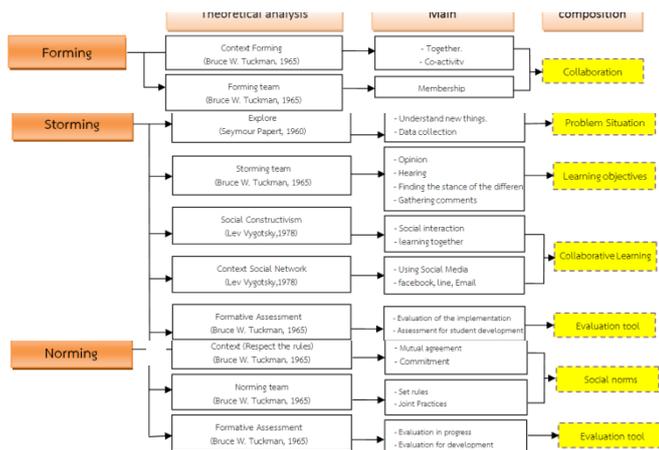


Figure 1 Conceptual framework and design principles

By synthesizing conceptual frameworks and principles in designing of a learning activity by using constructionism approach through social network improving team base learning. There are eight main components. 1) Problem Situation 2) Team base learning objectives 3) Case Studies 4) Social Networking Resources 5) Learning Resources 6) Social Communication Tools 7) Expert Advisory Centers 8) Activity Centers learning with constructionism. This can be described in detail with the following details:

1) Problem Situation

As a starting point, students can access the content of the course, which is designed by bringing the situation from the authentic context to help solve the appropriate problem of the learner to stimulate the learner. Group learning with constructionism.

2) Team base learning objectives

Designing by implementing the principles of E-learning this is a teaching that focuses on the learner to learn. Processed in the form of electronic media such as Using Social Networking. Web-Based Learning or on-line Learning by the students who study e-learning. Can study the content online. And can be used in presentations by Multimedia Technology. And Interactive Technology with Constructivist Focus on learning process of learners.

3) Case study

Design by applying the learning principle through the facilitator using a close case study to compare the learners for example, an image offense that can be traced to a source is based on the underlying theory. Creative learning by the intellect Seymour Papert [3] or message offense Counterfeit articles and other offenses. Under the Act on Computer-related Offenses Through social media online. From the basic theory of Lev Vygotsky [2]

4) The source of the social network.

Design by applying the basic theory of principle Lev Vygotsky [2]. The source of the online social network and learn to work as a team. Used to provide learners with access to key resources and collaborate on Team base learning Bruce W. Tuckman [1] and learning constructionism Seymour Papert [3] the principles of surveying such as Google, Bing, Yahoo and Ask

5) Learning Resources

Design by adopting access principles learning resources for learners to study in response. Learning Objectives encourage students to be born. Learning with constructionism of Seymour Papert [3] and stimulate Team base learning from theory Bruce W. Tuckman [1]. The findings of Seymour Papert [3] such as Website, YouTube, Video sharing

6) Social Communication Tools

Design by using communication tools to encourage learners to learn constructionism is based on the basic principles of constructionism learning of Seymour Papert [3] and team base learning through online social networks surveyed such as Facebook, Line, Email, and Twitter

7) Expert Advisory Centers

Design by expert consultant in order for the learners to listen to the experience, they can apply it to the mission promote work from the theory of Bruce W. Tuckman [1]

8) Activity Centers learning with constructionism

Designed to encourage learners to develop themselves using the principles of Social Constructivism. Based on the theory of Lev Vygotsky [2]. The concept

comes from "Social interaction plays an important role in the development of cognitive" when students are at a lower level than the zone of proximal development, so that learners are encouraged to learn Scaffolding by Vygotsky [2]. Focus on self-improvement through social networks to promote team base learning.

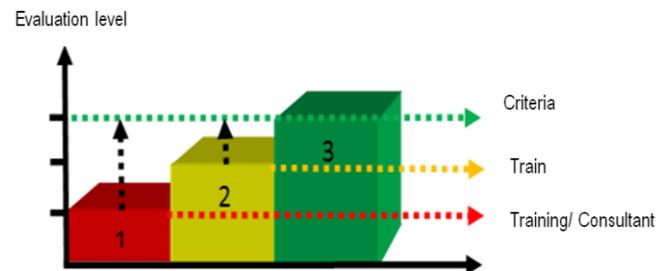


Figure 2 Personal development

1) The problematic development of the FILA guidance table consists of: Problem identification problem. Analyze Find out the facts. The truth that appears in the proposition. Know the facts between the facts. Take issues into issues. Ideas: Idea generations.

2) Evaluate for team base learning development based on benchmark. From team base learning to theory Bruce W. Tuckman [1]

3) Increasing knowledge by training. It is a systematic learning process to create or Knowledge, skill, ability and attitude this will help students develop more knowledge.

3. CONCLUSION

Designing models for a learning activity by using constructionism approach through social network improving team base learning the principles and theories of learning Constructionism theory of Seymour Papert [3] Social Network theory of Lev Vygotsky [2] and team base learning theory of Bruce W. Tuckman [1] as a basis for model design the researcher synthesized eight important elements. 1) Problem Situation 2) Team base learning objectives 3) Case Studies 4) Social Networking Resources 5) Learning Resources 6) Social Communication Tools 7) Expert Advisory Centers 8)

Activity Centers learning with constructionism. This will be used as a model for creating creative learning activities through the social network to promote teamwork in the next step.

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PID 12 The Effect of FATIH Project on Digital Divide and Equal Opportunities in Education in Turkey

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Abstract — This research has been realized with the aim of evaluating FATIH project which is applied in Turkey in the frame of digital divide and equal opportunity in education. The research has been realized with totally 1950 high school students having education in Sakarya in Turkey. “Scale of Using and Benefiting from tablet computers” has been used as data collection instrument in the research which is realized in general survey model. The data taken from the students attending in four different high schools have been classified according to aimed sampling method and 1597 of them have been transferred to SPSS 17.00 program. Independent Samples t-test, Paired Samples t-Test and One-Way ANOVA statistical procedures have been made on the data. According to the data taken, as tablet computers in the content of FATIH project are distributed, when the students attending at private schools are compared to the ones at governmental schools, the ones having tablet PCs and the ones not having, the students with high economic levels compared to low economic levels, the result of being able to use tablet computers and level of benefiting from the opportunities which tablet computers present has been higher has been reached. Also after the tablet computers are distributed to the students, it has been determined that in the future there is an increase at the level of students’ using skills of these computers and benefiting from the opportunities which tablet PCs present. These reached results it has been determined that FATIH project does not only provide equal

opportunity in education but also prevents digital divide. It is proposed that FATIH project has to be reached to every school all around Turkey and projects like these have to be enlivened by other countries in order to prevent digital divide and provide equal opportunity in education.

Keywords: Faith project, Digital divide, Equal opportunities in education

INTRODUCTION

Adopting ourselves to the development in the rapid developing world has been an obligation. If a society does not show enough sensitivity to the developments all around the world, there will be an increasing distance between him and developing world all through the time. In other words, as developed societies develop more, the ones which adapt themselves to the development will become underdeveloped. Because of this reason, many countries are in great effort to adapt themselves to the rapid developments all around the world. The matter underlying this effort is to own new information as soon as possible by reaching it in any way and take place in the developed countries by producing new information from the information they reached. The most important elements to reach this are having ICT and education.

As rapid developments in the world establish a change in economical and social lives [23], the most rapid method of following these developments is

having information and communication technologies (ICT) and this obliged us using these in a correct way. This situation brought out the need for the individuals who know the way of reaching information in a natural and rapid way, who question the information they reach, the ones who are able to use technology effectively [31]. In other words, in addition to having ICT, it is required to have educated individuals who are able to use in a correct way. The difference between the countries which have ICT and are able to use it and the ones which do not have ICT and are not able to use it increase more and more [8]. This situation is being lived not only between the countries but also in the borders of a country, between settlements [38] even in different districts of a city [39]. These inequalities being lived in access to ICT and usage of it are stated as “Digital Divide” [40]. Digital Divide is being defined by OECD (2001) as “differences in the frame of access to ICT and internet usage opportunities between individuals, household, enterprises and geographical regions at different socio-economical levels”. Hargittai (2003) defines it as the difference between the ones reaching digital technologies and the ones not reaching digital technologies or the ones using digital technologies and the ones not using them. As a result, digital divide is explained as “inequality”.

Generally, inequality concept states reaching the resources equally and benefiting from them in an equal way [32]. Bishop (1997) defines opportunity equality as giving opportunity to everyone to present their skills, not putting barriers to anyone on this subject and not providing unfair advantage. Opportunity equality in education is having the chance of benefiting from educational services equally to develop the skills of everyone without any barrier and difference in a relevant way states opportunity equality as the equality of reaching educational services in developing everyone’s secret power and skills without making any distinction and reaching all educational resources and benefiting from these. Fidan (1987) sees opportunity equality in education as establishing schools at the same quality for everyone, having equal

opportunities for the individuals attending at these schools, providing equality for the effectiveness of these schools and providing opportunities to provide equal academic skills and development for the children in all social classes.

On the other hand, at the result of *unequal source distribution* in the frame of education, unequal results are taken in teacher education and salaries, in the areas such as access of students to information unequally, in the context of social class, gender and ethnical sources [10]. According to Torun (2009), when the individuals who need special education are not taken into account, not the qualities of the individuals but characteristics of the society take place at the basis of inequality. For instance, Ferreira and Gignous (2010) see the family structure as the main source of opportunity inequality in Turkey related with education and success level. Income of the family plays an important role here. Though all social factors, the societies under the management of skilful, capable and intelligent people should give everybody the chance of participating in rivalry by providing opportunity equality principle [34]. Because of this reason, legal basics have been formed with 1739 numbered National Education Law and Turkish Republic Constitution with the aim of providing opportunity and condition equality in education to every individual in Turkey. According to National Education Basic Law;

Every citizen has the right of having education without making any difference.

Privilege is not given to any individual, family or society in education.

Opportunity and chance is provided for all individuals in society in education.

Required aids such as free boarding, scholarship, credits are made according to the financial conditions of the government with the aim of giving education till the highest levels of education to the successful students who do not have financial sources. Protective, strengthening, developing and growing cautions are taken both in school and out of school by taking care of contemporary and scientific education, methods and opportunities with the aim of

gaining a healthy, balanced and strong individuality for the students who need special education and educating them to be beneficiary for the society.

It is tried to provide benefiting from education at equal level without taking care of geographical location and residence, socio-economical level, gender, having a defect and ethnical sources about education in Turkey. As Yaylacı (2009) stated, there should not be an inequality about benefiting education because of the reasons given above according to the laws. Because of this reason “Movement of Enhancing Opportunities and Improving Technology (FATİH) Project has been started in 2012 by Ministry of National Education with the aim of especially “ *providing access to information in an equal way*” [10] and preventing “unequal source distribution”, “conditions of the schools” “teacher education” and “social class”.

FATİH (Movement of Enhancing Opportunities and Improving Technology) Project in Turkey

FATİH Project has been started in 17 cities and 52 pilot schools in 2011-2012 semester with the aim of realizing IT supported education by providing Information Technologies for the classrooms in k12 schools by Ministry of National Education in Turkey. FATİH Project is a project developed for providing opportunity equality in education and usage of information technologies instruments more actively in learning-teaching process to address more sensual organs with the aim of improving technology at schools. FATİH Project is formed of five main components (Mone, 2011):

- Provision of sub-structure of software and hardware, Provision and management of educational e-contents,

- Usage of information technologies actively in curriculum,

- In-service education of teachers,

- Conscious, confidential, manageable and measurable information technologies usage.

In the frame of these components, it is aimed to provide internet network sub-structure and LCD panel interactive boards of 570.000 classrooms at K12

schools in Turkey, giving tablet computers to every student and teacher, giving in-service education to teachers and formation of e-content curriculum.

It is observed that laptops and tablet computers are distributed in the content of several projects in some countries. The firsts of this type of projects firstly started in 2002 in Maine State of United States of America. After Maine state, laptops have been given to students in North Carolina, New Hampshire, Kentucky and Louisiana states in years of 2000 (Pamuk at al., 2013). In addition to USA, countries such as Portugal, Thailand, South Korea, Scotland, Singapore and France also started projects which include distribution of laptops and tablet computers. As required staff to provide working of sub-structure and in an efficient way have not been in some of these projects, it has been seen that they are not used effectively. It is seen that financial policies of the government change [36] to provide opportunity equality in education and prevent digital gap in Turkey. When distribution of the investments made in Information and Communication Technologies in public are examined, it is seen that education sector takes the first place. Especially an important share has been separated for FATİH Project since 2012 till the end of 2015 year. The investments made for FATİH Project for four years takes the first place. [30]. FATİH Project has been prepared to remove quality difference in education all around the country, to develop technology and to provide opportunity equality between all participants [11], Tablet PCs which are the newest version of educational technologies have been given to students in the content of FATİH Project in order to service this aim. When compared with other kinds of computers, tablet PC is an innovation [18]. As Tablet PC gives opportunity to enter data by hand and has digital ink technology, is requested to be integrated learning and teaching activities [7]. As it is easy portable [32], [3] and preferred for fast internet access in daily life, electronic mail control, writing document in electronic environment, it is important to use it in educational environments for the same reasons. So, it creates elasticity in the frame of time and location in

education [3]. While Tablet PCs in educational environments provide easiness to students for taking notes easily on them, drawing graphics and preparing their homework [20], it is also an instrument easing all academic applications such as preparing course, homework, research, making survey and making design by the help of its multimedia content [6]. Also, Tablet PCs are instruments which form document by using computer pen [2], carrying abstract concepts to the screen and transforming them concrete symbols [18], increasing interest and motivation of students [13], being in communication of students with the teachers out of school [34] in addition to all other computer technologies. In several researches, it has been presented that tablet computers increase individualistic interest, academic success and learning speed [17], effects helping between the students in a positive manner [6]. It can be told that there is not enough study on digital divide at k12 schools in Turkey [36] emphasized in their researches, in which they pointed out the role of information technology teachers in this process and function of education, that firstly the students should be information technology literate to be able to use tablets effectively in education in FATİH project in preventing numerical gap. Yilmaz and Ersoy (2012) examined digital divide between fifth grade students in the frame of several variables in Diyarbakır city. In their researches, they have determined that there are differences even between the centre districts in the city in the context of access to ICT and usage situation. Gunduz (2010) in his research has determined that few of the families with low income have computers at their homes, the ones with socio-economic level mostly have computers at home Gunduz & Hamedoglu (2003) also reached same results in their studies they realized on high school students. Asici and Usluel (2013) has examined numerical gap according to demographical characteristics of university students and determined that female students used ICT on academic subjects more than the male students. Pamuk et al. (2013) evaluated FATİH Project by teacher and student point of views and they reached the result that limitation in the usage of tablet and internet and not giving enough

technical support create some problems. The studies which are stated above and present the inequalities in ICT deal with the subject in the frame of digital divide, it can be stated that they did not examine opportunity inequality in education in detail as Enslin (2006) stated digital divide as “*access of students to information in an equal way*”. Also, although there are many studies on opportunity inequality in education in Turkey, it is observed that these researches do not take “*access of students to information in an equal way*” subject in the content of ICT. It is seen that these researches examine opportunity inequality in education in the frame of school buildings, conditions of the school, distribution of the sources, teacher quality, social class, gender ethnical origin, special education, socioeconomic level of the family, geographical region and ethnical origin. [29]. Three indicators as (1) access, (2) usage and (3) ICT literacy of ICT about digital divide are asserted [36]. (1) access states the individuals’ reaching software, hardware, internet and technology support [17]; (2) usage states individuals’ having ICT knowledge and skills [31], (3) ICT literacy states the individuals’ skills of knowing which sources they will apply while searching for knowledge, selecting it, processing it and reaching knowledge [39] these three components have a large perspective. In this research, three indicators which are accepted by the authorities have been taken as “*access=level of owning*”, “*Usage=usage level*”, “*ICT literacy= level of benefiting from the opportunities ICT presents*” [28]. However, in this research “*usage level*” and “*level of benefiting from the opportunities ICT presents*” have been taken in the content of the research. THE AIM OF THE STUDY

This research has been realized with the aim of evaluating FATİH Project which started in 2012 in the frame of Digital Divide and opportunity equality in education. The hypothesis below will be tested to reach this aim:

According to the school type, the students attending at private schools at (a) the level of using tablet (b) the level of benefiting from the opportunities tablet presents has been higher than the students attending at state schools.

The students having tablet computers at (a) the level of using tablet (b) the level of benefiting from the opportunities tablet presents has been higher than the students who do not have tablet computers.

The students having higher monthly income at (a) the level of using tablet (b) the level of benefiting from the opportunities tablet presents has been higher than the students having low monthly income.

After tablet computers have been distributed to the students there is an increase at (a) the level of using tablet (b) the level of benefiting from the opportunities tablet presents.

Importance of the research.

The individuals who have information and communication technologies can reach knowledge more rapidly. However, to have information and communication technologies requires a definite income economically. In other words, the ones who do not have ICT because of economical inadequacies and not benefiting from the opportunities these technologies present is a matter of subject. FATİH Project provides reaching knowledge in a very short time by giving opportunity of having ICT to all students in Turkey without making any distinction. Because of this reason, it is thought that FATİH project creates equality between the children of families with low income and children of families with high income to reach knowledge. Also, this equality is also provided for the children living in different geographical regions or different locations (city-district-village) Because of this reason, this research is seen very important as it emphasizes FATİH project as an important project in providing opportunity equality in education and preventing digital divide.

Limitation

This research is limited with 9th, 10th and 11th grade students attending at high schools in Sakarya in Turkey.

METHODOLOGY

Model, Population and Sample of Study

This research has been realized with general survey model from quantitative research types the population of the research is formed of students attending at high schools in Sakarya in Turkey. In the period when the research had been realized, total student number at high schools in Sakarya was approximately 50.000. The sample has been determined according to aimed sampling method. According to this sampling method, students attending at one private school, three state schools totally four schools have been included in the research. As 12th grade students had been preparing for the university exams, they were not included in the sample. When 12th grade students were not included, total student number taking place in the sample was 1950.

Data Collection Tools

“Scale of Using and Benefiting from Tablet Computers” which has been developed by Karabacak (2016) has been used. Scale is formed of 24 questions which have been prepared according to Quinary (five) Likert Reliability of the scale according to “Cronbach’s Alfa” is “0,975. At the result of validity study, sample measurement sufficiency value is “KMO=0,964>0,70”, Barlett’s Test value showing meaningful difference between sample number and item number in the scale is “p=0,00<0,05”. Also load value of every item in the scale is in “0,642-0,855” gap. The scale can measure %72,159 of the feature which is requested to be measured. According to these values, it can be told that the reliability and validity of the scale has been high. The scale is formed of two factor. The first factor has been named as “Level of Using Tablet”, the second is named as “Level of Benefiting from the Opportunities the tablet presents”. Scoring of the scale according to Quinary (five) Likert is as “never=1” points “Rarely=2” points, “Partially=3” points, “Almost=4”points, “completely=5”. After the statistical procedures have been realized, interpretation is made for “never” at 1,00-1,79” points gap, for “rarely” “1,80-2,59”, “for

“partially” “2,60-3,39”,for “almost” “3,40-4,19” and for “completely” 4,20-5,00”.

DATA COLLECTION

At the first phase, the data has been collected at the schools where tablet computers have been given to the students by the government in the first week when the tablets have been given, at the schools where tablet computers have not been given it has been collected by the researchers one week ago. At the first phase, 1950 scale forms same as the number of the students taking place in the sample have been used. At the second phase, the scale has been applied to totally 180 students attending in six classes at Anatolian Teacher High School six months later.

○ Data Analysis

Although 1950 scales have been given, collected 1900 scales have been examined in detail. As a result, the data taken from 1597 scales have been entered to SBSS 17.00 at computer environment. After the data taken from Anatolian Teacher High School have been entered with all sample group, they have been transferred to a new SPSS page with the aim of making pre-test and final test. The data taken after the scale has been applied second time in this page, they have been recorded as the continuation of the same group. After the data entrance has been completed, frequency distributions to determine the demographical characteristics of the sample have been determined. Independent simple t-test to compare the average of free two groups, One-Way ANOVA to compare averages of three groups, paired-Samples t-test statistical procedures for the group which the scale has been applied two times have been realized. After meaningful differences have been determined in One-Way ANOVA, multiple comparison TUKEY Test to find the source of the difference has been realized.

Findings.

Table 1: Demographic characteristics of the Sample
¹Science High School, ²Anatolian High School, ³Anatolian Teacher High School, ⁴Vocational High School,

As seen in Table 1,%53,6 of the students taking place in the sample are female,%46,4 are male., %2,8 of the

Variables		f	%	Valid %	Variables		f	%	Valid %
Gender	Female	855	53,5	53,6	School Type	State	1225	77,3	78,8
	Male	739	46,3	46,4		Private	332	20,8	21,2
	Total	1594	99,8	100		Total	1567	98,1	100
	Missing	3	0,2			Missing	30	1,9	
Grade	Prep.	45	2,8	2,8	School Type	SHS ¹	151	9,5	9,5
	9	691	43,3	43,4		AHS ²	101	63,3	63,7
	10	496	31,0	31,1		ATHS ³	371	23,2	23,4
	11	360	22,7	22,7		VHS ⁴	54	3,4	3,4
	Total	1593	99,7	100		Total	1587	99,4	100
	Missing	4	0,3			Missing	10	0,6	
Family income	-1000	87	5,4	5,9	Did the government give the tablet computer?	No	1087	68,1	69,3
	1001-3000	789	49,4	53,2		Yes	481	30,1	30,7
	3001-5000	386	24,2	26,0		Total	1568	98,2	100
	+5000	220	13,8	14,8		Mis.	29	1,8	
	Total	1482	92,8	100					
	Missing	115							
Do you have tablet computers?	No	585	36,6	36,8					
	Yes	1003	62,8	63,2					
	Total	1588	99,4	100					
	Mis.	9	0,6						

students attend preparation grade, %43,4 of them 9th grade, %31,1 of them 10th grade,%22,7 of them 11th grade. %77,8 of the students attend state schools, %21,2 of them attend private schools. The rate of the schools attending Science High School is %9,5, ²Anatolian High School is %63,7, Anatolian Teacher High School is %23,4 and Vocational High School is %3,4’dür. Whereas %63,2 of the students have tablet computers, %36,6 of them do not have although they are given by the government or they have been at private schools or they have not been in the content of FATİH project. %30,7 of the students have been

given tablet computers by the government in the content of FATİH Project.

○ *Level of Using Tablet and Level of Benefiting from the Opportunities the Tablet Presents according to the school types the students attend*

Table 2: Independent T-Test results

Variables		N	\bar{X}	sd.	t	p
The level of being able to use tablet	State School	648	3,251	1,282	4,353	,000*
	Private School	232	3,697	1,292		
The level of benefiting from the tablet	State School	645	2,811	1,143	3,419	,001*
	Private School	232	3,112	1,172		
General of The Scale	State School	708	2,999	1,141	4,782	,000*
	Private School	243	34,052	1,146		
The level of being able to use tablet	I have a Tablet	651	3,682	1,110	12,693	000*
	I haven't a Tablet	243	2,536	1,419		
The level of benefiting from the tablet	I have a Tablet	647	3,119	1,038	10,140	000*
	I haven't a Tablet	245	2,283	1,246		
General of The Scale	I have a Tablet	703	3,347	1,006	11,530	000*
	I haven't a Tablet	261	2,439	1,283		

*P<.05

○ *Level of Using Tablet According to the School Type.*

T-test results realized related to the level of using tablet according the school types the students attend have been given in Table 2. According to the analysis results, “t=4,353 and p=0, 00” values have been taken. These values indicate that there is a meaningful difference between the students attending at state schools and private at the level of using tablet computers. When the averages of the groups are examined from the same table, the average of students attending at state schools has been “3,251”, the average of students attending at private schools has been “3,697”. According to these averages, it can be said that the level of the students at using tablet computers attending at private schools is higher than the level the students at using tablet computers

attending at state schools. This finding is a finding which verifies “a” item of the first hypothesis.

○ *Level of Benefiting from the Opportunities Tablets Present According to the School Types.*

When t-test results related to level of benefiting from the opportunities tablets present according to the school types from Table 2, it has been determined that there is a meaningful difference between the students attending at state schools and private schools (t=3,419 and p=0,001). When the averages of the groups are examined from the same table, the average of students attending at state schools has been “2,811” the average of students attending at private schools has been “3,112”. According to these findings, it can be said that the students attending at state schools benefit from the opportunities tablets present less than the private school students. This finding is a finding which verifies “b” item of the first hypothesis. At the results of t-test which is realized related to the scale in general, it is seen that the students attending at private schools (\bar{X} =3,405) have more averages than the students attending at state schools (\bar{X} =2,999) (t=4,782, p=0,00)

F. *Level of Using Tablet and Level of Benefiting from the Opportunities the Tablet Presents according to the situation of having tablet computers.*

a. Level of Using Tablet according to the situation of having tablet computers. It has been determined that there is a meaningful difference according to t-test results realized between levels of using tablet related to the students’ having or not having tablet computers in Table 2 (t=12,693, p=0,00). When the averages are examined, the average of the students having tablet computers is “3,682” the average of the ones not having is “2,536”dir. According to these findings, level of using tablet computers is mostly high for the students having tablet computers than the ones not having tablet computers this finding is a finding which verifies “a” item of the second hypothesis.

b. Level of benefiting from the opportunities the Tablet Presents according to the situation of having tablet computers

It has been determined that there is a meaningful difference according to t-test results realized between the students having/not having tablet computers at the level of benefiting from the opportunities the tablet presents in Table 2 ($t=10,140, p=0,00$). According to these findings the students having tablet computers ($\bar{X}=3,119$) have higher level of benefiting from the opportunities the tablet presents than the students not having tablet computers ($\bar{X}=2,283$). This finding is a finding which verifies “b” item of the second hypothesis. At the results of t-test which is realized related to the scale in general, it is seen that the students having tablet computers ($\bar{X}=3,347$) have higher averages than the students not having tablet computers ($\bar{X}=2,439$) ($t=11,530, p=0,00$)

3. Level of Using Tablet and Level of Benefiting from the Opportunities the Tablet Presents according to the income level of the family

Table 3: One-Way ANOVA Results according to the income level of the family

Variables		Square total	S.D.	Square average	F	p
Level of Using Tablet Computers	Between the groups	23,431	3	7,810	4,611	0,003
	In-group	1404,233	829	1,694		
	Total	1427,664	832			
Level of Benefiting from the Opportunities the Tablet	Between the groups	15,485	3	5,162	3,884	Family income (Salary)
	In-group	1188,15	894	1,329		
	Total	1203,63	897			

$P < 0,05$

a. Level of using tablet according to the income of the family

According to the level of family income in Table 3, according to One Way ANOVA results related to the level of students’ using tablet computers, it has been determined as “ $F=4,611$ and $p=0,003$ ”. According to these data, there is a meaningful difference between the levels of family income related to the level of students’ using tablet computers.

Table 4: TUKEY Test Results according to the levels of family income related to the level of students’ using tablet computers. Income is higher than the students

with low family income. Even more, as the income of the family increases, there is a regular increase at the skills of using tablets. This finding is a finding which verifies “a” item of the third hypothesis of the research. According to TUKEY test results which is realized with the aim of determining between which groups there is a meaningful difference according to the level of family income in Table 4, it has been determined that there is a meaningful difference between the children of the families with income less than 800USD and more than 1500 USD. According to these findings taken, the level of using tablets with high family According to Table 4, meaningful difference has been found between the income of the family and level of benefiting from the opportunities the tablet presents ($F=3,884$ ve $p=0,009$). When multiple comparison TUKEY test results have been

(I) Preference order	N	\bar{X}	Ss	(J) Preference order	Average difference (I-J)	Standard Error	p
Less 300 USD	42	2,962	1,384	Between 301-800	-,28837	,21040	,518
				Between 800-1500	-,53997	,21847	,065
				More than 1501	-,62821*	,23057	,033*
301-800 USD	430	3,25	1,293	Less 300	,28837	,21040	,518
				Between 800-1500	-,25160	,10647	,085
				More than 1501	-,33983*	,12951	,044
Between 800-1500 USD	229	3,501	1,349	Less 301-800 USD	,53997	,21847	,065
				Between 800-1500 USD	,25160	,10647	,085
				More than 1501	-,08823	,14223	,926
More than 1501 USD	132	3,58	1,217	Less 300 USD	,62821*	,23057	,033*
				Between 301-800 USD	,33983*	,12951	,044
				Between 800-1500	,08823	,14223	,926

examined from Table 5, it is seen that there is a

meaningful difference between the children of the families with income less than 800USD and more than 1500 USD. When the table is examined, children of the families with income more than 1500 USD benefit from the opportunities the tablet computers present more than the children of the families with income less than 800USD. This finding is a finding which verifies “b” item of the third hypothesis of the research.

4. Findings related to the hypothesis of “There was an increase in six months later at (a) the level of using tablet

P < 0.05

(b) Benefiting from the tablet after the tablets have been given to the students by the government.”

Paired Sample t-test results which is realized for the data related to 160 students after the tablet computers have just been given and six months later are given in Table 6.

Table b: Paired Samples t-test Statistics.

a. Increase at the level of using tablet

When Table 6 is examined, it is seen that there is a meaningful difference between the levels of using tablet computers when they were first given to the students and using level after six months (*t*=5,796 and *p*=0,000). According to the same table, whereas the averages of the students in the period when they were distributed in the content of FATİH project were 3,386”, their averages after six months were “3,817”. According to this finding, it can be said that when the students have tablet computers, there is an increase at the level of their usage ability. This finding is a finding which verifies “a” item of the fourth hypothesis of the research.

b. Increase at the level of Benefiting from the Opportunities the Tablet Presents

According to the statistical results related to the level of benefiting from the opportunities tablet presents in Table 6, it has been determined that there is a meaningful difference between the averages when the tablets were given and after the tablets were given to the students (*p*=4,395 and *p*=0,000). The averages of

these students related to the level of benefiting from the opportunities tablet presents were “2,760” when they were first given, but after six months it became “3,115”. These findings show that after the students had the tablets in the content of FATİH project there is an increase at the level of benefiting from the opportunities tablet presents. This finding is a finding which verifies “b” item of the fourth hypothesis of the research. The same findings were reached in the generality of the scale. In other words, it is seen that averages increased in an important manner before and after.

Results and Discussion

The results below have been reached according to the findings at the result of statistical procedures taken from 1597 students in the research which has been realized with the students attending at high schools in Sakarya in Turkey with the aim of evaluating FATİH project in the frame of digital divide and opportunity

Variables		N	\bar{X}	ss.	V%	t	Sd	p
The level of being able to use tablet	Before	142	3,386	1,065	31,453	5,796	141	,000
	After	142	3,817	,926	24,257			
The level of benefiting from the tablet	Before	128	2,760	,951	34,456	4,395	127	,000
	After	128	3,115	1,005	32,263			
General of The Scale	Before	160	3,020	,962	31,854	5,682	159	,000
	After	160	3,419	,886	25,914			

equality in education: As tablet computers have been given in the content of FATİH Project, the level of the students of using tablet computers and the level of benefiting from the opportunities tablet computers presents attending at private schools were higher than state schools. The reason of this is that the family of the students attending at private schools have higher economic levels (Uygun, 2003) and so they can have tablets. The student’s attending at a state or private school is seen as an important factor for having a computer at home [4] and the students attending at private schools have computers, laptops or tablets but [22], [23], the students attending at state schools do

not have these. Ayik's (2008) research also supports this situation. According to Ayik's research, whereas %58,4 of the students attending at state schools do not have computers, only 12, and 5 of the students attending at private schools do not have computers. On the other hand, when an evaluation is made in the frame of student cost, in 1980s whereas individualistic cost at state schools in United States of America had been higher [36], nowadays it is seen that cost for every student at state schools has been lower than the students attending at private schools. Also the studies related to the comparison of educational quality between state schools and private schools indicate results of superiority of private schools. [9]. This situation can be in relation with the high increase in the cost of private schools and the investments made for Information and Communication Technologies being more than state schools. The private schools' increasing the costs with the aim of giving better service to the students, the students attending at private school having more ICT than the students attending at state schools and benefiting from these opportunities more create opportunity inequality in education. Whereas students attending at private school can access information more rapidly, the students at state schools cannot even access information in addition to accessing information rapidly. It is obvious that this situation creates a great inequality in education. As tablets in FATİH project have been to the schools at state schools, every tablet given to the students who do not have computers will decrease the inequality between state schools and private schools. As a result, it can be told that FATİH project is a project providing opportunity equality in the means of accessing information equally by moving digital divide between state schools and private schools. Another result taken in the research is that the level of using tablet computers and the level of benefiting from the opportunities they present for the students having tablet computers is higher than the ones not having them. This is a natural result. Because, if a person has an instrument, he can use it. If a driver has an automobile, he can drive it and he can go wherever he wants by driving it by himself. In

this context, if a student has a tablet PC he can use it and benefit from its opportunities. With this point of view, FATİH Project should be seen as a project giving this opportunity to every student, using ICT and benefiting from the opportunities it presents. In addition to providing opportunity equality in education, when it is taken as digital divide, it can be told that FATİH Project has the attribute of preventing digital divide as it gives the opportunity of having this technology who do not have ICT. Third result reached in the research is that the children of the families with high income have higher and more rapid level of using tablet computers and benefiting from the opportunities they present from the children of the families with low income. It is a reality that the students with high socio-economical level have more computers and they benefit from these computers. [4]. This situation is not only at family base, but also at rich countries and rich regions [4]. In other words, the students living in the countries with gross national product and having education in these countries can have these technologies but children in the countries and regions with low gross national product cannot have. However, FATİH Project provides for every student have a tablet PC without taking their income level into account. At the same time, the distributions are made without making any difference between the regions of Turkey in the content of this project. In this context, it can be told that FATİH Project has the attribute of preventing digital divide in addition to preventing opportunity inequality in education which is sourced from the economic situation of the families. Lastly in the research, it is examined whether there is an increase or not at the levels of students before and after having tablet PCs at the level of using tablet computers and benefiting from the opportunities they present. The reached result is that there is an increase at the levels of students before and after having tablet PCs at the level of using tablet computers and benefiting from the opportunities they present. This result indicates that the students having tablet computers can use technology during time and can access information rapidly. As the students have ICT, they can access information easily and rapidly

wherever they live. Opportunity equality is provided for these students who can access information rapidly. This situation at the same time should be accepted as the indicator that FATİH Project is a project which prevents digital divide. As a result, whatever income of the family has been, in which school the student attends, whether the student has a PC or not, it should be accepted as a project which prevents living inequality in education because of several reasons and prevents digital divide by providing them have a tablet PC.

Recommendations

The investment made on education is a turnaround investment. This return can sometimes take long years. But, when products are started to be taken from this investment in a country, big improvements realize. The results of this are seen in developed countries. Because of this reason, as FATİH project has been a project providing opportunity equality in education and preventing digital divide, it should be thought that reaching of it to the endmost village of Turkey is a required investment. The government should mobilize all its conditions for this project. As the opportunities of the government will not be enough in a country with such a large geography and young population, a mobilization can be started as in the example of Finland. Holdings with economic power, civil society organizations and other all institutions can support this project. In other words, the meanings which opportunity equality in education and digital divide concepts carry and as a result long term achievements of Turkey in the content of FATİH should be given well. By this way, usage of tablets out of their aims can be prevented and their service for their aim can be provided.

Many countries have enlivened projects like FATİH project. But when these countries are examined, it is observed that the countries accepted as developed countries have been the ones who first develop and apply such projects. If the countries which did not develop and underdeveloped ones do not apply projects like FATİH Project, the gap between them and developed countries will increase. In order to give

opportunity for this gap, these countries should start projects not only in one region of the country but they should apply projects all through the country. Especially in the countries in which young population is less than or equal to middle age population, the population who completed educational life and started working, projects for adults like FATİH Project can be applied. Because, till the young population in developed and underdeveloped countries grow, the developed countries will develop more and the difference between them will increase more. If the adults are given the chance of accessing knowledge more rapidly, instead of increasing the difference, making it stay at the same level or less difference can be provided. When young population grows, this gap can be closed. Whether tablet PCs are effective or not in increasing success in the courses has not been examined. Several researches have been realized in some cities of Turkey on this subject about FATİH project. However, large contented researches are not made at regional and national base. Because of this, researchers can realize researches related to the importance of effectiveness of FATİH Project in the frame of opportunity equality in education and digital divide by realizing studies with larger samples.

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PID 13 Local Wisdom Application for Participatory Career Development

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Abstract — Career development only grounded on community participation cannot completely achieve the purpose of development process; instead, local wisdom application plays a huge role in enhancing career development. Therefore, it becomes another aspect of development process to improve career in the community based on applying local wisdom. It is regarded as “alternative development” that can be collaboratively created by the community. Moreover, community members can gain advantages from the people who know and understand their community well. That is to say, it applies the knowledge of people in the community to create understanding and mutually tackle the existing problems in community under suggestions provided by the community leader and potential local wisdoms without only depending on the support from government agencies. Such people’s belief contributes to searching for the effective and direct way to build on sustainability in community. The purposes of this research are to 1) study career condition and the participation in career development of community members in Bung-Bon sub-district and 2) study local wisdom application to be the fundamental of participatory career development in community, the case study of Bung-Bon sub-district, Nong Suea district, Pathum Thani province. The respondents consisted of 9 community leaders, 9 local philosophers, 20 community members, and 6 government officials. 2 sets of structured interviews were employed for data collection while the content analysis was used for data analysis. The findings of local wisdom application for participatory career development indicated that the community used the local wisdom, regarded as applied local wisdom, for career development to completely improve the career in community thus leading to sustainability in career development. Moreover, this affected defining the contexts of

participatory career development based on local wisdom application to enhance the career knowledge in community into 6 aspects which were: 1) agricultural system management, 2) production cost reduction, 3) culture, 4) group/network, 5) community economics and 6) local resource application.

Keywords: Participatory career development, Local wisdom

Rationale

Participatory community development refers to the process that systematically causes the change in activities people in community do for their living. It sheds the light on sustainability in self-reliance within the boundary of communities that have good relationship, communication, learning exchange, assisting and depending on each other as well as collaboration. This characteristic will happen to be the network under the same norms and culture with mutual objective, aim and good sense. Utilizing the knowledge of local wisdoms can handle the problems occurring in the community and social with the concept that community overcomes the problems of community with their own wisdom. This idea absolutely reinforces long-term development, well-being as well as healthy and happy long life of people in the community. Local wisdom is, therefore, considered to be the important resource in community development. This is, it is the body of knowledge accumulated by the ancestors for a long period of time; however, it may slightly change when facing the shifting circumstances. It is essential to note that community development depends on the systematic approach with the educational procedure focusing on knowledge development and the process of consistent body of knowledge creation in order to enhance the long-term strengths in community. Likewise, various

communities can create bodies of knowledge integration within the existing environment and resources in the community for survival and bodies of knowledge preservation to be handed down over the next generation [3]. In this regard, wisdom means the knowledge, capability, belief, and behavioral ability human used for problem-solving. Furthermore, it refers to the learning process of people in community based on their experiences and beliefs thus resulting in the knowledge collected from the ancestors and passed down from generation to generation. Nevertheless, local wisdom can be adjusted, applied and changed all the time in order to be the knowledge in harmony with the contexts of cultural social and environment of the community. In other words, wisdom is the knowledge consisting of virtue adhering to traditional way of life; wisdom is also the knowledge created by the local people from their learning through long experiences including trial and error for long period of time. Created wisdom finally crystalizes to be the set of knowledge grounded on understanding in environment blending with relief and traditional customs. In addition, local wisdom causes from the knowledge regarding area and landscape that can be specified how they are; it can be separated into category, qualification and telling the community behaviors.

Career development in the community by applying local wisdom is regarded as “alternative development” that can be collaboratively built by the community. It provides advantages for the community members when using the local wisdom from people who know and truly understand their own community. It gains even more benefits when using the knowledge of people in the community to build understanding and co-operatively overcome the difficulties in the community under recommendations offered from community leader and potential local wisdoms rather than only receiving support from the government agencies. For this reason, it contributes to searching for the direct and effective way created from the requirements of community in order to solve their problems with local wisdom application and build on along-term sustainability in community. Likewise, it

is consistent with the philosophy of community development; that is, community development has to motivate people in community applying self-reliance or self-help to their lives so that they can think, make decision and solve the problems as well as response to their private and public requirements [1],[2],[3]. [4]. Bung Bon sub-district, Nong Suea district, Pathum Thani province, Thailand is selected to be the case of this study because it is the area that uses the alternative development for problem-solving in traditional career development of community. In particular, they can ensure the preservation of agricultural career despite facing the changing current of country development which mainly put strong emphasis on producing labors to support industrial sector. Instead, Bung Bon community applies the way of local wisdoms, acting as consultants, to agricultural career development in the area. The community leaders also have the major role in urging their members to assemble, mutually employ the group power for career problem-solving to reach the ultimate goal of long-term sustainability.

Research objectives

- 1) To study career condition and participation in career development of community members in Bung Bon sub-district.
- 2) To study local wisdom application to be the fundamental of participatory career development in community, the case study of Bung Bon sub-district, Nong Suea district, Pathum Thani province.

Research methodology

Descriptive research was used for this study by collecting both qualitative and quantitative data from the respondents in communities.

Respondents: the selection of target group was mainly based on the objective of this research. It was the unstructured selection of respondents without strict procedure and uncomplicated process (Chai Photisita, 2004:125). The respondents in phase1 were divided into 3 groups as following:

Group1: 9 community leaders from 9 villages in Bung Bon community

Group2: 9 local philosophers and 20 community members

Group3: 6 government officials who performed their duties in the areas of Bung Bon sub-district, Nong Suea district, Phatum Thani province.

Research tools used for data collection: they consisted of structured interview regarding career condition and the extent of participation in career development of community, Bung Bon sub-district and structured interviews of local philosophers, local wisdom transmission and local wisdom utilization to be the fundamental of career development in communities, Bung Bon sub-district.

Data analysis: career condition, participation in career development of community and local wisdom, local wisdom transmission and local wisdom application to be the fundamental of career development in communities, Bung Bon sub-district, Nong Suea district, Phatum Thani province were analyzed by using content analysis.

Research findings

Section 1: The study results of career condition and participation in career development of community members in Bung Bon sub-district, Nong Suea district, Phatum Thani province.

The results of interview of respondents that comprised community leaders and community members were shown below:

1. Traditional career: according to the interview, 90 percent of respondents (both group 1 and 2) gave the consistent information that before 1968, rice farming was their traditional career.
2. Condition of land ownership: 90 percent of the respondents identified the same information relevant to the condition of land ownership of people in communities, Bung Bon sub-district. That was, most of their lands were in areas of Agricultural Land Reform Office and each family would have occupied areas around 25 rai which could not be sold as the normal land. However, they could only give the land to their lineages as their legacy.
3. Knowledge in career: a majority of respondents, 90 percent of them, also provided the consistent data. They employed the traditional knowledge transmitted from members within their families. There were some

local wisdom utilization; knowledge that families obtained were broadcasting rice cultivation and vegetable planting. The knowledge of community was the knowledge inherited from the ancestors, who accumulated the local wisdom through their experiences and expected their lineages in this generation to continue it as a career for living. Changing the body of knowledge referred to the change of modern agricultural process, hybrid species and the different ways of cultivation. Furthermore, the knowledge regarding career of community members in Bung Bon sub-district derived from the government sector through various training projects provided by the government officials; nevertheless, the so-called career knowledge transmission projects only attracted the interests from some group members.

4. Major and minor careers: 90 percent of respondents indicated that community members in Bung Bon sub-district had rice cultivation as the major career while the minor career appeared to be garden vegetable planting, such as cowpea, lemongrass, canton, basil, sweet basil, bitter melon and galangal. Garden vegetable planters spread over the areas.

5. Productivity and incomes: 90 percent of respondents specified that rice farmers of communities in Bung Bon sub-district normally obtained the productivity from rice production 750-850 buckets /rai in average.

6. Constraints in career: most of the respondents, about 90 percent, indicated that the major constraints in career for community members in Bung Bon sub-district were summarized into following points: participation in career of community members, characteristic and capability of community leaders and participation of people who have local wisdom.

The respondents shared their harmonious opinions that participation in career of community members slightly occurred. The whole respondent interviews concerning the characteristics and capabilities of the community leaders indicated that the community leaders were enthusiastic about their roles, but they were not strong enough to lead the community alone as well as lacked the knowledge and expertise in convincing the community members to see their own potentials. It was suggested that community leaders

should absorb more knowledge in terms of group process in community participation.

7. Obtaining support from government sector: 90 percent of the respondents gave the information of the support from government sector that the supports were provided through the government officials who put the efforts on community development management in setting up group system for all community members to participate in. When group needed to improve in any aspects, the government officials would provide assistances in forms of capital, equipment and other knowledge necessary for career development.

8. Means of career development in households: most of the respondents, about 90 percent, shared the information that although there were cooperative efforts between the government agencies and community members in career development of Bung Bon sub-district, the performance was not much satisfying. It was found that people in the communities needed to adjust the way of production depending on the outside factors. That was, since the beginning of planting until product harvesting, they shouldered rather high expenses. In addition, when they distributed their products, they remained only small profits. It caused them to see things around in the community they could do to gain outcomes and reduce their expenses.

As noted above, even though people in community had bodies of knowledge in career, community still lacked various major factors that were necessary to be supported and recommended from government agencies. The results from the interviews of respondents obviously reflected the whole difficulties as follows:

Government policy that put too less emphasis on agricultural sector despite the fact that almost all the areas in Thailand were the essential sources of food for the world. Having the policy but lacking of concrete drive force seems to be useless. Leaving the enormous producers who were agriculturists to face the unsolvable problems by themselves-namely, uncertain price of products, declining product price, not having the market for agricultural products with chemical-free and not having the concrete campaigns

supporting the agriculturist are discourage. Hence, it was quite necessary for the government sector to define healthy products with chemical-free to be the national agenda.

Bung Bon sub-district was located near the central, Bangkok, so it was possible that the youth were absorbed by the trend of urban culture to live or work in the central. People in Bung Bon sub-district who had agricultural careers in both rice farming and vegetable planting still made use of chemical substance, such as fertilizer, pesticides to eliminate pests in rice farming and vegetable garden. Nevertheless, when the price of those chemical substances increased, community members were more interested in the idea involving organic substances use as well as microbial products in their productions. In fact, the reinforcement from the government sector considering chemical substances reduction campaign utilized for agricultural production in the communities is slightly conducted.

The results from the interview of government officials

1) Working condition with community: according to the interview of government officials, they explained that the community leaders provided good collaboration to government officials particularly in terms of reinforcement and community development. Moreover, they were aware of attempts the community leaders put in urging people in their communities to engage in community development collaboration. Unfortunately, under only supervision of the community leaders, trustworthiness in collaboration of the community members was scanty. Thus, government officials, who were on duty and a part of community, had to reinforce the community leaders together with using their existing knowledge to support and offering recommendations for the community. In the meantime, government officials had to coordinate with other organizations to provide knowledge support and suggestions to the community. The major principles to be achieved were career development in the community; setting up powerful groups in community; arranging village fund system; and preserving traditional customs of the community.

2) Difficulties in working with community: consistent answer given by all government officials was that the important current problems existing in the community members of Bung Bon sub-district were lacking of enthusiasm in participation. It was also found that they worked separately depending on themselves; moreover, there were only a few people who gave importance to the participation in resource preservation and taking highest advantages of resource application.

3) Career reinforcement in the community: the government officials had an important role in introducing and supporting the requirements of people in the communities. In terms of the collaboration with the government officials, people in the community did not totally accept the change. On the contrary, when they faced the problems with the epidemic of rice insect pests, they still needed the assistance from the government officials. The production in community still mainly relied on the traditional process inherited from the ancestors although there were, some period of time, adjustments conforming to the change of modern career. Consequently, the duty on career development of government officials toward community in Bung Bon sub-district was realized to use the means of development consistent with traditional ways of life in the community; whereas, the development support in other aspects would be basically conducted as community's requirement.

Section 2: The study results of local wisdom application in career development

2.1 Aspects of wisdom

According to the interview of local philosophers or the people who possessed local wisdom, the idea shared by 90 percent of them could be concluded into following points. Community leaders were important people who paid attention to problem-solving in the community. Furthermore, there were supports provided by the government officials in terms of knowledge and collaboration in order that people would have education and guidelines in career development. In this research, wisdom was categorized into 3 groups as follows:

2.1.1 Wisdom in Bung Bon sub-district: local wisdom in the communities of Bung Bon sub-district were the people who had knowledge gained over a long period of time through experiences. In particular, it was the knowledge of career inherited from the ancestors; each person might have different bodies of knowledge and they exchanged them within the community. This resulted in career development according to the ways of community that continuously conducted for a long time.

2.1.2 Community leader: referring to the interview of community leaders from 9 villages, it was found that the roles of community leaders were being coordinators between people and government sector related to the community. Community leaders would be the persons who perceived the matters concerning career in community and other relevant matters about community development at the district office. Then, community leaders would inform their members the matters in relations with new government policy to enhance quality of life and careers in the community. Moreover, community leaders coordinated harmony among people in community to live together happily, monitored and took care of members as well as were the group leaders grounded from just administrative power.

2.1.3 Government official

1) Agricultural Research Officers, professional level, of Bung Bon sub-district who were responsible for data collection, statistics of all aspects especially data of agricultural career; moreover, they provided community recommendations regarding agricultural career development. They gave explanation about significant problems of career in community of Bung Bon sub-district; that was, the price for rice sharply decreased while the cost of rice production increased. As a result, it was the duty of government officials to provide suggestions on rice production cost reduction. In terms of the vegetable planning group, the big problem became the marketing and network creation to induce this group into the market forces.

2) Department of Community Development: this organization was in charge of supporting community participation, providing recommendations and

assisting the community in terms of community business. Community development officers performed their duty to develop the community in Bung Bon sub-district in all aspects mainly focusing on community career development support.

3) Sub-district Administrative Organization of Bung Bon sub-district had the policy to support career development; however, there was not certain plan of development. According to the budget request from the Sub-district Administrative Organization, people in community had to write the budget plan request to be included in sub-district development plan. Furthermore, each year, there is money fund provided through Community Development Department; sub-district agricultural officer will be the coordinator requesting the budget to support the community in the form of training and equipment used for the career.

Referring to content analysis in the aspects of wisdom, wisdom of people, wisdom of community leader and wisdom of government official, all the wisdom aspects had obvious roles and responsibilities that contributed to career development. Participation of all wisdom aspects in this career development was called "applied wisdom for career development"

2.2 Local wisdom application for career development

According to the interview of people with local wisdom, the community leaders and government officials, 90 percent of them provided the career information in communities of Bung Bon sub-district developed for a long period of time. Although people in communities had changed their careers, they returned to traditional ones. That was clear that local wisdom never disappeared; instead, they were applied to the modern knowledge. However, this local wisdom contributed to people's own career development in the community at only a certain level. It was necessary to continuously receive additional bodies of knowledge development to suit economic and social change. In the regard of rice farming and vegetable planting, there were requirements in production cost reduction by using existing resources with highest benefits rather than using chemical substances in production; moreover, saving capital sources, cultural tradition and group or network setting were taken into account.

The researcher had analyzed and categorized all the data of local wisdom application, which was the fundamental of career development in the communities of Bung Bon sub-district, into 6 aspects by utilizing applied wisdom to support career knowledge as following:

Aspect 1: Agricultural system management

Production system management was regarded as major factor because it was the process that started from growing until harvesting brought to the market for sale and consumption as follows:

1. Rice cultivation system: farmers in the communities of Bung Bon sub-district had learnt the new production method- namely, selecting appropriate rice seed for each season, learning techniques of pest control with chemical-free such as decrease and increase the quantity of water in each span of rice age that affected the epidemic of rice insect pests and other pests and suitable management before rice growing.

2. Vegetable growing system: farmers who grew safe vegetables in communities of Bung Bon sub-district had knowledge in selecting vegetables for each season appropriately which was related to the demand of market affecting the quantity of production and the epidemic of vegetable insect pests. There were biological products use, such as *Beauveria bassiana*, *Trichoderma* fungi to prevent and get rid of insects and diseases instead of using chemical substances.

Aspect 2: Production cost reduction

When it came to production method adjustment, respondents in communities of Bung Bon sub-district came to realize the increasing production cost from chemical fertilizers, chemical substances used in preventing and eliminating pests- namely, chemical substances to get rid of insects and chemical pesticides to kill vegetable diseases. All chemical substances often used to destroy vegetable diseases totally caused the increasing production cost. People in communities had learnt from the knowledge provided by the government officials concerning factors that assisted in production cost reduction and were not hazardous to both producers and consumers. The idea of

producing biological fertilizer, biological fermentation, biological products and herbal fermentation to use instead of chemical substances had been initiated since then.

Aspect 3: Culture

Culture had been accumulated since the ancient time involving relatives and neighbors in the communities. All of the people in Bung Bon sub-district were practitioners of Buddhism, so temples were the center of people's hearts together with clergies who were spiritualists. Religious activities were also collected at the temple which was the beginning of collaboration; moreover, other customs were passed over in communities, such as religious ceremony/tradition, gathering for growing rice, rice blessing ceremony and rice blessing when it gets pregnant.

Aspect 4: Group/Network

1. Awareness/ value: people realized the way of living in community related to giving the significance to group setting in order to analyze, criticize and solve the problems in the community. Existing groups not only took place from the idea of community but also were the group setting motivated by the government for career development concerning problem-solving and systematic development. Moreover, people thought about the future of their lineages that had to inherit this way of life in the community and face the change affected from the outside such as way of city life, idea of consumerism. Speaking of awareness, the people in group of safe vegetable growing shared the idea of their strictness not to use chemical substances in vegetable growing; however, it was found by sampling check that some people still depended on it in secret with chemical product use that considerably influenced the trustworthiness toward the group.

2. Problem-solving: group and community network were important influences on problem-solving in product distribution particularly safe vegetable growing to the specific market. This was because growing process of vegetables free of chemical pesticides totally differed from the one with chemical use. Thus, safe vegetables should have

visible source of distribution and reach the target consumers. When the community was aware of the determination of government agencies, they supported safe vegetable product distribution at the market of Thammasart University Hospital, Klong Luang district, Pathum Thani province.

3. Participation: it was necessary for communities in Bung Bon sub-district to cooperatively assemble the groups in order to gather brainstorming of members for problem-solving which started from finding, analyzing, planning and performing to overcome the existing problems. Additionally, they mutually gained the benefits from the group of safe vegetable producers in communities of Bung Bon sub-district, village no.2 which established the obvious group becoming the part of local wisdom in the community.

Aspect 5: Community-based economic system

Community-based economic system refers to having circulating fund, searching for source of investment funds and saving to have the adequate sources of fund for all the group of agriculturists to support their agricultural production below.

1. Source of investment funds: it was necessary for communities in Bung Bon sub-district to have sources of investment fund in terms of money and equipment used to support their career. Being the members of Co-op Klong 7 with clear regulations in administration was the effective way to uphold the communities' source of investment funds.

2. Saving group of Bung Bon sub-district: all 9 villages had set up the saving groups together with regulations in saving performance, such as deposit, raising a loan with certain financial amount but depending on the treaty of each village. This program enhanced savings happening in each village of Bung Bon sub-district so that people would have money for future use.

3. Household accounting: conducting household accounting was the reinforcement from Community Development Office that enhanced all the families to record their incomes and expenses. They could also apply the household budget idea to their

career. Household accounting helped the people to see the unnecessary expenses such as paying high cost for pesticide or costly fertilizer. After considering the household budget, people would realize to reduce the production cost from using chemical substances to use biological ones instead such as fertilizer compost or manure.

Aspect 6: Local Resource Use

1. Local vegetable: There were a variety of local vegetables in Bung Bon sub-district that naturally happened and could be eaten.
2. Herbs: people in communities of Bung Bon sub-district had body of knowledge in herbal use to prevent diseases from insects very well. Herbal developed naturally and grew could be used for herbal fermentation based on organic fertilizer method, such as Tuba root, Calamus, Citronella grass, Chromolaena odorata, Azadirachta indica and bergamot, etc.
3. Agricultural equipment invention: people in communities of Bung Bon sub-district were able to modify abundant things to be agricultural equipment, such as making sickle from the saw for hooking ear of rice and cutting small banana root.

All 6 groups of wisdom aspects were considered important elements of local wisdom in the communities of Bung Bon sub-district. All wisdom aspects played vital roles in participatory career development, which was called "alternative development". That was, career development based on local wisdom of people in the communities in Bung Bon sub-district was crucial mechanism in career development in the communities.

Recommendations for research results application

According to the findings, it was found that local wisdom application was considered to be the innovation in career development of community in the group of "alternative development" that could be cooperatively created by community members. On the

other hand, they could make use from people who had local wisdom to build understanding and problem-solving in the communities under recommendations provided by the community leaders and strong local wisdoms without only depending on reinforcement from government agencies. As a consequence, relevant organizations should apply the prototype of this innovation to be spread over and expanded to other communities that depend on agricultural career and have ready local wisdom to support the career development innovation in the communities.

Organizations in policy level should bring out this research to be the guideline in strategy setting for career development in the community that relies on agricultural career thus resulting in sustainability in community. In this regard, organizations should consider the community that has similar characteristics with those of Bung Bon sub-district by using applied wisdom of 3 groups of people-namely, community leader, local wisdoms and government officials that collaboratively enhance the career development.

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PID 14 Development of Creative Thinking Entrepreneur Program Based on Creative Economy

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Abstract — It is a passport to employment and an opportunity for social development. However, this aspect of education, supports entrepreneurship development, is facing many challenges to prepare a sufficient number of people with the right skills to meet the labour market demands. This paper therefore, presents the develop the creative entrepreneur program for students thanks to the shortfall in the study on and the preparation of the business creativity development despite the higher education emphasis on post-study careers. The research found that the preparation process comprised of the target designation, the program structure and the program design that arose from the data of the problems and needs of the current society. There were the five characteristics of the business operating creativity of the entrepreneurs, namely, the inquisitiveness (endless learning), the far vision (the significance of thinking), the good relationships (enjoyment), the endeavors and patience (high ambition), and the ceaseless pacing (moving on). The development program consisted of the preparation activity table as classified by semester and study year. The first year of study had one activity option to arrange (The special academic lecture), handled three activity-options (The creative thinking, special academic lecture and the far visioning activities), the second year faced eight activity-options (independent career training, special academic lecture, career counseling, short job-training, the student exchange project with enterprises, the senior-junior meeting project, the career development camp, and the teaching by case-studies), the third year possessed 3 activity-options (The independent career training, the special academic lecture, and the career counseling).

Keywords : Creative economy, Creative thinking, Entrepreneur

Introduction

The National Economic and Social Development Plan edition 10 has focused on restructuring Thailand economy from relying on producing tangible goods by importing its technology to using creativity through development plan in areas such as personnel in possess of creative thinking, community to integration pulling out wisdom in a mix of ideas and resources available. Economy structural change under new model highlighting the importance of research and development and innovation process will create value in products and services to be competitive with aboard. Creative Economy according to The Creative & Design Center referring to John Hawkins [3] has provided the basic concept of the creative economy as a concept making change into manufacturing sector, service, sales, or even entertainment industry and working on new style basing on factors of capabilities and skills. However, the concept of creative economy cannot be made to happen in a short time. But it will take time to develop various factors as a base for the development of the creative economy to achieve objectives, if necessary. In the past, people with Vocational education tend toward a career as officer or employee, while those with intermediate education level and below tend to be a self-employed entrepreneur lacking the basic knowledge of management for improving business to compete with others under the new free trade. New strategy of promoting SMEs aims to invite those who are educated, experienced and capable to step into entrepreneurship. Therefore, it is main core to build

up the creative entrepreneur, to generate new businesses into Thai economy. This will help recovery in the country's economy with steadily increased immunity. So the preparation to enter the profession is an important first step and the last step before leaving out of the education system leading to future potential, especially labor force in middle class and above from vocational to university. The essence of entrepreneurship as a way of creativity economy is the creative idea, which is not inherited, but come from thinking skills and originality which are required for practices in school or university. From college education, it has focused for students to take up occupations; however, it has not extensively studied in preparation of creativity development for becoming entrepreneurs. With exploring the truth in this research, it will lead to a series of activities to strengthen college students as a creative entrepreneur, and can be taken as a guide to professional development in accordance with environment being rapidly changed in economic, social and technology and in line with government policy, with emphasis on personnel production to meet requirements of the country.

Research Objectives

To develop program for vocational students in preparation of the creativity development for entrepreneur, based on the concept

Literature Review: The Creative Entrepreneur Concept

Campbell [2] detailed the concept of "The Creative Entrepreneur" as follows:

1. **Avoid Negative Self-talk.** Such self-blaming expressions like "I am not creative," "I don't have imagination," or "Why do I have those bad ideas?" merely implant the blame onto oneself and recurrences of those thoughts may fade one's creativity eventually.
2. **Acknowledge Creative Ideas.** New ideas whether or not currently practicable should be responded with self-warning that at least one practicable thought will come soon upon little self-praising.

3. **Avoid Becoming Over-tired or Over-stressed.** Creative thoughts believed from the right brain may die down after hard works for several hours or days including stresses. Ones need to rest and reduce stress when facing severe work load.

4. **Nurture Your Creativity.** Busy entrepreneurs frequently engross in working and ignore participating in activities and diverse situation. Shifting the atmosphere by giving time for oneself and changing activities can render out creativity and well refresh the right brain.

The Creative Entrepreneur Making Approach

The business operators who wish to reach the creative economy system need to prepare themselves in order to be "The Creative Entrepreneur." Jennifer Lee identified 10 methods to build the entrepreneurs with creative hearts.

1. **Enlist your imagination.** Using initiatives and creativity as to how a business can be successful and spending time to order the needed pictures (visions) in a one year period and ponder how they are. Once those visions are created from the imagination, it is easy to look for the following details.
2. **Create a Right-Brain Business Plan.** Business plans need not look similar. An important key of a business plan is the clarity of the business target, that has to be noted down on paper. The business plan from the right brain may be in the leaflet form with the front cover showing the inspiration that links with the visions and the back cover indicating details such as the financial objectives, the significant appointment dates or even the marketing targets.
3. **Play with the Post-it Note Project Plan.** A large amount of the project plans in the brain can be drawn down into the post-it notes. Each piece of the work is in each note. Different colors can be used to make groups and the post-it notes must be placed in order on a large piece of paper. That large paper can be stuck on the wall. Long lines may be drawn on the large paper to make a weekly or monthly calendar whereas the post-it notes can be posted on it in the required period of time. That helps ease the

adjustment of the earlier designated plan and make the additional thoughts more vivid.

4. **Track Your Progress.** Plenty of thoughts can confuse an entrepreneur enough to fail to start the work. A bead can be thrown into a beautiful container after a work has been finished. Maybe beads may fall off the filled container before one knows its fullness.

5. **Follow the Flow.** Whenever feeling in gridlock, one can make a newly created innovation to make further movement. Singing a song or knitting a scarf may be useful. What is important is to keep the creative thoughts in balance and to look for new ideas in the brain.

6. **Build on What You Know.** One can also deploy a familiar stuff to make more clarity. For instance, thinking of budgeting is like cooking after a food recipe. Firstly, a food recipe is needed (like having a model to designate the budget). Secondly, the ingredients must be collected (like gathering all items of the budget). Then, all ingredients must be measured (like putting a financial amount into each field of the budget). All are just an example of how to step along a process of something we know. It helps discover the origin of the creative thoughts and the new activities that can reduce fear.

7. **Learn Something New.** Seeking an enjoying method to collect new business operating knowledge is useful. If loving reading, one can glimpse a relevant interesting book. If loving interacting with others, one can attend a training program. Knowing more increases, one's power.

8. **Make Time for Reflection.** Surveyed each quarter are which point has been reached, where to go next, what the designated targets in the business plan are, what the next stages of the activities run from the project plan noted on the post-it notes are. All of these help ones learn and accept the needs to make correction over a mistake or to accept the success and achievement of an objective.

9. **Ask for Help.** It is unnecessary to make all thought come true by oneself. Outsourcing for the bad work done or disliked. Examples are hiring an accountant to set up the accounting system, hiring a consultant group to provide marketing strategies,

hiring an assistant to designate the meeting times, and assigning some works or activities for others to do. That can make the entrepreneur to fully concentrate on the essential portion of the business.

10. **Connect with Creative Cohorts.** Ones need to fetch an inspiration from other creators or to meet some favored persons in order to their advices, or to make a socializing appointment with friends so as to brainstorm the supporting ideas for the further business growth [2],[3].

Research Methodology

The study of development of creative thinking entrepreneur program based on creative economy is descriptive research by collecting data for quantitative analysis. The researcher conducted the process of research in 2 phases as follow:

First phase: Study preparation process to develop creative ideas, and study creative features of business operations, having 2 stages:-

Stage 1

It is a survey research by conducting study and analysis of preparation process according to creative economy concept, and using interviews to collect information about characteristics of creative thinking before analyzing the activity patterns in Stage 2.

Research Population is a document and research related to the preparatory process for the development of creativity. Entrepreneurs for SME/Experts in creative thinking development/experts in creative economy/ Individuals with improving the quality of graduate.

Research Instrument is the analytical pattern of entrepreneur's creative thinking feature in business operation, and a semi-structured interview about the preparation process for creativity development.

Stage 2

Study activity patterns of creative thinking characteristics, based on the creative economy concept, by using analysis of data from stage 1.

Research Instrument: Using analysis pattern for developing creative thinking features, in order to obtain its activity pattern for entrepreneurs in carrying out their businesses.

Second phase: Develop program for activities to prepare for creative thinking development in business operations.

Instrument for data collection is questionnaire in which creative thinking characteristics is derived from interviews in Phase 1, and activity list is derived from survey, researches related, interviews, including questions of academic semesters and years. About this, the expert will use to consider and comment. After phase 2, there will have activity program for creative thinking development under the concept of creative economy.

Research Findings

Part 1 The result revealed that the preparation process comprised of the designation of the program targets, principles, structure and design by using the data of the problems and the needs of the current society and the discussion with experts in each field. That involved the stipulation of the general objectives, the teaching and learning plans, the instructor and educational workforce training to ensure that those teachers understand the research-resultant extra-curriculum activity units and that they can use them properly as per the curriculum. The preparation process also included the public relations for others to acknowledge.

The researcher selected the business operating creativity characteristics from relevant literature and the interview with experts or individuals relevant with the creativity character development. Those characteristics were chosen by more than half of the respondents and five of them were directly in line with those 11 ones of John Howkins. Those five ones were the framework of this research.

1. Inquisitiveness (unceasing learning)
2. Far visioning (significance of thinking)
3. Good relationships (fun making)
4. Endeavors and patience (high ambition)
5. Always on-pacing (moving-on)

The interview with the experts in the study on the creative entrepreneur preparation program showed the following 10 activities.

1. Independent career training
2. Creative thinking
3. Special academic lecture
4. Job consultancy
5. Short-term job practicum
6. Student exchange program with enterprises
7. Senior-meet-Junior Project
8. Job development camp
9. Far visioning activity
10. Teaching by case studies

The activity table of the preparation program was arranged in accordance with the semester and study year under the most agreed and feasibility opinions of the experts. The second semester of the third study year contained most activity options, namely 4 activities. Details were as follows:

The 1st year: 1 activity option (the special academic lecture).

The 2nd year: 3 activity options (the creative thinking, the special academic lecture, and the far vision opening)

The 3rd year: 8 activity options (the independent job training, the special academic lecture, the career consultancy, the short term job practicum, the student exchange with enterprises, the senior-meet-junior project, the career development camp, and the teaching by case studies).

The 4th year: 3 activity options (the independent job training, the special academic lecture, and the career consultancy)

Suggestions

This research manifested that the synthesized creative entrepreneur preparation under the creative economy concept could enhance the business operating capacity after the university graduation. The educational institution can utilize them as the teaching or the extra-curriculum activities by adjusting them to accord the teaching courses and by selecting diverse activity units to suit the student development.

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PID 15 Problems of Authentic Assessment and Guideline for Authentic Vocational Student Assessment in Vocational Education Institute, Thailand

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Abstract — The purposes of this research are to develop and examine the authentic assessment for vocational instruction reform by utilizing research and development approach associate with the participatory action research. The research methodology is divided into 3 phases as follows. Survey research and data collection that consists of questionnaire and interview are used for this research; Developing the authentic student assessment development for vocational instruction reform. Focus group of 10 knowledgeable people is arranged to improve the framework and the approaches of authentic instruction including authentic assessment. Later, workshops are set in order to design the manual of authentic student assessment. The research findings represent that the model of authentic student assessment mostly required by the instructors (88%) for self-development is workshops. Moreover, the first 5 demanded details for the workshops are 1) knowledge and true understanding of authentic assessment, 2) authentic instruction arrangement 3) tool selection for authentic assessment 4) tool improvement and 5) curriculum analysis. they can realize the guidelines for vocational instruction reform. In other words, the administrators and instructors need to have right understanding for vocational authentic instruction. Importantly, all instructors must be assigned to arrange the authentic learning arrangement plan in all subjects specified in the curriculum.

Keywords : Authentic assessment, Vocational education

Introduction

According to National Education Act of 1999 and additional amendment (issue no. 2) in 2012 of Thailand, category 6: standard and educational quality assurance, section 47, It determines to have the educational quality assurance system in order to enhance the quality and educational standard in all levels. Furthermore, the National Education Act of 2008, section 6 has mentioned the aims of vocational management and training that must be related to vocational education management which is consistent with the National Economic and Social Development Plan. These put the emphasis on production and vocational manpower development in skill level, technical level and technological level thus resulting in the highest quality of desired occupational competency. In addition, it is expected to upgrade the mastery of academic to be in line with the requirements of labor market. In section 11, it defines the Office of Vocational Education Commission roles and duties to consider and suggest the target policy on production and manpower development plan, including promote, support, control and inspect the quality assurance to improve the quality and vocational standard.

The Office of Vocational Education Commission or OVEC Thailand has determined essential missions regarding mentioned vocational education management improvement to be a target policy and strategies which are compatible to the government policy and the policy of Education Ministry. The policy of production and vocational manpower development to be accepted worldwide in 2012-2026 of the Office of Vocational Education Commission has also decided the important missions to upgrade vocational education management by emphasizing on the educational institution level, classroom level,

quality enhancement including building sustainable development and vocational education quality improvement. One of the significant approaches for vocational education development to create the highest potential workers is learning arrangement according to the guidelines of authentic assessment. Authentic assessment refers to the measurement of performance tasks or activities assigned to students; the mentioned tasks or activities can be either work or authentic situations in their real lives. These might be the tasks that are in complicated situations and be holistic rather than the work in general learning activities. In particular, the assigned tasks should cover the essential characteristics of students expected from each subject objective; moreover, they can evaluate the abilities, skills and student characteristics related to things that can be applied to their daily lives. It should emphasize real ability and examine the high level of thinking process and implementation of students whether they follow the standard or specified criteria. Besides, using matters or situations from real/nearly real condition in daily life to drive the students to express their responses, do or produce the best work based from the expected work process and good quality product. This will be the reflection to conclude the degree to which competencies and skills students have, how much satisfying and what successful level they are in [1],[2],[4],[5]. Therefore, authentic assessment development for vocational instruction is absolutely necessary. The ultimate goals of this conduct is to approach learning competency improvement by putting the emphasis on knowledge, basic necessary foundations for work and occupational skills that influence student learning. Further, the assessment approach that focuses on development assessment of students and instructional efficiency, measurement and test covering the real condition must be taken into account; all of these will efficiently advocate vocational education development [3].

Objectives

The mainly research objectives are to study the condition and problems of authentic assessment and the requirements of authentic vocational student

assessment and to set a guideline for the authentic student assessment for vocational institutions under the Office of Vocational Education Commission Thailand.

Research Methodology

Investigators partly employed the research and development approach cooperating with the participatory action research to conduct this study. The investigators aim to truly develop the authentic student assessment for vocational instruction reform in educational institutions under the Office of Vocational Education Commission. This research was conducted from the participation of stakeholders involving instruction arrangement to improve the quality of students. The research methodology is therefore divided into 3 phases as follows:

Phase I: Studying the condition, problems of authentic student assessment and the requirements on authentic student assessment development for vocational instruction reform.

Questionnaire sent via the post to 516 instructors were used for data collection on this phase.

Phase II: Developing the authentic student assessment development for vocational instruction reform in educational institutions under the Office of Vocational Education Commission. There were two sub-steps as the following:

Sub-step 1: Arranging the focus group for knowledgeable people to improve the frameworks and the guidelines of authentic instruction including authentic assessment of the Office of Vocational Education Commission. The informants were 1 knowledgeable people in measurement and educational assessment, 9 administrators and experts in vocational instruction under the Office of Vocational Education Commission, totally 10 people.

Sub-step 2: Creating a manual of authentic assessment for vocational instruction reform in educational institutions under the Office of Vocational Education Commission (OVEC). The informants were instructors under OVEC who are skilled in lesson plan arrangement and are capable of learning management separating from 9 academic programs,

total 22 people and from a group of basic subject 3 people, grand total 25 people.

Sub-step 3: examining authentic student assessment for vocational instruction reform in educational institutions under the Office of Vocational Education Commission (OVEC). The examiners were 345 experts in vocational instruction from various academic groups under OVEC. Data collection was prepared by sending them the manuals of authentic student assessment including lesson plans for the subjects they are experienced in; all the examiners evaluated the appropriateness of each component with their recommendations. Then, all set of data were analyzed, while the lesson plans were adjusted appropriately for later use.

Research Findings

The study results of condition and problems regarding authentic learning assessment, General information of respondents most of instructors (53.7 percent) graduated with bachelor degree, following (45.2 percent) graduated with master degree and just a few graduated with doctor degree. Further, 55.4 percent have instructional experiences more than 19 years. Academic programs the informants teach are follows: Industry, Commerce / Business Administration/ Fine and Applied Arts/ Agriculture/ Home Economics/ Fisheries/ Tourism and Hospitality/ Textile Industry/ Information Technology and Communication/ Agricultural Mechanic/ Basic Subject which are distributed as the ratio of opened courses. Most of informants are in Industry program, 31.6 percent, Commerce/ Business Administration 29.1 percent and Home Economics 15.5 percent. The quantity the instructors teach each semester is 2-3 subjects and almost all of them teach in vocational certificate level and higher vocational certificate level.

Current condition of authentic learning assessment based on own understanding

Learning assessment method defined by the instructors is suggested below:

1)Cognitive domain: almost instructors mention that there are assessments in terms of understanding, thinking ability, problem solving ability, and learning activity arrangement. When it comes to learning activity arrangement to promote cognitive domain, lecturing is used most often, while questioning and researching are used subsequently. Other methods such as project-based instruction, problem-based instruction, and other instruction techniques are less used to enhance the cognitive domain.

2)Affective domain: the instructors specify that there are desired characteristics defining such as responsibility, interest and seeking knowledge, good attitude towards learning and good sense towards careers.

3)Psychomotor domain: the instructors indicate that there are work process defining, and work qualities. It could be concluded that most of the instructors completely define learning objectives covering all of 3 categories.

Tools and learning assessment approach, it is found that

1)Cognitive domain: the instructors mostly use performance examination and knowledge measurement, while other methods such as worksheet check, demonstration and experiment are hardly used.

2)Affective domain: the instructors mostly use observation, following with inquiring, and portfolio.

3)Psychomotor domain: work assessment is mostly used, while working behavior observations, performance assessment and portfolio are following used respectively.

The instructional assessors specify that all of the assessments: cognitive domain, affective domain and psychomotor domain are evaluated by the instructors; on the other hand, students half participate in their self-assessment and only a few that are assessed by friends.

Problems found in authentic assessment

The opinions of instructors who do self-assessment, it is found that there are 5 problem levels, the highest to the least, caused from the instructors.

That is, the instructors have problems of true understanding in authentic assessment, the ability to analyze and defining learning results. Moreover, the ability of functioning, explanation, or providing the meanings of learning results, academic record decision, authentic instructional activity arrangement, tool creation and implementation become the essential problems of the instructors.

According to the average point level of the instructors who share their opinions from self-assessment, the problems of instructors are the true understanding in authentic assessment, the ability of analysis and learning result defining. Especially, the following problems happen to be essential difficulties for the instructors: the ability of functioning, explanation or providing the meanings of learning results, academic record decision, authentic instructional activity arrangement, tool creation and implementation.

The requirements of authentic student assessment development

The research results represent that the model of authentic student assessment mostly required by the instructors for their self-development is the workshop, following with the manual for self-studying and other methods such as field trip and supervision. Desired points or contents for the training fall into the following: 1) knowledge and understanding regarding authentic learning assessment, 2) authentic instructional activity arrangement, 3) tool selection for authentic learning assessment, 4) tool improvement and 5) curriculum analysis.

The results of authentic student assessment development for vocational instruction reform

Referring to the authentic student assessment development, the manual of authentic student assessment for vocational instruction reform of educational institutions under the Office of Vocational Education Commission is created. The concept ideas are using the authentic student assessment that refers to the authentic work assessment rather than being an assessment by the test or just either side assessment in accordance with specified criteria. The authentic

student assessment, therefor, covers the oral presentation, exhibition organizing, student best work collection, demonstration recording, showing on special occasion, craft creation, model, problem solving method, experiment, retrieval works or using work process including the observation of instructors, the survey of the performance and behaviors of students and group work or single work. This research is regarded as innovation development that can be applied by the instructors as a guideline for subject performance assessment facilitating to authentic vocational instruction activities arrangement. This supports the instructors to define learning objectives in terms of knowledge, skill and attitude towards career; in the meantime, it facilitates the desired morality happen to students who can apply it to their real lives or work lives.

Instructional arrangement innovation by using created vocational authentic learning plan has 3 principles as follows:

1. Learning objective defining
2. Learning activity defining

The research results derives from the samples of authentic learning assessment plan of all subjects, totally 14 learning arrangement plans, which are the opening /co-studying in the vocational certificate 2013.

The components of authentic student assessment manual for vocational instruction reform are classified into 3 sections: Section I instructional arrangement and vocational authentic learning assessment, section II approaches and tools used in authentic assessment and section III instructional arrangement and vocational authentic assessment. These learning plan and authentic assessment compose of learning units, performance objective defining and learning assessment including performance criteria defining together with samples of measurement tools and learning assessment for 9 subjects and 2 groups of basic subject: Industry program-Mechanics, Automotive, Welder, Information Technology program, Tourism program, Home Economics program, Agricultural program,

Fisheries program, Commerce/Business administration program, Fine and Applied Arts program, group of basic subject-Language and group of basic subject-Mathematics.

1. The examination results of created authentic student assessment guidelines

According to the results of lesson plan assessment and vocational authentic assessment, totally 14 plans, the results of overall lesson plan assessment reveal that more than 80 percent of the experts consider the lesson plans in all components suitable at the high to highest level. On the other hand, there are some suggestions for improvement in some lesson plans regarding assessor adjustment to be clearer and consistent with practical standard criteria. Some suggestions are agreeable to be adjusted in many lesson plans; for example, the participation of students and other people in lesson plan assessment and the research result implementation.

Recommendations

The office of Vocational Education Commission (OVEC) should determine the policy for all administrators and instructors under their responsibility to truly understand the guidelines of practice for instructional reform. In other words, the administrators and instructors must have right understanding in vocational authentic instructional activity. Each subject performance should be also defined its learning objectives correctly. When learning arrangement is created properly in accordance with its right performance, it undoubtedly leads to correct authentic assessment which reflects the true ability of students.

There should be the presentation of authentic learning plan innovation of instructors that have been used for authentic instructional development. It is also recommended to set the stage for presentation or competition authentic learning plan innovation created by the instructors to exchange ideas in college level/section region/region etc. Interestingly, instructors can also learn and share each other's ideas for learning activity improvement, appropriate and effective authentic learning arrangement for their students.

Suggestions for further research development for instructional and learning reform

Vocational instruction must depend on the coordination among establishments which realize on the participation principle for production and manpower development. Not only students in vocational system but also students in dual vocational training are considered to be important for authentic student learning performance development. Moreover, there must be a record for the job training; what students obtain from the job training, works or assigned work. The consideration of work performance of students must be assessed or examined from instructors/college supervisor/cooperating instructor (personnel in establishment). The job training assessment/student visit in the traditional way will be conducted by instructors/college supervisor and personnel in establishment who together examine, record student performance and finally consider the best works created by students to be collected in their portfolios. Portfolio is arranged by students to collect samples or evidences that represent on the achievements, abilities, efforts, skills of students; furthermore, the portfolio will be presented to instructors/college supervisor/personnel in accomplishment to consider.

Currently, electronic learning is regarded as an important factor for daily life; consequently, instructional materials of teacher nowadays seem to bring this electronic learning to involve in learning activity arrangement. Further, the innovation can be further developed for job training assessment system of students as well. It causes the assessment system to be sophisticated and can be used for assessment immediately by checking student performance in the website or proper assessment program. Likewise, when students conduct work or finish the assigned work or need to record the performance/job training results, they can record or present their performances in the program. Teachers, college supervisor, coordinating teacher can examine it all the time. In other words, student performances can be assessed online. Clearly, it is the innovation development to create electronic portfolio or E-port and assess the

performance online for the job training of students in the establishments.

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