ISATE 2014
International Symposium on Advances in Technology Education
24 – 26 September 2014, Nanyang Polytechnic, SINGAPORE

TEACHING, LEARNING AND SHARING BASED WEB-LEARNING WITH EVFA

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Abstract

Education is an important, core element in the development of a person, so educators have to develop the ability to teach students in a creative manner and environment. While the development of video and flash animation has been familiar with the educators, in the teaching process there is a need for a media that provides teaching materials which suit the needs of each educator. The availability of EVFA (Education Video and Flash Animation), a web-learning system that can provide teaching materials, makes the search for a solution easier and faster.

Using the web-learning EVFA educators will have it easy, especially in providing instructional materials to students in the learning context of each lesson. With the ongoing globalization of communication now, especially in the Internet era with its own requirements, educators can be expected to take advantage of technological developments that have with particular relevance to their education system. In his research, the writer found that the use of video and flash animation in the process of learning and teaching affects the students' motivation to learn and understand, and it also motivates the educators in delivering their learning materials, making web-learning crucial in the provision of teaching materials used by educators from the different schools. In its use, web-learning also provides media to discuss and share teaching methods between educators who, as we already know, have unique teaching methods.

Keywords: *Web-learning, Video, Flash Animation, Eduation*

Introduction

Education is a very important role in improving the quality of human resources rather than through a formal education or in the daily activities. In general, education is a process of behavior change for the better, so that education can be obtained even if not through a school or other educational institution. Moreover education is also expected to balance between mental health and the human body, have the knowledge and ability so as to improve the ability, intelligence and good character. In achieving these objectives and the need for quality education outcomes through enhanced learning process in schools.

Technology-based learning, or better known as e-learning at the moment has been developed through various forms has many users, especially educators who are trying to develop innovations in education so that what is taught to be more effective and able to improve the quality of learning, but occasionally this learning does not provide any benefit because all of this depends on the ability of educators to deliver as quoted **"**Newer technologies such as computers and video conferencing are not necessarily better (or worse) for teaching or learning than older technologies . . . they are just different . . . The choice of technology should be driven by the needs of the learners and the context in which we are working, not by its novelty.**"** **(**Bates AW. *Technology, open learning and distance education***.** London: Routledge, 1995).

Richey, R.C. (2008) found that "Educational technology (also called learning technology) is the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources." The development of e-learning is so rapid in education has resulted in many emerging concept of e-learning based learning, but in Bandung is still a lack of concern for fellow educators to educators so that they at least teach educators who share their experiences with fellow educators as most educators still think that it is not necessary to share teaching methods because each method depends on the individual. In this case needs to be clarified that the importance of a means to improve the quality of teaching educators by sharing methods, materials, or other forms of learning so that the creation of quality educators who are able to solve problems in education.

E-learning that we have developed a web -learning that makes a pattern composed in the form of videos, flash animations and a media for educators to discuss the problems in learning, teaching or various forms of good teaching. So the use of this website allows teachers to get teaching materials in the form of video and flash animation quickly and effectively because it

makes the web more structured teaching materials, allow educators to establish communication in solving problems in education.

Materials and Methods

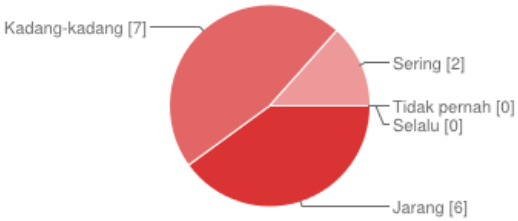
In this study the authors investigated the purposes of educators in the use of video and flash animation in the classroom as well as the importance of educators share their experiences in teaching so as to provide information to other educators in teaching methods to the students in the class. Learners also have the right to conduct an evaluation of the learning is done so as to provide a response that is able to establish the quality of the teacher.

Author involving high school teachers in making the necessary data with the interview, while high school teachers came from the Senior High Indonesia in University of Education, Bandung. Data have been obtained in the use of material in the form of video and flash animation in learning has been frequently used in everyday learning, but in getting the instructional materials to the unavailability of a website that can provide all of these things (video, flash animation and media for teacher communication).

In addition to retrieving data in Senior High School in Indonesia University of Education, we also obtained data on the role of students to make an evaluation to lecture who teach them, the students come from the computer science and computer science education department, Faculty of Mathematics and Science Education, Indonesia University of Education.
In the data that has been obtained from the student, the use of technology has been Integrate well in learning but not quite up to the content of teaching materials are used, because they tend to use power point slides so that the interaction does not occur with the maximum learning and understanding. Students still require the input of lecturers because they are still monotonous.

Results and Discussion

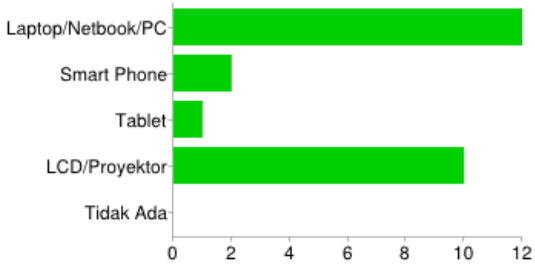
Do you often get a form of video material in delivering learning materials in the classroom by the teacher /lecturer?



Translate :

Kadang-kadang	= sometimes
Sering	= often
Tidak Pernah	= never
Selalu	= always
Jarang	= rarely

In the delivery of learning materials made by the Teacher / Lecturer electronic media what is normally used?



The data that has been obtained by the authors, the use of video and flash animation in learning in Bandung is still not optimal due to the limited number of media provided to teachers and limited of teachers ability in the use of technology in learning, only a few teachers who have been eager to meet the instructional needs of students who make interactive student learning. These data demonstrate that the use of a device that is still not optimal because it only uses the monotony of the media so that the learning objectives are not maximal.

Conclusions

In web-learning that has been author designed and created to improve the preparation of teachers to teach in the procurement of teaching materials and capable of providing a media of communication for teachers to share teaching experiences and problems faced when teaching and be able to have discussions with other teachers through EVFA (Education Video and Flash Animation).
In use the web also able to give students the means to independently through content that is available. The importance of preparing students in learning so as to provide active participation of students in the classroom so that learning objectives will be achieved.

Acknowledgements

In arranging this paper, a lot of people have provided motivation, advice, support, and even remark that had helped the researcher. In this valuable chance, the researcher aims to express gratitude and appreciation to all of them. First, the researcher's deepest appreciation goes to her beloved family for the endless love, pray, and support.

The researcher greatest thanks are given to Computer Science Education of FPMIPA UPI, for the advisor in Computer Science Education for advice, motivation, and useful knowledge. The deepest thanks also for all staffs either in department or in faculty who have helped the researcher in managing all formal needs during this thesis arrangement.

Our sincere thanks go to the entire staff at the UPI's university center and South Sumatera provincial

education department that has provided great support in financing research and departure to Singapore.

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CURRICULA PRINCIPLES FOR NEXT GENERATION EXPERTS

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Abstract

Future education will focus on skills in addition to knowledge and working in groups instead of working in isolation. In addition, adopting a broad range of learning methods prepares students for work. We will move away from a fragmented curriculum towards learning that is based on problems and phenomena. This future vision was one starting point for our curricula reform. Other guiding principles for our reform were the CDIO approach and the Innovation pedagogy. The CDIO approach aims to educate students with deeper working knowledge of the technical fundamentals, and to educate engineers to lead, create and operate new products and systems. The tools of CDIO focus on curriculum, active teaching and learning, and industry collaborations. Innovation pedagogy is the strategic cornerstone of the education provided in our university. The core of innovation pedagogy lies in emphasising interactive dialogue between the educational organization, students, and the surrounding working life and society.

The key elements of innovation pedagogy are cross disciplinary learning environment, flexible curricula and entrepreneurship. The curriculum reform work involved degree programmes in Information technology, Chemical and materials engineering, Business, International Business, Business information systems, and Library and information services. All these programmes belong to the Faculty of Business, ICT and Life Sciences in Turku University of Applied Sciences. The reform started with a fundamental assessment of the curriculum-wide goals and involved a high-level re-alignment of the entire curriculum structure in the whole faculty. The curricula reform implemented several principles to our curricula: a) Curricula is based on relative large modules, b) Study year is divided in five periods (nine weeks, seven weeks, nine weeks, seven weeks and seven weeks), c) Introduction to courses in the first semester, d) Multi-disciplinary innovation project (15 credits) in the third year of studies, e) Elective modules in the beginning of the second and third year (15 credits each).

In this paper we will explain the implemented principles in details, discuss the challenges and provide suggestions to other programs for their curriculum reform activities.

Keywords: *Curriculum, CDIO, Innovation Pedagogy, Working life relevance, Expertise*

Introduction

There are great challenges that higher education faces in near future just like newspaper industry had been facing. The higher education sector has reached a critical point where it must address the innovations that have changed the way its learners, and the rest of society, seek and engage with knowledge. If we do not adapt quickly enough to change we might suffer the same fate as some newspapers. (Johnson, Adams Becker, Estrada, & Freeman, 2014) We have moved towards an information society or an experiental society. It's becoming crucial to have the capacity to work in a new way to achieve new or improved solutions. Future education will focus on skills in addition to knowledge and working in groups instead of working in isolation. (Confederation of Finnish Industries, 2011) In Finland the Ministry of Education and Culture requires changes in the way of higher education too. They have introduced a new funding model for higher education institutes. This new model emphasizes study progress and education results instead of the old mostly number of students based model. (Ministry of Education and Culture Finland, 2011)

The importance of developing teaching and learning methods and a collaborative culture is widely recognized (Confederation of Finnish Industries, 2011). One of the key guiding structures of teaching and learning is curricula. The curricula can be looked from different viewpoints such as subject content, organization, pedagogy, learning outcomes and assessment (Blackmore & Kandiko, 2012). The overall structure of curriculum is changing from a fragmented curriculum towards learning that is based on problems and phenomena. Adopting a broad range of learning methods prepares students for work that is performed in a variety of ways. (Confederation of Finnish Industries, 2011) The Royal Academy of Engineering (2007) emphasized similar thoughts too: *university engineering courses must provide students with the range of knowledge and innovative problem-solving skills to work effectively in industry as well as motivating*

students to become engineers on graduation. At best, learning is done in projects where students grasps information through phenomena and problems and projects emphasize working in teams too (Confederation of Finnish Industries, 2011). Furthermore, we should establish learning processes which support multidisciplinary activities combining business and engineering for example (Ministry of Employment and the Economy, 2014).

The above introduced visions were one starting point for the curricula reform of the Faculty of Business, ICT and Life Sciences in Turku University of Applied Sciences in Finland. Other guiding principles for our reform were the CDIO approach (CDIO, 2014a) and innovation pedagogy. The international CDIO approach aims at educating students with deeper working knowledge of the technical fundamentals and educating engineers that a capable of leading the creation and operation of new products and systems. The tools of CDIO focus on curriculum, active teaching and learning and industry collaboration. There are 12 CDIO standards – best practices – that programs can use to improve their education. The 12 CDIO Standards address program philosophy (Standard 1), curriculum development (Standards 2, 3 and 4), design-implement experiences and workspaces (Standards 5 and 6), methods of teaching and learning (Standards 7 and 8), faculty development (Standards 9 and 10), and assessment and evaluation (Standards 11 and 12) (CDIO, 2014b). For example, standard 3 is about integrated curriculum. According to the description of the standard 3 an integrated curriculum includes learning experiences that lead to the acquisition of personal and interpersonal skills, and product, process, and system building skills, interwoven with the learning of disciplinary knowledge and its application in professional engineering (CDIO, 2014c).

The other guiding principle for our curriculum development work was innovation pedagogy. Innovation pedagogy is the strategic cornerstone of the education provided in our university. The core of innovation pedagogy lies in emphasizing interactive dialogue between the educational organization, students, and surrounding working life and society. The core idea in innovation pedagogy is to bridge the gap between the educational context and working life. Learning and teaching processes are developed so that they provide improved competences for the students and enable personal and professional growth. (Penttilä, Kairisto-Mertanen, & Putkonen, 2011) The key elements of innovation pedagogy are cross disciplinary learning environment, research and development activities executed by a big amount of students, flexible curricula, concentration of acknowledging the importance of entrepreneurship and service production and internationalization in the level of research, development and student engagement (Kettunen, 2011).

CDIO approach and innovation pedagogy are interconnected and they share very parallel goals and objectives (Penttilä & Kontio, 2014; Penttilä, Kontio, Kairisto-Mertanen, & Mertanen, 2013). The ideas of CDIO and innovation pedagogy are commonly supported. For example, the report on effective learning and teaching in UK higher education (David et al., 2009) shares similar recommendations for effective pedagogy such as

- recognize the significance of informal learning to developing specific expertise
- foster both individual and social processes and outcomes
- promote the active engagement of the student as learner
- design assessment for maximum validity in terms of learning outcomes and learning processes
- engage students with the concepts, key skills and processes, modes of discourse, ways of thinking and practicing and attitudes and relationships which are most valued in their subject.

This paper presents the curricula reform that was done in the Faculty of Business, ICT and Life Sciences in spring 2014. The reform involved degree programmes in Information technology, Chemical and materials engineering, Business, International Business, Business information systems, Library and information services. Using Tight's (2012) general categories of higher education research we can categorize this study to Course design category and looking to Blackmore et al. study (Blackmore & Kandiko, 2012) we can say that our work mostly focuses on the organization part of curriculum.

Pathways to change in higher education

As a higher education institute we need to react, learn and transform ourselves to the challenges introduced, to the changes in the external environment and to our own guiding principles. A report by Confederation of Finnish Industries (2011) states that change is obtained when we focus on two things throughout the educational system: educating skills alongside information and doing together instead of stressing individual performances.

Clark (1998) discusses five more general change pathways for universities. First, the strengthened steering core is needed because the complexity of universities has increased and the pace of change has accelerated. Thus there is the need for a greater managerial capacity. Second, the expanded developmental periphery refers to the need to reach across the old university boundaries, link with outside organizations and groups and build outreach structures such as research centers. Third, the diversified funding base becomes essential when the governmental funding base is hardly increasing. Fourth, the stimulated academic heartland emphasizes the need to achieve changes in the departmental level and turn them to entrepreneurial units reaching outside with new programs and relationship and promoting new income sources. Fifth, the integrated entrepreneurial culture refers to the work culture that embraces change and

creates ground for new practices and innovations. Universities actively seeking new ways and moving away from close governmental regulation and sector standardization are enterprising universities. An entrepreneurial university seeks to innovate how it operates and functions in its business (Clark, 1998). Shattock (2010) shares this idea when saying *successful universities will always seek to improve their performance in teaching and research*.

One of the key issues in transformation is how to maintain the new way and not to be drawn back to the old structures. Based on Graham's (2012) study there are several possibilities to support lasting change. First, the need for reform should be communication throughout the faculty. Second, the new curriculum should be designed using the whole faculty and commit them to the change this way. Third, during the reform you should consult external experts and learn from their perspectives. Fourth, there should be a management team to lead the reform and they should be given reasonable time for this. Finally, some kind of impact evaluation should be established. Graham's (2012) study also showed that successful and sustainable change starts with a fundamental assessment of the curriculum-wide goals and involves a high-level re-alignment of the entire curriculum structure in which a cross section of faculty are involved.

Results

Our curricula reform work involved degree programmes in Information technology, Chemical and materials engineering, Business, International Business, Business information systems, Library and information services. The first two programmes lead to Bachelor of Engineering degree and the length of these programmes is 240 ECTS (4 years). The other programmes lead to Bachelor of Business Administration and the length of these programmes is 210 ECTS (3.5 years). During the curricula reform each programme created a new curriculum for their next intake of students for September 2014. All these programmes belong to the Faculty of Business, ICT and Life Sciences in Turku University of Applied Sciences. This is a new faculty created on a merger of two old faculties: Telecommunications and eBusiness and Life Sciences and Business. The new faculty is a good example of a truly multidisciplinary organisation with around 3000 students and around 170 faculty members including teachers, researchers, project workers and all others.

The curriculum reform started in spring 2014 with a fundamental assessment of the curricula-wide goals. The assessment work was done in two steps. First the management board of the faculty focused on the future requirements and identified challenges confronting higher education. After that a high-level realignment of the entire curricula structure in the whole faculty was established and key skill areas of our graduates were defined. While defining the key skill areas we wanted to emphasize the role of our research groups too and connect them stronger to the learning. This high-level structure was then discussed with the advisory boards of the degree programs. At the same time the key competence areas of each field were discussed. The results of the assessment provided us the key structures and principles for the curricula reform. These are

- curricula is based on relative large modules
- study year is divided in five periods (9 weeks, 7 weeks, 9 weeks, 7 weeks and 7 weeks)
- introduction to – courses in first semester
- multi-disciplinary innovation project (15 credits) in third year of studies,
- elective modules in the beginning of second and third year (15 credits each).

Our old curricula were packed with courses with relatively low number of credits. In addition, the courses didn't provide a fully consistent and integrated curricula. The new curricula has larger modules preferable 15 ECTS each. A module can be divided into courses minimum of 5 ECTS. The key idea of introducing larger modules is to enhance study progress and shorten graduation time.

Together with the study modules the academic study year was rescheduled. Our autumn semester starts in the beginning of September and finishes approximately a week before Christmas. This means that during autumn semester there are around 16 study weeks. In spring we start in the first week of January and earlier continued until end of May. Even in the previous model the spring semester was clearly longer. Despite this inconsistency of the semester lengths we used to divide the 60 ECTS of one study year equally between autumn and spring semesters. Thus a students had to study the 30 ECTS in autumn very quickly and hard and it was the same with teachers – they had to organize the learning in relative short time compared to spring semester. Another rationale for rethinking the study year was the new funding model which rewards us for each student who does 55 ECTS or more in one study year. The new structure of academic year is such that autumn semester has two periods (9 weeks and 7 weeks) and spring semester has three periods (9 weeks, 7 weeks, 7 weeks). In autumn semester student is supposed to study 25 ECTS and in spring 35 ECTS. We even defined that within the 9 week periods there should be learning activities worth 15 ECTS and within the 7 week periods learning activities worth 10 ECTS.

Third faculty wide element we required each curriculum to have is an introduction to –course in first semester. The idea of this requirement comes from the CDIO standard 4. An introductory course provides the framework for engineering practice in product, process, and system building, and introduces essential personal and interpersonal skills. The wording of the standard description targets for engineering, but the overall idea is adaptable to other disciplines too. The introduction to –course provides the framework for the studies and engages students from the beginning of studies to his/her own study field. Furthermore the course should include personal and interpersonal skills knowledge, skills, and attitudes that are essential at the start of a

program to prepare students for more advanced learning activities. Most of our degree programmes had this introduction to –course in their previous curriculum already, but we wanted to explicitly define that this course is fundamental part of each curriculum also in the future.

The fourth element of our curriculum reform is to include an innovation project module into all our new curricula. The innovation project module answers to the requirement of CDIO standard 5 when a curriculum includes two or more design-implement experiences, including one at a basic level and one at an advanced level. The innovation project is well discussed in Kulmala et al. (2014) and in the module website too (http://capstone.dc.turkuamk.fi/). The innovation project (15 ECTS) is implemented in multidisciplinary teams of 6-8 mainly 3rd year students. During the course students develop a prototype solution to a problem or need of a real client. The project covers the whole life cycle of a product development process from an initial idea phase to closing the project. The pedagogical framework of the course includes innovation pedagogy, problem-based learning (PBL) and project-based learning. In addition, user-centred methods are applied in the planning phase of the project, and agile methods, especially Scrum, are used in project implementation.

The fifth element of our curriculum reform was to include free elective modules in the beginning of second and third year (15 credits each). This solutions answers to the requirements of our university new degree regulations – each degree program should have 30 ECTS of free elective studies. In addition, with this solutions we enable T model experts (Figure 1) that are required in the future working life (Confederation of Finnish Industries, 2011).

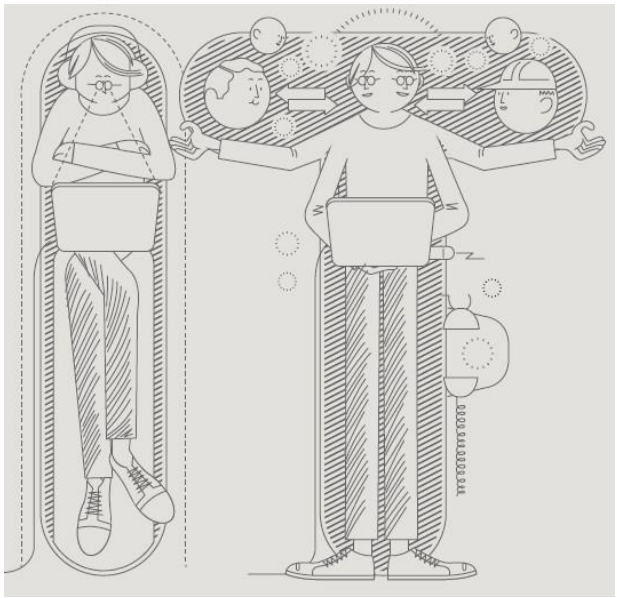

Figure 1. From I model to T model graduates.

The free elective modules are provided during the first autumn period in 2nd and 3rd study year – in principle no other modules are provided at that time. Basically our degree programmes offer modules that they see valuable and interesting for the students of the other degree programmes. The elective modules were created in a faculty wide competition where teacher teams suggested themes. We received altogether 59 suggestions. Based on the suggestions the management board of the faculty then selected 15 theme areas for further development. Some of them were the original suggestions and some of them were combinations of two to three suggestions. These 15 modules will be provided for preliminary selection to the students staring this autumn and studying these modules in autumn 2015.

The general curriculum reform principles implemented can be summarized in the Figure 2 below.

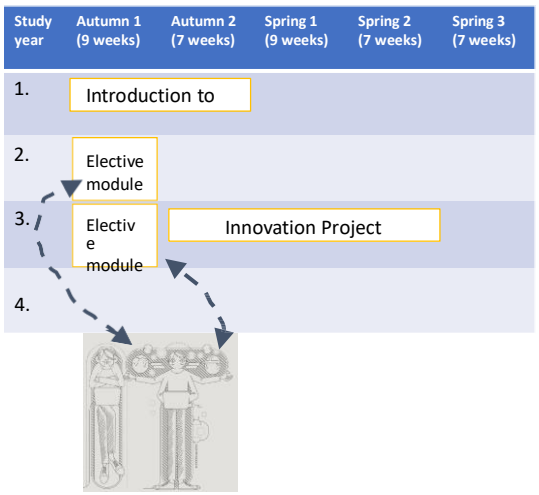

Figure 2. Summary of curriculum reform principles.

Discussion

The results section shows that our faculty has taken actions to react to the challenges facing us. Curriculum reform has followed the guiding principles well. Elements of the innovation pedagogy are embedded into the curriculum. Each curricula has an innovation project that by nature is a cross disciplinary learning environment. Each curricula has also free elective modules that are provided by other disciplines than their own and students in these modules represent cross disciplin ary programmes. Second, the innovation projects are real life research and development assignments and all our students join these during their third study year. In addition, we have connected our research groups more clearly to the final study years and learning activities there. Third, the designed general curriculum structure is flexible. There are 30 ECTS of free elective modules and the focus of an innovation project can be quite flexible for example. Fourth, both the introduction to –courses, the innovation project and free elective modules teach our students elements of entrepreneurship. Some of them are dedicated to entrepreneurship while others operate in entrepreneur-like way.

CDIO is also very well acknowledged in our new curriculum structure. Each curricula has an introduction to –course as standard 4 suggests. We have at least two design-build project courses in each curriculum like standard 5 proposes: the introduction to –course and the innovation project. Because we have been a CDIO collaborator since 2007, the CDIO standards have been guiding our curriculum work many years already. For example our curricula are outcome based and learning competences have been defined (Standard 2: Learning Outcomes). Similarly many ideas of the standard 3 (Integrated curriculum) have been implemented, but we still have room for improvement too. The other standards have been in our development agenda as well since joining CDIO (Kontio, 2012).

Graham (2012) proposed several supporting actions to be taken for successing in higher education development activities. Most of the actions she proposes we have taken too. The need for reform is communicated throughout the faculty in several faculty meetings. The need is informed, explained and discussed – we have really taken time to make everyone aware of the need. We have also activated our whole faculty to the design of new curriculum. Everyone has had changes to contribute and make our curricula better. We have even used external experts and arranged two times teaching tricks workshops followed by degree programmes's discussions and reflections. The whole curriculum reform was led by the dean and faculty management board consisting mainly of degree programme managers. They all had resources to take this reform through, but we should have weighted this even more. The final one of Graham's actions is still waiting, but we have discussed that the impacts of this curriculum reform should be followed and evaluated.

Clark (1998) provided different pathways to transformation too. These pathways were not as concrete as Graham's, but we can find certain elements from his work as well. During this curriculum reform process we have recognized the need to expand our networks and enter into new territories. We haven't yet established new outreach organization, but some plans do exist. However, a lot of discussion has been on diversifying our funding base. Actually at the final phases of this curriculum reform process new organization structure was presented and one of the aims is to support enlargement of the funding base. Since joining CDIO we have all the time worked on improving our education and processes. Thus we could say that there is a quite good ground for new practices and innovations.

Conclusions

This paper has presented a curriculum reform process in the Faculty of Business, ICT and Life Sciences. We have tried to explain our solutions in detail and hope that they give ideas to other universities, faculties or programs in their development work. The solutions we have implement are of course connected with our environment and regulations and are not transferred to others as such. Still, we can sum up our work as Clark (1998) concluded his work by saying that significant innovation in university means that some deep structures are altered to the point where the long-term course of the organization is changed.

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DEVELOPMENT OF MULTI-COLLABORATION-BASED VOCATIONAL EDUCATION SYSTEM: APPLIED BACHELOR PROGRAM OF MANAGEMENT AND MAINTENANCE OF HEAVY EQUIPMENT ENGINEERING

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Abstract

This paper presents multi-collaboration-based development of vocational educational applied bachelor program. The approach of multi collaboration-based has been carried out by Vocational School of Gadjah Mada University, PT. Hexindo Adiperkasa Tbk. (Subsidiary of Hitachi Construction Machinery, Japan), Local Government of Gunung Kidul Yogyakarta, and Vocational High School of Ngawen, Gunung Kidul Yogyakarta. Each represents participatory, capabilities, needs and goals to be collaborated. The learning scheme and curriculum, as well as the graduate competence, have been defined and developed collaboratively. It has been developed based on what is really needed in the real work, and delivered according to standardized education system in Indonesia, applying to 60% practical courses and 40% theoretical courses.

During the first two years, this program has accepted 30 students per year. During the last two years, 60 students have been accepted per year. Students from the first batch have completed one semester internship program in several coal mining companies. Those are the customers of Hexindo-Hitachi, in which Hexindo-Hitachi deploys supporting unit/department within those.

The students have shown high performance during the internship program. Based on the feedback from the managers in Hexindo-Hitachi who supervised the students during the internship program, students performed very well since they have learned knowledge, skills and understanding about the real work, while in the class. More importantly, they have shown readiness in terms of attitude and communication skills. Hexindo-Hitachi is one of their desired companies for students to start their careers. However, since they have gained many opportunities during the internship program, they can consider other companies since many of them have received offers from several outstanding companies.

Keywords: *heavy equipment, engineering, multi-collaboration, curriculum*

Introduction

The Indonesian economy has recorded strong growth over the past few decades. Recently, Indonesia has been considered as the world's 10th-largest economy, climbing five places in six years, according to a recent World Bank (WB)-affiliated report. Indonesian demographic also shows promising future based on the golden age of workers. Education has been indeed becoming critical concern. During the last five years, there has been major change in education paradigm.

Previously, Indonesian people had a perception that academic education path is more preferable rather than vocational education path. Currently, people have shifted to have strong confidence toward the vocational path. It is also driven by industries that demand skilled and competence workers. The number of vocational high schools, polytechnics as well as vocational colleges within university increase quite significantly.

The growth of Indonesia economy has significant connection with minning industries, especially coal, construction, forestry and plantation. According to Suhala (2011), the director of Indonesian Coal Minning Association, the increase of heavy equipment demand is constantly followed by the increase of coal minning production.

Indonesia is one of the world's largest producers and exporters of coal. Since 2005, when it overtook Australia, the country is leading exporter in thermal coal. A significant portion of this exported thermal coal for which large demand comes from China and India. According to information presented by the Indonesian Ministry of Energy, Indonesian coal reserves are estimated to last around 83 years if the current rate of production is to be continued. Regarding global coal reserves, Indonesia currently ranks 13th.

If we take the longer term into consideration - when global economic activity is back on track - demand from China and India is forecast to make the coal business very profitable again (China's demand is in fact expected to double between 2011 and 2016 to 6 billion

tonnes). These promising future perspectives are the main reason that in recent years many Indonesian companies have started - or are planning to start - expanding into the nation's coal mining industry, sometimes even resulting in a shift of their core business.

Table 1 shows that prediction of heavy equipments demand for coming years is clearly high. Along with the increase of heavy equipment demand, the need of high quality mechanics/technicians increase accordingly for the maintenance (Edwards, D.J., Holt, G.D., Harris, F.C., 1998). Heavy equipment units are considerably very expensive. High quality periodic maintenance will lead to longer lifecycle, which means leading to cost efficiency. A small excavator requires several mechanics/technicians for periodic maintenance. Middle and giants size ones require many more accordingly. Meanwhile, there are no many departments or educational programs on this field of study which are specifically dealing with heavy equipment mechanics/technicians preparation. If we include construction, forestry and plantation sectors, we would surely come up with the conclusion that heavy equipment technicians are strongly needed. Existing Heavy Equipment Engineering in other polytechnics in Indonesia, for inctance Politeknik Negeri Jakarta (PNJ) and Politeknik Negeri Balikpapan in Kalimantan, are preparing graduates within three year period of study. Those are Diplome-3 program. Up to now, developed program discussed in this paper is considerably the first applied bachelor heavy equipment engineering program in Indonesia. Its graduates will be able to continue their study into applied master program or even to applied doctoral program as considered as long-life learning aspect. Thus, improvement on their career will be more feasible. Most of those also in collaboration with heavy equipment manufacturer. However, the level of collaboration of this program is considerably higher in terms of facilities support, curriculum development, internship program, graduates delivery scheme, etc.

Conceptual Design of Multi-Collaboration

Vocational College of Gadjah Mada University, in 2012, Indonesia developed a new study program within Department of Mechanical Engineering, called Applied Bachelor of Management and Maintenance of Heavy Equipment Engineering. There have been several others, Heavy Equipment Engineering Department, in other universities or Polytechnics in Indonesia. However, most of those are Diplome-3 degree. Thus, their goal is to create graduates who will be mostly connected with technical aspects in the real work. In our case, the goal is to create 'Senior Technician' who are able to manage and supervise the heavy equipment maintenance work – deployed in mining, plantation, forestry, and civil/building construction projects - that varies from small, medium and large/giant size. As we all know that heavy equipment performance extensively depends on its maintenance system, especially the medium and giant sizes those lead to more complicated aspects.

The approach of multi collaboration-based has been carried out covering Vocational School of Gadjah Mada University, PT. Hexindo Adiperkasa Tbk., (Subsidiary of Hitachi Construction Machinery, Japan), Local Government of Gunung Kidul Yogyakarta, and Vocational High School of Ngawen, Gunung Kidul Yogyakarta. Each represents capabilities, needs and goals to be collaborated. Hexindo-Hitachi provides practical curriculum based on real practices, as well as facilities for the laboratories. Hexindo-Hitachi also provides professional trainers who are periodically visiting the campus to give the lecturer together with

Table 1. Sectors and Type of Heavy Equipment

Sectors	2011	2012	2013	2014	2015	2016
Mining	7,311	9,066	11,241	13,939	17,285	21,433
Plantation	2,483	2,979	3,575	4,290	5,148	6,178
Forestry	790	1,028	1,336	1,737	2,257	2,935
Construction	2,179	2,549	2,982	3,489	4,082	4,776
TOTAL	12,763	15,622	19,134	23,455	28,772	35,322
Type of Heavy Equipment						
Excavator	4,581	5,851	7,320	9,354	11,463	14,677
Bulldozer	2,807	3,585	4,360	5,150	6,456	7,577
Motor Grader	1,814	1,839	2,436	3,176	3,186	3,739
BH-Loader	1,013	1,323	1,397	1,920	2,543	2,643
Dump Trucks	1,727	1,977	2,270	2,299	3,487	4,551
Tractors	223	298	465	515	618	803
Others	597	746	887	1,044	1,021	1,333
TOTAL	12,762	15,62	19,134	23,455	28,772	35,322

Source: PT. Hexindo Adiperkasa Tbk.

Gadjah Mada University lecturers. Hexindo-Hitachi also provides high commitment to adsorb the graduates. Students realize that they will have high possibility within near future to start their career in Hexindo or in Hexindo-Hitachi customers, mainly those that are related with coal minning companies. During first three years, this program has accepted 60 students per year. Students from first batch have just completed one semester internship program in several coal mining companies. Those are the customers of Hexindo-Hitachi, in which Hexindo-Hitachi deploys supporting unit/department within those.

Further, the local government endorsements realize many supports, for instances allowing several places for the practical and real training area, as well as enhancement of collaboration with local vocational high schools that also supply highly prepared new students. The high school is also supervised and supported by Vocational School of Gadjah Mada University and Hexindo.

In order to enhance the advantage, the new field of study of heavy equipment engineering has been established within Vocational High School Ngawen. It takes place in neighboring area that covers mountains and villages, so call Gunung Kidul City. Vocational College of Gadjah Mada University becomes the mentor for its establishment and provides support in terms of practical education activities as well as the development of curriculum. Afterwards, a new member of this collaboration is added by the appearance of Local Government of Gunung Kidul City that will officially allow several hills to be excavated in order to realize new access to connect remote areas in Gunung Kidul City, as currently are about to start officially. These projects are useful for the educational purpose as the practical real problem.

to standardized education system in Indonesia. Therefore it is considered as competence-based curriculum (M.Singer, 2006). Afterwards, multi-collaboration approaches have been applied and realized as follow:

(a) Joint lecturers between teaching staffs in university and specialists/trainers from Hexindo-Hitachi who have experiences in the real world.
(b) Teaching activities are conducted in Vocational College of Gadjah Mada University (Semester 1-5 and Semester 8) and in Hexindo-Hitachi Training Center (Semester 6) close to project area in Kalimantan.
(c) Semester-7: schematic internship program in which the students will have opportunity to experience the real problems and challenges as deployed in mining area.
(d) Internship Program will also lead to further opportunity in accomplishing practical research based on real problem which is compulsory for graduation.
(e) Curriculum content adopts the human resource and employment system in Hexindo-Hitachi so that not only the graduates competences will meet the company requirements but also the graduates will be officially addressed properly as the employee.
(f) Compentece-based curriculum has been designed according to market-driven concern.
(g) Curriculum should adopt soft-skill and managerial aspects since the graduate will perform not only in technical area.
(h) Internasional language learning should be taken into significant account.
(i) Certification system by Vocational College, Gadjah Mada University and Hexindo-Hitachi will lead to international recognition of the graduates.
(j) Hexindo-Hitachi will adsorb the graduates within conditions that meet requirements of Hexindo Human Resource Department.

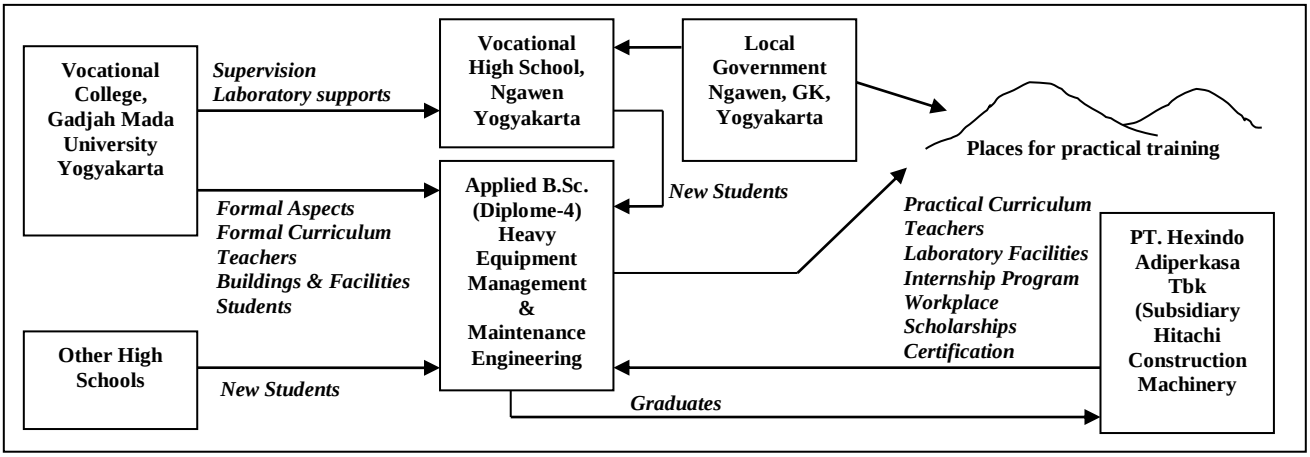

Figure 1. Conceptual Design

Learning Scheme and Curriculum

The learning scheme and curriculum, as well as the graduate competence have been defined and developed collaboratively. It has been developed based on what is really needed in the real work, and delivered according

(k) Applying 60% practical courses and 40% theoritical courses.

Theoritical skills covers understanding of basic science subjects such as Math, Physics, Engineering Materials and Energy Convertion. Further, student should be able to make a design into the realization of the designed metal part, by means of conventional and non-conventional production machines (milling, lathe, grinding, boring, etc.). They should learn how to use CAD (Computer Aided Design) to realize the design into engineering drawing.

The ability of operating and using measuring tools and material coating equipment is also essential. Students also should be able to understand the electricity and automation system of excavator and dump-truck. Next, students should be able to deal with trouble-shooting on those heavy equipments. Coming into more specific learning materials, students learn how to deal with basic hydraulic system, power train, diesel engine, and under-carriage.

They should be able to repair turbo charger, cylinder head group, fuel injection pump and radiator ass. More importantly, they should be able to conduct periodic maintenance (daily or 10 hours operation, weekly or 50 hours operation, monthly or 250 hours operation, and 2000 hours operation).

Real cases discussion have been commonly done in the class, since not only Hexindo-Hitachi trainers become the lecturer but also Gadjah Mada University lecturers are also constantly trained by Hexindo-Hitachi especially during the training camp in Jakarta, Kalimantan and Sumatra. Thus, university lecturers should be able to bring the real cases and experiences into the class, as the concept of 'teaching industry'.

Results and Discussion

Just after the establishment day, many mining companies, as well as the supporting companies informally stated their interest towards the graduates. It means that they were already convinced by the quality of educational program, participating stakeholder reputation and the college reputation. Some even offer scholarship in order to secure the future potential students earlier.

Concerning the new intake, as being introduced massively, approximately 5% of all applicants were accepted to be the new students. There are several aspects that attract their interest, for example the certainty to start career in the mining company, besides college and Hexindo-Hitachi, as well as Hitachi reputation.

Classes are conducted by Gadjah Mada University lecturers – who already completed basic and professional training program held by Hexindo-Hitachi - and Hexindo-Hitachi trainers or managers. Students learn comprehensively from the team teaching system, since lecturers actually bring real cases from real work into class. Visiting lecturers from Hexindo-Hitachi indeed improve knowledge not only the students but also Gadjah Mada University lecturers.

Laboratory facilities have been developed collaboratively. Existing laboratories of Vocational College, Gadjah Mada University, such as Welding Lab, Metal Production Technology Lab, Automotive Lab, Computer Lab, and Pneumatic & Hydraulic Control Lab were then added with a new laboratory so called Heavy Equipment Lab. Hexindo-Hitachi provided excavator engines (mid-giant size), hydraulic components, and other components of heavy equipment. These facilities were meant for practical learning programs. By means of all laboratory facilities, together with the designed curriculum, the scheme of 60% (practical) : 40% (theory).

Great participation from local government together with vocational high school of Ngawen realize more real learning program. The city major together officially delivered commands to the head of local village and principal of vocational high school to initiate heavy equipment study program. The collaboration was then enhanced into real projects that involve heavy equipments. Normally, it improves the roads quality within the local village. This leads to opportunity for students to practice what they have learned and to learn how to operate the heavy equipments. Ultimately, the projects are useful to improve local people economic condition.

The first batch students have just completed internship program in Kalimantan, Indonesia. They were deployed in mining side and re-manufacturing side, addressed with real jobs to be accomplished and real problem to be solved. High level supervision bu Hexindo-Hitachi managers also took place significantly. Hexindo-Hitachi also prepared the dormitory as well as the financial support, including monthly allowance for the students.

Based on the feedback from the managers in Hexindo-Hitachi who supervised the students during internship program, students performed very well since they have learned knowledge, skills and understanding about the real work in the class. More importantly, they have shown readiness in terms of attitude and communication skills.

Table 2. Result of Internship Program Assessment

Number Of student	Aspect (in average)				
	Basic Technical Skills	Atti-tude	Disci-pline	Moti-vation	Communi-cation skill
23	Good: 90% Fair: 10%	Good: 100%	Good: 100%	Good: 90% Fair: 10%	Good: 100%

Compared to prior internship programs (last year batch and last two years batch), consisting of common mechanical engineering students, result depicted in Table 2 shows significant improvement of students performance. In the past, basic technical skill aspect hardly could achieve the score of 60% in average. Tasks

and assignments addressed to the students are now considerably the ones significantly support main service to the customer, such as maintenance and re-manufacturing of the parts. In other word, Hexindo-Hitachi put higher target to the students, compared the one to previous batches.

However, continuous improvement still needs to be carried out, especially those related to how to use tools in real cases. Vocational College of Gadjah Mada University have to add more tools into the laboratory which are quite costly. Regarding other aspects, attitude, discipline and communication skill are even more noteworthy, since Hexindo-Hitachi trainers/teachers constantly bring the real cases and experiences into the class. As for aspect of motivation, two among 23 students showed the up and down performance. Although 90% is considerably a not bad score, improvement should take place.

Dealing with assessment result, during the last two week of internship program, students follow 10 days training class in Hexindo-Hitachi Training Center in Balikpapan city, Kalimantan. They discussed what they have learned, conformed the solutions, and establishing topic for the final assignment for the graduation. The final assignment is considered as a practical research with the topic of real cases in real work, supervised collaboratively by lecturers/trainers from Vocational College of Gadjah Mada University and Hexindo-Hitachi. Final report should be accomplished as soon as they come back to the Gadjah Mada University.

It is no doubt that curriculum as well as learning materials should be improved further. Several conflicting aspects will be improved further. Given the complexity of a curriculum reform, this opposite tension, faced by most current day change processes, cannot and should not be addressed by a firm option for one of the solutions, rather the balance between extremes should be adopted by well informed decisions at conceptual, institutional and strategic levels (M. Singer, and L. Sarivan, 2006). As for this program, curriculum will be adopted further with broader contexts since facilities supports, internship program, financial support, etc., will be considered based on implementation and evaluation of previous internship program.

Speaking of students preference about company to which they will start their career, Hexindo-Hitachi is one of their desired one. However, since they have seen many opportunities in the real world, they could consider others, since many of them have got offers from several outstanding companies.

Last but not least, massive introduction of this program through newspapers and other media (both online and offline), drives people perception towards smart participation of Hexindo-Hitachi in Indonesia education development. It is certain than Hexindo-Hitachi should consider the market competition. It is hoped that at certain point this collaboration will eventually affect on Hexindo-Hitachi sales.

Conclusions

Multi-collaboration-based educational program development has shown very good results. It was quite tough during the early phase of development, especially to convince all stakeholders. However, we strongly suggest to replicate this idea as well as its methods to other educational program in order to achieve higher quality of graduates with brighter future of career roadmap. Further, the university and stakeholders will also get the benefits within comprehensive scheme. Further, when it is implemented in other universities, improvements and adjustments are essential toward local context.

Acknowledgements

The authors would like to sincerely acknowledge all supports provided by PT. Hexindo Adiperkasa Tbk. and Government of Gunung Kidul which are very useful dor carrying out this program development.

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ISATE 2014
International Symposium on Advances in Technology Education
24 – 26 September 2014,Nanyang Polytechnic, SINGAPORE

INTEGRATED VISUALIZATION, CHRONOLOGICAL SIMULATION, AND SMART ANALOGY (iVCSA) AS AN INNOVATIVE E-LEARNING MODEL FOR EDUCATION IN SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS (STEM) FIELD

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Abstract

Education in the field of Science, Technology, Engineering, and Mathematics (STEM) subjects is quite difficult to be understood by students. This is because the STEM subjects are complex and require high levels of thinking and reasoning from the students, especially in the areas of Logics and Concepts. In addition, the subject material is also quite difficult to teach. Teachers, as educators, need a specific way to teach in order to make the material easily understood by students.

To make teaching more effective, it needs a learning model or a medium which can provide a concrete illustration, conceptual, and definitive, in order to improve the effectiveness of the learning process and to achieve the learning objectives. Integrated Visualization, Chronological Simulation, and Smart Analogy (iVCSA) is an innovative and revolutionary e-learning model that uses Computer-Aided Design (CAD), Computer-Generated Imagery (CGI) and Visual Effect (VFX) softwares. This e-learning model can give a detailed representation and creates interesting definitions of Theories, Concepts, Principles, and the Formulas that are contained in the STEM lessons material, and can also provide a real visualization and real chronology of the phenomenon, real-world implementation, or problem sets in STEM subjects.

This model is concerned with the Integrated Visual- Logical-Verbal (VLV) Describing, to make the learning process easy-to-teach and easy-to-learn. This iVCSA model is used by teachers to provide STEM lessons' material in the classroom, as a primary medium or as an alternative tool. As the result, the process of learning in STEM fields using iVCSA model is more interesting, more integrated, and can surely improve the effectiveness in the teaching and learning process. Besides making it easier for students to understand the STEM subjects, the model also facilitates teachers in teaching STEM lessons material in the classroom.

Keywords: *Science, Technology, Engineering, Mathematics (STEM), Integration, Visualization, Visual-Logical-Verbal (VLV) Describing, Simulation, Analogy, Effectiveness.*

Introduction

Education in the field of Science, Technology, Engineering, and Mathematics (STEM) subjects is quite difficult to be understood by students, this is because the STEM subjects have a complex material and requires high thinking and reasoning of students. In addition, the subject material is also quite difficult to teach. Teacher –as educators- needs a specific ways in teaching in order to make the material is easily provide and easily understood by students. In the learning process, it can make the learning process is not effective. Agree with the previous topic, STEM is a learning material which difficult to be taught, because the teacher have to be creative in provide the learning material to students, not only with the examples and exercises but also with the explanation, comprehension, illustration and implementation about learning material. Despite of that, student also have to do extra effort to understand STEM material, because not all teacher can teach the STEM material effectively. In order to increase an effectiveness of learning process in STEM field and for help teacher to achieve learning objectives, there were many e-learning model has made to make learning process more effective and give the more comprehension. The e-learning has given a great influence in the innovation of learning model.

Bryden et al (2005) describes that modeling, simulation and visualization have been used by engineers to analyze physical phenomena and design complex engineering systems. In same case, the advances of software technology in 80s has given a new type of software, called Computer-Aided Design (CAD). The CAD software is one of computer

softwares that used by Engineer to assist in modeling, analysis, simulation, visualization, and surely optimization of a design in order to increase productivity, quality, and effectiveness of a design process. Current CAD software included Computer-Aided Engineering (CAE) and Computer-Aided Manufacturing (CAM). CAE is usage of computer software to aid in engineering analysis tasks. CAE software have a capability to give an Applied Science phenomena virtually. For example, we can use Finite Element Method (FEM) for analyze the Strength of Material and use Computational Fluid Dynamics (CFD) to understand a Fluid behavior.

The other type of computer software is Computer-Generated Imagery (CGI) and/or Visual Effects (VFX) software. These software used in movie making, interactive 3D application, game, and animated video. Nowadays, CGI software is same with CAD software that can give a Science Phenomena, such as Fluid or Particle Effects. The CGI and VFX software have a rendering content to give a real visualization of images or videos.

Description of iVCSA

The general context of this e-learning model is to Visualize the learning material and use Spatial Capabilities or Visual Intelligence or Visual Thinking of students for understanding learning material that use Visualization in that providing. Newcombe (2010) defined that a critically important application of spatial thinking is to the science, technology, engineering, and mathematics (STEM) disciplines. For example, Watson and Crick's discovery of the structure of DNA occurred when they were able to fit a 3D model to Rosalind Franklin's flat images of the molecule—clearly a spatial task.

Integrated Visualization, Chronological Simulation, and Smart Analogy (iVCSA) is an innovative and revolutionary e-learning model for STEM Education that uses Computer-Aided Design/Engineering (CAD/E), Computer-Generated Imagery (CGI) and Visual Effects (VFX) softwares in the making. Bernardino (2011) said that visual learning proclivity of current students has been further accentuated due to their extensive exposure to electronic visual devices such as computers, videogames etc. We use CGI and VFX software that uses in video games to create this model. This e-learning model can give a detailed representation and create an interesting definition of theories, concepts, principles, and the formulas that contained in STEM lessons material, and also can provide a real visualization and real chronology of a phenomenon, real-world implementation, or problem sets in STEM subjects. Newcombe (2010) defined that the relation between Visual Thinking and STEM is a robust one. So, this model is concern on the Integrated Visual-Logical-Verbal (VLV) Describing in form of Visualization, to make the learning process easy-to-teach and easy-to-learn.

The iVCSA have 3 main contents : Visualization, Chronological Simulation, and Smart Analogy.

The first content is Visualization. This content provides a general visualization of a model, concept, theory, formula, principle, implementation and the other comprehensions of STEM learning material.

Figure 1 : Example of Molecular Structure Visualization in Basic Chemical learning material

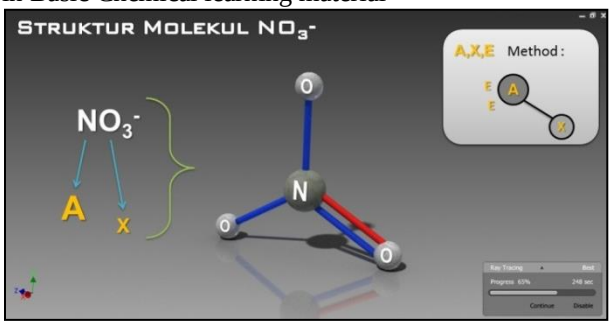
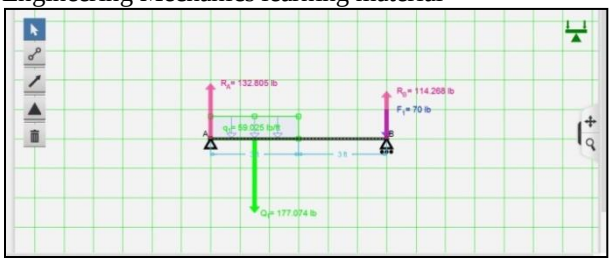
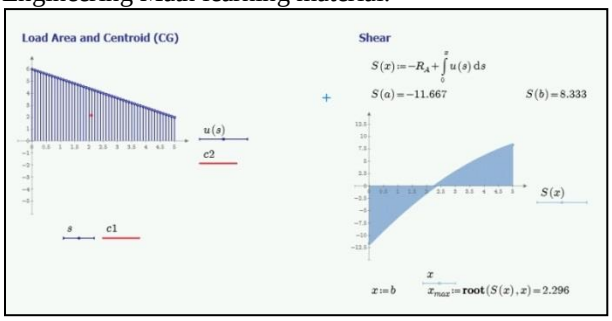


Figure 2 : Example of Distributed Load Visualization in Engineering Mechanics learning material



This is the unique example of Visualization in Mathematics. Surif (2007) said Geometric in mathematics often associated directly with the visualization capabilities.

Figure 3 : Example of Visualization adn Implementation of Mathematics Function for Engineering Mechanics in Engineering Math learning material.



The second content is Chronological Simulation, this content provides a chronology and representation of a simulation, activities, process and the problem in field of STEM with information about reason factor, analysis, and the result of simulation which appropriate with the real occurrence. Korakakis et al (2009) defined that interactive 3D animations and 3D animations dominate the 3D illustrations regarding the increase of the study interest for the thematic unit that is presented. The second content is available in 2D and 3D version,

included VLV Describing This thing is so important for student to understand a process which difficult to visualize..

Figure 4 : 2D animation version of chronological simulation of Attached Flow (Stall) on Plane's Wing in Aerodinamics learning material.

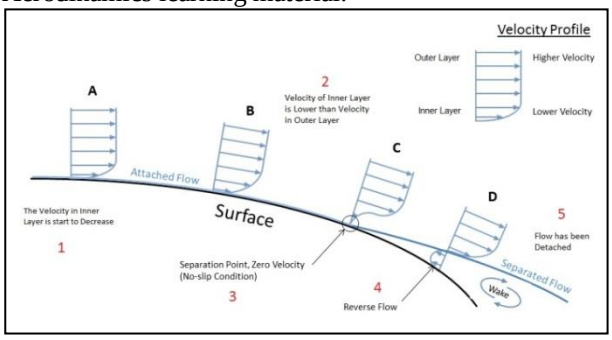


Figure 5 : Part of Video of Analysis and Simulation of Stress on a beam in Finite Element Method (FEM) learning material.

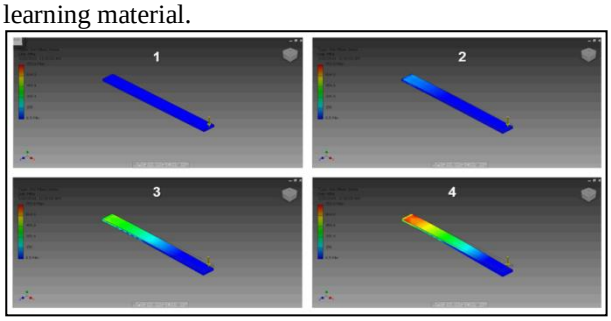
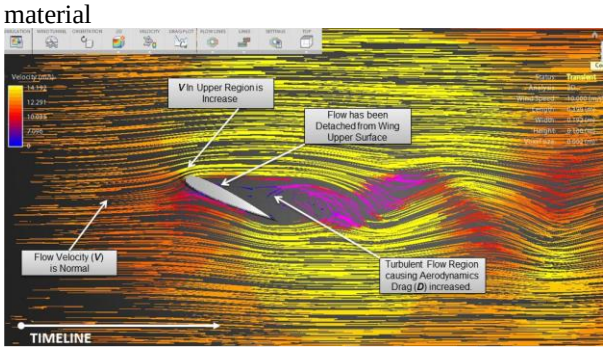
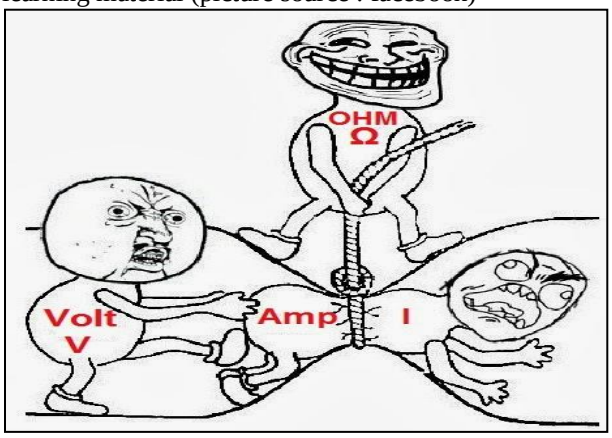


Figure 6 : Representation and Definition of Stall Simulation on Plane's Wing in Aerodinamics learning material



The final content is an Smart Analogy, in 2D or 3D version, and picture and video version. This content provides an analogy of a theory, principle, and concept which difficult to be understood to more interesting and easy to be understood. Glynn (2008) said that Science-education research studies and science teachers' classroom experiences have shown that analogies, when used properly, can help make science concepts meaningful to students

Figure 7 : Example of 2D picture Analogy of difference between Volt, Ampere, and Ohm in Basic Electronics learning material (picture source : facebook)



Goals and Objectives

The main goal of this project is to increase an effectiveness of learning process in STEM education by implementing iVCSA e-learning model in class. The spesific objectives of this project is to make a learning process in STEM field more integrated, easy to learn by students, and easy to provide by teachers.

Research Method

We use a true-experimental research methods with Randomized Control-Group Pretest-Posttest Design. We divided the students into three classes or groups, one Control Group and two Experimental Group. Selection of students per class is done by random. The Control Group is a class that does not use e-learning in the learning process. This means that only uses conventional seminar method. Experimental Group 1 is a class that uses a conventional e-learning (called MMA or Multimedia Animation) in the learning process. And Experimental Group 2 is a class that implementing the iVCSA model of e-learning in the learning process. All group has given a Pretest (T_1) before Treatment, and will bi given Posttest (T_2) after that.

Table 1 : Research Method

Class	Pretest	Treatment	Posttest
Control Group	T_1		T_2
Exp. Group 1	T_1	Conventional E-Learning/ MMA	T_2
Exp. Group 2	T_1	iVCSA	T_2

Result and Discussion

The research was conducted on grade 1 college student in Department of Mechanical Engineering Education, Indonesia University of Education in the subject of Engineering Mechanics. The data in this study based on the score of the Pretest, Posttest, and a comparison of the average score and the comparison

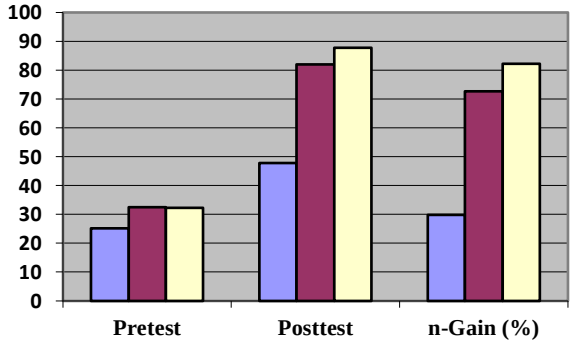
between the Normalized-Gain (n-Gain) of Control Class, Experimental Class 1 (MMA) and Experimental Class 2 (iVCSA).

Table 2 : Calculation result of Pretest, Posttest, and n-Gain

Class	Average Score			n-Gain (%)
	Pretest	Posttest	n-Gain	
Control	25.15	47.73	0.30	29.9 %
Exp. 1	32.44	81.95	0.73	72.6 %
Exp. 2	32.33	87.67	0.82	82.2 %

As reported in the Table 2, all model of e-learning that implementing in Experimental Class 1 and Experimental Class 2 were effective in learning process. The comparison of Average Score on Posttest and n-Gain between Control Class and Experimental Class is very significant. The Control Class, that does not use e-learning just get 0.3 or 29.9% n-Gain average score. In the other side, the Experimental Class 1 get 0.73 or 72.6 % n-Gain average score, and the Experimental Class 2, that uses iVCSA e-learning model get 0.82 or 82.2 % n-Gain average score, the highest average score between 3 classes. Also in Posttest, Experimental Class 2 get the highest score, 87.67.

Figure 8 : Bar Diagram of Calculation result of Pretest, Posttest, and n-Gain (Blue : Control Group, Violet : Exp. 1, Yellow : Exp. 2)



Satisfaction Level

After implementing MMA and iVCSA in Experimental Class, we conducted a survey of student satisfaction in learning process that uses e-learning, MMA and iVCSA.

Figure 9 : Satisfaction Level of Students that uses MMA e-learning in classrom

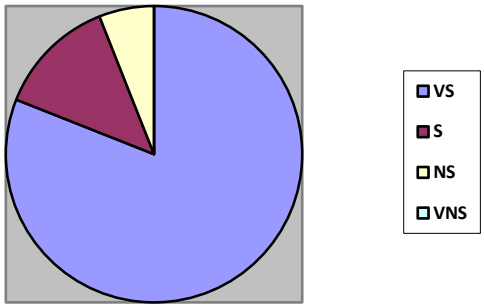
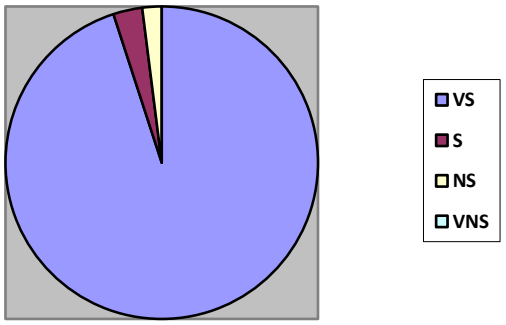


Figure 10 : Satisfaction Level of students that uses iVCSA e-learning model in classroom



VS = Very Satisfied, S = Satisfied, NS = Not Satisfied, VNS = Very Not Satisfied.

Conclusions

In this paper we shown an impact of implementation of two model of e-learning in learning process, MMA and iVCSA.

Implementing iVCSA in a learning process is more effective than MMA (conventional e-learning). We can see the result in previous chapter, Experimental Class 2 that uses iVCSA e-learning process get highest score in Posttest and n-Gain. In student's Satisfaction Level, 95% of students are very satisfied, 3% are satisfied and just 2% are not satisfied.

Because the result in this paper just in Engineering field, we have to disscuss some further steps to be taken in the future for implementing iVCSA e-learning model to other field, such as in Mathematics in Chemistry.

Acknowledgements

The iVCSA model created in some softwares from Autodesk and PTC. We used an Educational Version of Autodesk Inventor, Autodesk Maya, FlowDesign, MathCAD, and ForceEffect.

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ISATE 2014
International Symposium on Advances in Technology Education
24 – 26 September 2014, Nanyang Polytechnic, SINGAPORE

ILT PEDAGOGY MENTORING – A CASE STUDY

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Abstract

Northern Ireland (NI) extends over 14,000km^2 and has a population of 1.8 million. The South Eastern Regional College (SERC) provides a range of Higher and Further Education courses for 35,000 students across NI every year.

Peer mentoring programmes are normally the domain of initial teacher training, but in SERC, an ILT Pedagogy mentoring programme was implemented to enhance the effective integration of technology enhanced learning into classroom practice for existing staff, providing an opportunity for peer support through demonstration lessons, team teaching, training and final classroom observations. Based on the Japanese model of lesson study, the theoretical model was adapted to focus on technology enhanced learning. Using this model, peer mentors trained, taught mentees classes and peer observed their colleagues. Embedding the professional development of teachers in classroom based, peer observed sessions, exposed the teacher to new pedagogical practices and technology enhanced learning strategies.

Seeking student feedback following each classroom based session provided a window into student thinking. Collaborative planning of these lessons allowed for deeper discussion and greater reflection on current teaching practice. Observational notes formed the backdrop to the post observation reflection between the teacher and their mentor. This case study seeks to bridge the gap between theory and practice, showing how teachers can implement new ideas and pedagogical strategies which have not been presented as abstract, general principles, but as living examples, where the technologies and teaching strategies were contextualized to the curriculum area of the teacher being mentored in a series of taught lessons which the mentored teacher observed.

To date more than 400 mentoring cycles have been completed. The data from this case study was examined using text mining and the main findings have highlighted the impact of the ILT pedagogy mentoring on teaching and learning in a number of key areas. The case study provides evidence of the potential effectiveness of ILT pedagogy mentoring as a tool, to transform individual practice and create a culture of sharing ideas and strategies, connecting teachers in a specific curriculum area with a focus on a specific curriculum theme.

Keywords: *Peer mentoring, technology enhanced learning, peer observation, pedagogy, education*

Introduction

"Many current ICT-supported reform efforts demand teachers to assume the role of epistemic facilitator of knowledge construction supported by technology" (CHAI, 2010). The pedagogical beliefs of the teachers, impact on their preparedness to use technology and the teaching strategies they employ. To address the need for greater use of technology enhanced learning requires in service training for teachers, that not only tackles their digital literacy, but also the teaching and learning strategies they would employ when using the technologies chosen. Teachers who prefer didactic instruction will tend to act as the sole provider of knowledge which leaves students becoming the passive recipients of knowledge. The challenge is to create active learning opportunities for students which encourage collaboration, reflection and higher order thinking skills. The relationship between a teacher's pedagogical beliefs and their use of technology in the classroom has been the backdrop to the ILT pedagogy mentoring programme discussed in this case study.

Campaign for Learning (2009) highlighted the kinesthetic learning preferences of adult learners who prefer to learn by doing. 23 percent mentioned their use of technology and so the need to harness the interests of the students drives the need to integrate the use of technology effectively into the classroom.

The continuing professional development of teachers is important to teachers, students and wider stakeholders, as CPD is a career-long obligation for practicing professionals. Knowing that the teacher's skills, knowledge and expertise are continuously improving is important in raising standards and in addressing students' learning needs and learning preferences. Since *Success for All* (Department for Education and Skills, 2002), teacher education in FE has been put high on the Department's agenda. There is increasing evidence on how technology can raise achievement, engage disadvantaged,

vulnerable students whilst increasing capacity and efficiency. In order to widen learning opportunities, access to technology and learning resources needs to be readily available. Learners need the necessary digital literacy to engage effectively with the technology and this falls on the shoulders of the teachers.

Although organisation priorities often focus on investment in tangible assets, CPD investment can impact in a range of areas including greater efficiency, improved retention and achievement resulting in greater learner engagement. "The skills and qualifications of employees are seen as the biggest beneficiary from an investment in intangible assets" (European Commission, 2013). However, historically there has been a "haphazard and uneven approach to the professional development of teachers in the FE". (Lucas, 2005). Teachers need to be not only knowledgeable and current in their own curriculum area, but they should also know how to effectively use technology to engage their students and create an effective teaching and learning environment. Staff development over a day or two days has been shown to be poor in terms gaining knowledge and skills that will be retained and utilized in the weeks following the training. Much of what has been learnt on the day is forgotten within a number of weeks or is never translated into practice. (Klasen & Clutterbuck, 2002). Therefore there is a need for training to be not merely the transmission of abstract and decontextualised knowledge, but a social process whereby knowledge is co-constructed through peer collaboration.

Background

SERC is a UK public sector regional college of further education. With over 32,000 enrolments and 1,185 it is one of 6 regional colleges of the Northern Ireland Further Education sector. Whilst the UK economy faces an uncertain future, skills are the main driver for economic success, and the Further Education (FE) Colleges of Northern Ireland, as the main skills providers, are instrumental to the solution. In an environment where public spending is under pressure the focus needs to be on investing in the areas which are fundamental to the growth of the economy.

SERC was formed through the merger of three colleges (Lisburn Institute of Further and Higher Education, North Down and Ards Institute of FHE and East Down Institute of FHE) over four main campuses and a number of subsidiary campuses. The first three years saw the demolition of existing buildings in Ballynahinch, Downpatrick, Lisburn and Newcastle and the construction of new campus buildings in these locations. With significant investment in the infrastructure came the challenge of ensuring that curriculum staff had the digital literacy skills and confidence to embed the effective use technology to enhanced teaching and learning across a variety of curricular disciplines. There was the need to bridge the gap between theoretical knowledge and practice. An initial pilot in 2008-09 focused on the specifically on teachers in Essential Skills. Embedding the effective use of ILT in a classroom context develops the whole learner and so strategically looking at an area focused on adult education was deemed to have many potential learning gains.

Joyce and Showers and Bennett's research (1987) showed that any training should not simply focus on adopting new approaches and practices. It should seek to change how teachers think about teaching. What constitutes good teaching and learning should be at the heart of the training. Once teachers think grasp the new teaching and learning strategies, they will find methods of implementation which the mentor may not have even thought of. Cerbin and Kopp (2006) highlight how preparing lessons is a solitary activity and this limits efforts to improve teaching and learning on a broader scale.

The fundamental premise of the ILT pedagogy mentoring project was set in the context of teachers needing to see not just the new technology but the translation of what it looked like in practice. The term ILT refers to Information and Learning Technology and the name given to the mentors reflects the desire to see sound pedagogical practice at the heart of the learning.

Traditional staff development has left teachers to translate the general training given into everyday classroom practice. However finding time and having the support to implement this is a challenge for many teachers. Teachers need to see "living examples of implementation, by teachers with whom they can identify and from whom they can both derive conviction and confidence". (Black & Wiliam, 2005)

The mentoring project focused on a range of ILT training alongside classroom sessions where the new teaching and learning strategies associated with the technologies could be implemented. The pilot confirmed the original proposal and has subsequently been rolled out across SERC where, to date, there have been more than 450 mentoring cycles completed.

A team of mentors were appointed based on an interview and an observed lesson. The successful candidates were seconded from part of their teaching timetable. This allowed the programme to draw on the expertise and experience of the successful candidates by pairing them with a range of staff whom they mentor over the course of a semester.

The emphasis of the mentoring process is not on the technology and its capabilities but how the tutor can enhance teaching and learning using the technology and appropriate teaching and learning strategies.

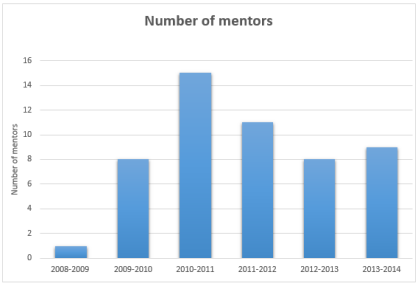

Figure 1 - Graph showing number of mentors

ILT pedagogy mentoring

From the original cohort of teachers who completed the mentoring the structure has remained largely unchanged:

Figure 2- ILT Pedagogy mentoring

Prior to commencing the ILT pedagogy mentoring the mentor assesses the mentee's digital literacy. A range of methods were used initially, but a less formal process is now needed as mentors have had more experience with each mentee. Initial targets regarding technologies to be used and the associated teaching and learning strategies, are agreed based on the mentee and curriculum needs.

The mentoring includes a total of six hours of face to face training with the mentee. Each training session is followed by a classroom session. The first classroom session is where the mentor teaches the mentee's classes using the technologies initially targeted and showing how the technology can be used as part of a wider pedagogical toolkit. This has proved critical for mentee 'buy-in' enabling them to see the how the theory translates in practice. The mentee completes a peer observation form during this first session. Indeed this form is completed at each stage. This provides an opportunity for the mentor and mentee to reflect on the educational gains from the session. The students also complete a simple feedback form enabling them to have their say in the direction that the training takes and also allowing them to have a voice. The main findings highlight that change has happened as a result of the peer review, reflective dialogue and in response to student feedback. The teacher and mentor's collaboration is key. It is an opportunity for them to exchange ideas experiences. The post observation reflection informs future practice and highlights the response of the learner.

The second training session is designed around the feedback from the mentee and the students following the demonstration lesson where the mentor has taught the mentee's class. The second classroom session is a team teach and the mentor and mentee plan the session enabling the mentor to look at how the lesson is scaffolded, the teaching and learning strategies being employed and how learning is assessed.

The third training session is based around the feedback from classroom session 2 and student feedback. This enables the mentor to focus any further areas for development using technology and associated teaching and learning strategies which will enhance the learner experience.

The final classroom session is where the mentee teaches and the mentor observes. The mentor completes a final peer observation form and the students complete the usual feedback form. When the mentor provides feedback to the mentee on the observed session it is the nature of the feedback that is provided which is critical. Comments highlighting what went well and areas for improvement provide the backdrop to the subsequent sessions. To be effective the post observation discussion should facilitate an opportunity to discuss perceived learning gains during the classroom sessions. This was a challenge initially to the mentor as it required them to make explicit what was normally thought of as implicit - that the mentored teacher would know what went well, what did not and what they should do next.

Following the mentoring, the mentees complete an anonymous post pilot survey which enables the ILT pedagogy team to get feedback a number of months later when the teacher has had a chance to reflect on the mentoring and the advantages and disadvantages they perceive.

The final question on the peer observation form asks the tutor if they would recommend the process to others. One tutor commented that they felt that one of the main gains of the mentoring was, "experiencing what excellent, student needs focused and supportive true mentoring is all about." Staff appreciated an opportunity to focus with a colleague on specific technologies and the associated teaching and learning strategies. They saw this method of CPD (Continuous Professional Development) as something that provided not merely support but also "time to embed the learning"

> "It was great having the time set aside to focus on ILT and have the ILT mentor confidently guide you through the use of ILT in the class, otherwise I would not have time or the know how to do it alone. I think this needs to be carried out each year to give teachers the opportunity and confidence to explore ILT options to improve teaching and learning."

Mentees are referred to the mentoring team through the Head of School. Some will have asked to be put on the mentoring list and others will come as a result of the Head of School's recommendation. The process is voluntary. Initially there was the challenge overcoming hesitance to peer observation, but as the mentoring process progressed staff became cognisant of the fact that the mentoring was a confidential process. None of the feedback from the observation process is made available to management and this has become key to the success of the programme. Staff perceive it as a truly supportive process and currently there are always staff on the waiting list ready for the next free slots. A number of staff have been through the mentoring three or more times. Some mentees have gone on and become mentors.

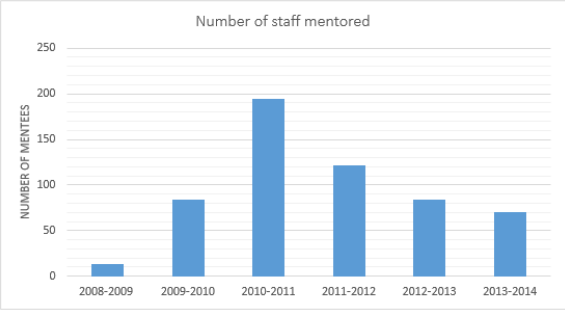

Figure 4- Chart showing the number of staff mentored

Table 1- mapping mentees by department

Number of mentors	1	8	15	10	8
			Number of Mentees		
School	2008-2009	2009-2010	2010-11	2011-12	2012-13
BHT	0	9	33	11	8
ASSP	0	7	16	8	7
MEE	0	4	11	12	8
PACA	0	9	11	22	16
HBSfL	11	13	42	23	7
HSC	0	1	12	7	12
CSM	0	14	25	16	3
CES	0	13	22	17	8
AE	0	10	16	10	15
TOTALS	**11**	**80**	**188**	**126**	**84**

The responsibilities of the mentor to the mentee are varied and require them to model good practice, to assess the mentee's technical and pedagogical skills and to set technology targets linked to appropriate teaching and learning strategies. The mentors have also been a valuable in-house resource for staff development.

To ensure standardization in the quality of mentoring received by teachers, quality observations of the training and / or classroom sessions being delivered by the mentor are carried out by the coordinator.

Results

The experience of each mentee will vary depending on their preconceptions coming onto the mentoring and the mentor assigned. The strengths of the mentor lie not merely on their pedagogical and technical skills, but also on their ability to listen, build confidence in the mentee and to perceive what is needed and which technologies and pedagogical strategies would best support the teacher being mentored. Any mentoring is based on relationships and so the standardization of mentoring programme is nearly impossible because of the nuances brought to the framework by the unique qualities of each mentor. The challenge lies in matching mentees with the appropriate mentor where possible. Some mentees will prefer someone within their department who understands their curriculum area, whilst others prefer someone who has a similar personality.

The ILT pedagogy mentoring focusses on supporting teachers through transition. This transition is about more than simple knowledge gains, but also about change and development.

A survey was used as the main method for data collection. Each teacher who responded to the survey had been through the ILT pedagogy mentoring at least once in the last 5 years. 3% staff who responded had been mentored 3 times in the last 5 years, 21% twice and 76% once. The surveys were completed anonymously by the staff.

Table 2 - Survey respondents by department

Department	Percentage of teachers responding
Access to Education	15.83%
Applied Science and Sport	10.00%
Business, Hospitality and Tourism	14.17%
Computing and Software Engineering	6.67%
Construction and Engineering Services	10.00%
Hair, beauty and Skills for Life	25.83%
Health and Care	5.83%
Manufacturing and Electrical Engineering	6.67%
Performing and creative Arts	5.00%

Teachers' opinions after peer mentoring programmes were analyzed using a Text Mining method. The analysis was conducted using SPSS Text Analytics for Surveys Ver. 4.0.1. Several questions were asked to teachers and one of the questions was analyzed: what do you consider are the benefits of the ILT pedagogy mentoring

The number of teachers who responded to the questions was 169, and 11 categories were classified out of the keywords extracted from the teachers' opinions. Each category has the same type of keywords, and it has a relation to other keywords.

The relations among the keywords were shown in figure 9. According to the result, there were a lot of opinions to the question regarding the benefits of the ILT pedagogy mentoring; for example, "new," "technology," "classroom," and "students," and a commonality was found among the teachers' replies. It was found that the teachers thought ILT mentoring project was positive. It means that ILT pedagogy is a new technology and contributes to students and classroom.

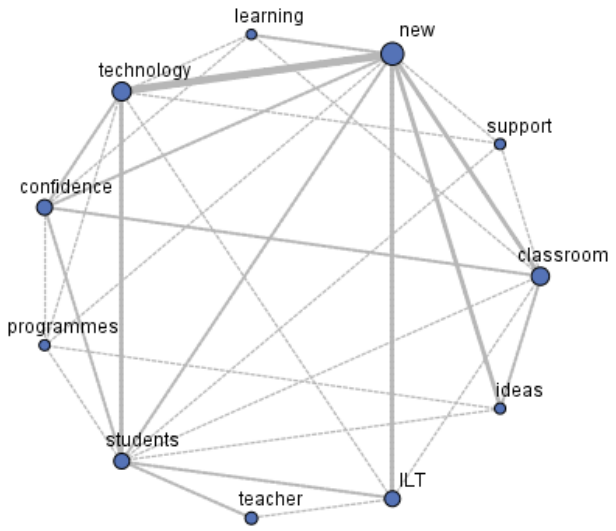

Figure 5: Chart showing the relationship between keywords

There was a strong link between technology and students. In the survey teachers commented on students being digital natives and their desire to harness the effective use of technology to provide a range of teaching and learning strategies. According to their comments the technology provided greater opportunities for engagement. One teacher responded, "technology is part of the students' lives and they have told me they expect technology to play a big part in their learning". Comments also focused on students finding a greater sense of fun as a result. There were opportunities to consolidate student learning as a result of using the technologies.

There was also a strong link between classroom, ideas and confidence. In the survey teachers commented on the ILT pedagogy mentoring providing an opportunity to use a range of technologies with appropriate teaching and learning strategies. Teachers stated that the ILT pedagogy mentoring benefits teachers because it, "increases confidence using the technologies so that students are more engaged in learning" and also "it is an invaluable support to lecturers both in terms of using new technologies and structuring lessons to better engage students".

Conclusion

There have been benefits not just simply for the mentee but also mutually for the mentor. It provides the mentor with an opportunity to share their passion for teaching and learning and reinforces why they enjoy their job. They also have the opportunity to see how others teach and benefit from observing others applying different pedagogical strategies in perhaps ways that the mentor would not have thought of. As busy teachers it provides critical opportunities to interact and share experiences with their peers.

Acknowledgements

Thanks go to Dr Naruse and National Institute of Technology, Toyama College for providing their expertise and software for the text mining of the survey data from the teachers who have been mentored.

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COMPUTER SCIENCE ENGLISH CLUB (CSEC) AS AN INTERACTIVE LEARNING FOR STUDENTS

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Abstract

English is an international language that is studied by all students in Indonesia. English also has an important role because Indonesia has registered as a participant in the ASEAN Economic Community 2015. The English language has an important role in the communication that occurs especially among the business and academic fields and hence learning this language is a priority from primary school until university. But not all students are able to learn the English language well, resulting in the inability to speak, listen, read or write the language well.

In the Indonesian University of Education, especially in the Computer Science Education and Computer Science Department, the English language is also an issue for students whose graduation is delayed due to their lack of proficiency in English. On the basis of these issues, at the beginning of the first semester in 2013, the Computer Science English Club (CSEC) was established to support the English lectures that gave students two credits. The CSEC required each new student to follow the activities carried out by the committee. This paper conveys the methods, the curriculum, the problems encountered and the solutions that have been done.

Keywords: *Computer Science English Club, Interactive Learning, Academic Curricular.*

Introduction

Indonesia, which has great human and natural resources that make the enormous potential in the global interaction that occurs especially in the next year will face the ASEAN Free Trade Area 2015 where there will be a simplicity in the employment opportunities of registered members so that the potential is there then Indonesia will be the main destination from other countries. Challenges in the global life now make students have more value when it is able to master the English language in interaction both in academic and in the organization.

English has a very important relationship with Computer Science because basically any interaction with a variety of subjects, especially all of the programming language using English. But there are still many students who have not been able to use the English language both written and verbal. Weaknesses of students in the use of the English language can cause a variety of problems in the future. In Computer Science Education Program and Computer Science University of Indonesia, English language courses are taught only 2 credits during the course so that lessons learned are still lacking both in quality and quantity.

Computer Science English Club (CSEC) is an academic organization that was formed to address the problems in learning English in Education Program in Computer Science and Computer Science makes additional learning required for students to pass the English language courses. In application execution CSEC held each semester which divides into two groups, the CSEC semester classes will be held for Computer Science Education and Semester for Computer Science. Students have an important role in the implementation of CSEC as all activities will be carried out by an active board gets guidance and input from the supervisor. Determination of each activity will be discussed by the board and not limited to the implementation of activities, teaching will also be carried out by competent students with material that has been prepared with the curriculum.

Materials and Methods

Implementation of CSEC in each semester is fully managed by the student from the start of the preparation of curriculum, preparation of teaching materials, design contents of events and up to the assessment. The main purpose of CSEC is to help students learning about the mastery material of the TOEFL. TOEFL become one measuring tool of English language skills, adapted to the circumstances existing at the Computer Science Education Program and Computer Science. In each semester CSEC will be conducted over 10 meetings with the details:

weeks	Materials
1	Opening and Pre Test
2	Grammar Overview 1
3	Grammar Overview 2
4	Grammar Overview 3
5	Relevant Issues for Computer Science
6	Structure and Written Expression
7	Reading Comprehension
8	Native Speaker
9	TOEFL Practice
10	Closing and Post Test

Table 1 – General Curriculum

Participants will follow CSEC's activities like a normal classes because here gives value also determines graduation in English language courses, with this condition the participation of new students will occur continuously because it is an obligation that has been approved by the head of department and faculty.

Figure 1 – An Outside room lesson about "Science"

CSEC in learning tailored to the learning materials can be in the classroom or outside the classroom, as is done in the first half of the material abot "scientific" we learn in our Bareti garden. In the fifth week there will be lesson that comes from outside of committee with relevant and competent teacher to give the material that has been determined. At week nine lesson will be done by invited native speakers with the aim of providing experience to directly interact and hone the skills of students in English language comprehension in general.
In reference to the book are taken using the following references:

- Ellis, David & Forman, David (1992) *A Picture Story Grammar of English*. Singapore : EPB PUBLISHER PTE LTD.
- Lou, Robby (2006). *English Tenses and How to Use Them*. Jakarta : Robby Lou.
- Oxford Dictionary & Oxford Grammar.
- Sudarmono, Edhi (2013). *The King TOEFL*. South Jakarta : PT Wahyu Media.

Test will be given to participants based on the book and curriculum so that there is no element of subjectivity in the assessment. Value to be given refers to the level of student attendance, student activity during the activity, the tasks assigned and tests conducted. CSEC entire assessment will be combined with the value of lectures in English, so weight becomes final assessment is 20% of the CSEC and 80% of the course requirements students must follow the CSEC activities.

Results and Discussion

CSEC has been carried out during the first period of committee is conducted over 2 semesters with a number of 180 students participant, 80 students from the computer science education and 80 other from computer science. CSEC is required in the first period freshmen class of 2013.
In the execution of CSEC is fully supported by both the Faculty and the Department of licensing or funding for activities undertaken in that there is only in human resources management and administrative management of organization that has problems.

Conclusions

CSEC is an appropriate solution in addressing the problems in learning English which is generally caused by a lack of academic learning time, lack of student motivation in learning English and learning that takes less interesting. In this case CSEC with administrators who have status as a student learning to be able to attract new students to improve learning motivation and increase the quantity of learning that were previously only 2 credits to 4 credits and of course with an interesting series of events.

In the implementation of CSEC also gives students the opportunity to improve English language skills after the course ends by joining the future committee.

Acknowledgements

In arranging this paper, a lot of people have provided motivation, advice, support, and even remark that had helped the researcher. In this valuable chance, the researcher aims to express gratitude and appreciation to all of them. First, the researcher's deepest appreciation goes to her beloved family for the endless love, pray, and support.

The researcher greatest thanks to Computer Science Education of FPMIPA UPI, for the advisor in Computer Science Education for advice, motivation, and useful knowledge. The Deepest thanks also for all staffs either in department or in faculty who have helped the researcher in managing all formal needs during this thesis arrangement.

Our sincere thanks go to the the entire staff at the UPI's university center and South Sumatera provincial education department that has provided great support in financing research and departure to Singapore.

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THE SEED OF EDUCATIONAL SYSTEM IN INDONESIA BASED ON THE UN (NATIONAL EXAMINATION) RESULT

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Abstract

UN (*National Examination)* is still a decisive factor in the student graduation standards rather than as a means of mapping the quality of education in Indonesia. UN has become the most sinister and frightening specter, and in the minds of the students, they worry that they are not able to pass. Based on the exposure, it can be assumed that the portrait of national education today has failed, because the government does not believe in the educational process. However the purpose of education is consistently described in the curriculum and learning systems. The less than optimal implementation of the education system in Indonesia is also due to the difficulty of providing professional teachers in these areas. Actually, the Indonesian curriculum is not less than the curriculum in developed countries, but the implementation is still far from the optimal. The education system floater has also become a problem because of its poor implementation and is not optimal, with limited facilities for learning for both teachers and learners.

The quality of education in Indonesia is lower that that in some countries in Southeast Asia. The unequal access and low quality of education, limited access, and inadequate infrastructure, are some of the main problems behind the inequality in the access to productive employment. This indicates the occurrence of irregularities in the implementation of the Indonesian education system outlined in the Law no. 20 of 2003. Based on the explanation above, that the education system is to develop along with solving problems in Indonesia, more should really be done in totality, which includes governments, communities, educators, and students themselves. So the problem of education that we face now can be resolved soon.

Keywords
Education, National Examination, Goverment Problem

Introduction

Explicitly design of the national education system in Indonesia stressed the importance of education and moral character. It is based on the definition According to the Education Act of the National Education System (UUSPN) No. 20/2003 Chapter I, section 1: " Education is a conscious and deliberate effort to create an atmosphere of learning and the learning process so that learners are actively developing self-potential, personality, intelligence, noble character, and skills needed, society, nation and state". But the fact is, education has undergone a shift in orientation ".

Orientation of education in order to create a human becomes a moral person and are no longer considered responsible. Educational orientation has shifted towards a more materialistic. That is the purpose of education has shifted towards how to create students become physicians, employees, and other employees. Not on how to produce complete human beings. Education only emphasizes the intellectual alone, with evidence that the presence of the National Examination (UN) as a measure of educational success without seeing the process of the formation of character and manners of the students.

The controversies of having UN have become a major focus since it was first implemented, especially in achieving the minimum average score that use to make pass/fail decision. Since first introduced in 2003, the national examination (UN) has become a denial among experts, parents and students themselves. Various arguments are presented by them, to disagree with the national examination policy that have introduced by the government. They believed that UN has more negative impacts than positive on the national quality of education. UN early cases in 2004 was about the conversion value of the UN that is considered detrimental to the students who are good and better benefit students who are less intelligent. Beside that, the UN has led teachers to teach not meaningful (teaching to the test), willing to engage in cheating, measure students' cognitive ability only and feeling stressed and under pressure.

National examination implementation is still needed in order to motivate students and teachers at school. However, the negative effects of UN have outweighed the positive. The need to reformulate the national exam in Indonesia is crucial due to the negative impact resulting from the current UN. The government should re-think the policy of using the minimum threshold to make a pass/fail decision which will incriminate the students.

Materials and Methods or pedagogy

The National Education System According to Law No. 2 of 1989

Based on Law No.2 of 1989, the role of the national education system is to attempt to form genuine Pancasila citizens as development agents of high quality with the ability to be independent and provide support for the development of Indonesian society, the nation and country. The development is realized through tough national resilience to boost national ability to prevent every teaching, understanding and ideology that runs counter to the principles of the Pancasila. National education system is a conscious efforts to prepare the Indonesian nation to defend its lifestyle and culture, increase its long-term survival ability and sustain development continuously from one generation to the next. The national education system is simultaneously a very important tool and objective in the struggle to achieve true independence and the objectives of the Indonesian country and nation.

The national education system should be able to provide a minimum level of education for every Indonesian citizen, so that every citizen regardless of background has the opportunity to obtain at least basic knowledge and ability, including the ability to read, write, and arithmetic, as well as to use the Indonesian national language. These are the minimum requirements needed by every citizen to be able to participate as active community members, and members of a nation, and country. Every Indonesian citizen has a right to obtain education either through in-school education or out-of- school education until the level suited to their ability. The national education system provides the broadest possible range of learning opportunities to every citizen regardless of gender or background. It is therefore illegal to discriminate on the grounds of gender, religion, ethnicity, race, social or economic background in the acceptance of new pupils

Law No. 2/1989 provides the foundation for one national education system, it emphasizes that the national education system be universally implemented in a complete and totally integrated manner. *Universal* means open to all people and valid throughout the country. *Complete* means to cover all channels, levels and types of education, and *integrated* means there are mutual supporting links between all types and levels of national education, and development efforts. Therefore, within the Law all units, channels, types and levels of education as well as implementation regulations are defined, including the objectives and expected output criteria of all types and levels of education.

The structure of the education and school system according to the National Education System Law of 2003 in shown below:

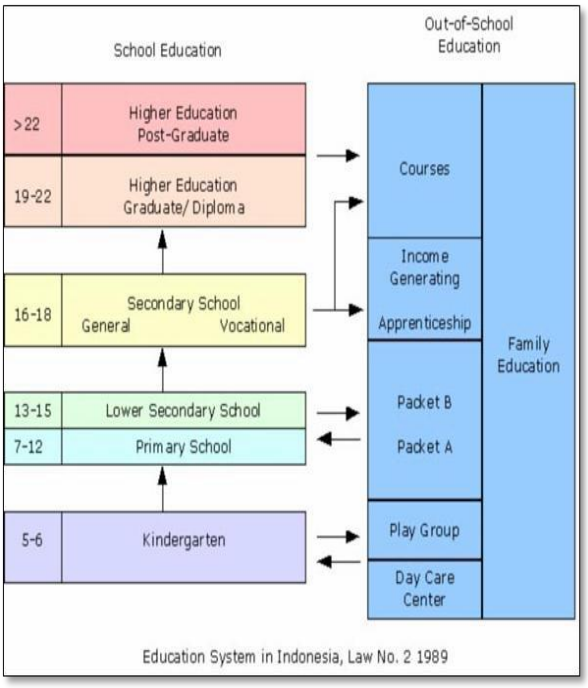

Diagram of the education system in Indonesia according to Law No. 2/1989

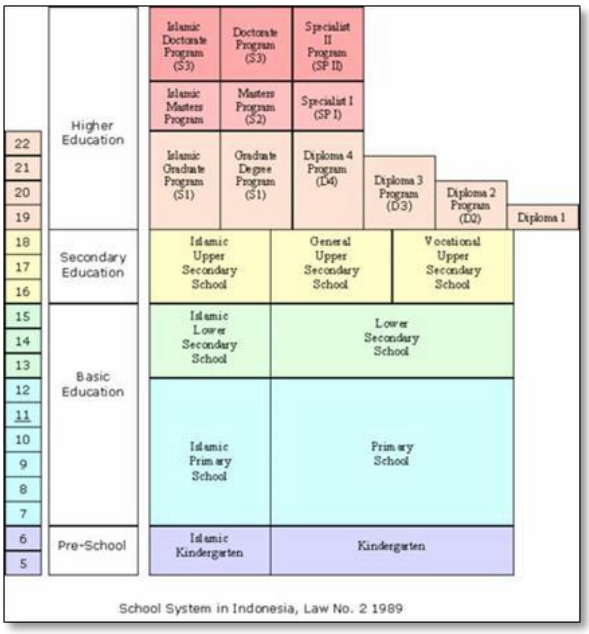

Diagram of the school system in Indonesia according to Law No. 2/1989

Basic Education

According to Law No. 2/1989 and Government Regulation No. 28/1990, basic education is general

education with a duration of 9 years, including 6 years in Primary School and three years in Lower Secondary School or equivalent educational level. Basic education aims to provide assets in the form of abilities to learning participants so they may develop their lives and lifestyles as individual members of society, citizens and human beings, as well as to prepare them to attend secondary education.

Secondary Education

Secondary education is education that is organized for graduates of basic education. Types of secondary education cover the broad fields of general, vocational, religious, officials, and special education. *General secondary education* focuses on knowledge expansion and skills improvement of students, and preparing students for further education. *Vocational secondary education* focuses on the development of skills that apply to a certain specific occupation, and preparing students for employment as well as developing professional attitude. *Religious secondary education* focuses on the mastery of the teaching of the respective religions. *Officials secondary education* focuses on ability improvement to support the implementation of official duties for government officials or potential government officials. Finally, *special secondary education* is carried out for students with physical and/or mental disorders

Higher education

Higher education is the continuation of secondary education through the in-school education channel. This channel consists of two divisions, academic and professional education. Academic education is directed particularly toward mastery of technological science and/or arts in the academic sense, whereas professional education is directed more toward the preparation of certain applied skills useful in the workforce.

UN (National Examination)

Starting from the year 2003, the new form of standardized national examination called Ujian Akhir Nasional (National Final Examination), or well known with the acronym UAN, has been introduced by the Indonesian ministry of education. Only three subjects were tested, namely Indonesian language, English and Mathematics. Since this year, students' graduation was determined by the value of individual subjects tested in the national final examination. In 2005, the new Ministry of Education decided to conduct a similar pattern of national testing, which has introduced in 2003 –2004. Nevertheless, the test used a new name, which is popular until this year that called Ujian Nasional (National Examination) or well known as UN. This test also adopted the same format on the subject tested, testing three subjects, Indonesian language, English and Mathematics. 3 Since the year, 2008 until 2010, Nashir.tk (2010) states that, the subjects tested have dramatically changed, from three different subjects to be six different subjects. However, this test received much criticism from many educational experts and the public. Therefore, based on this criticism for the previous UN, the new format of UN was introduced in 2011, where the students' graduation is not only dependent on the score from six different subjects, but also from the process of learning during the academic year. The proportion is 60% from UN and 40% from the process of learning, or "the formula for combined the value = (0.6 x UN) + (0.4 x the average score during the process of learning)" (Anonymous, 2011).

The national examination known as UN is a standardized test 2 which is done nationally to measure and assess the learners' competency in particular subjects in primary and secondary education (Kemdiknas, 2005.). Clause 3 of the Decree No. 75/2009 from the ministry of education states four purposes for conducting the UN. Firstly, mapping the competency and quality of Indonesian national education; secondly, determination of students graduation from one education level; thirdly, selection basis into the next education level; and lastly, a basic supervising and providing support to a particular school due to an effort to improve the education quality (Permendiknas, 2009). The UN practice in Indonesia is conducted three times after the completion of each level of education: primary-grade 6, lower secondary-grade 9 and upper secondary-grade 12 (SEAMEO, 2001). Those exams differ from the exam for entering the higher education which also done nationally.

Results and Discussion

Since first introduced in 2003, the national examination (UN) has become a denial among experts, parents and students themselves. Various arguments are presented by them, to disagree with the national examination policy that have introduced by the government. They believed that UN has more negative impacts than positive on the national quality of education. The UN has led teachers to teach not meaningful (teaching to the test), willing to engage in cheating, measure students' cognitive ability only and feeling stressed and under pressure. (Rusmar, 2011)

Teachers "Teach to the test"

Most of the teaching activities focus onthe test taking strategies, in order to prepare students to be able to answer all of the questions properly. This tradition might make the teachers tend to be less creative and less innovative indesigning their lesson. This situation is also evident in the Indonesian classroom context, where unconsciously, the learning process has changed from focusing on the lesson into familiarizing the students with the format of the test, discussing the strategies to answering the questions (tricks and tips) and discussing thequestion as well as conducting several mock tests for students. The teachers tend to make their lesson close with the content of the UN test. This situation of the learning process is not essential to improve students' understanding about the concepts of the lesson, because

the students only learn to remember test information, not to master a concept of the lesson

Willing to Engage in Cheating

In the Indonesian national examination context, cheating has become "well-organized cheating" that involved teachers, students and the local government, in order to provide a better mark for students. It is extremely terrible when a group of professionals such as teachers and other educational related officers planned such a dirty plan for their students, because indirectly, this refers to how low quality of Indonesian national examination

Therefore, most of the teachers consider it is significantly hard for students to achieve the minimum score in order to pass the exam; they tend to allow cheating during the exam. However, cheating is still as a huge crime that might influence Indonesian students' unwillingness to study. Cheating also might eliminate the basic skills of study, discipline and honesty from students, and this can have a negative influence on the quality of Indonesian national education.

Only Measures the Cognitive Aspects of Students

Most of the questions given to students tend to encourage the students learn by memorizing, without understanding the lesson fully. Moreover, the questions also commonly lead students to find the answers directly, without considering any process in order to find solutions. This is clear that the abilities, such as responding, valuing, organizing and characterizing, unconsciously disappear from the students. In other words, students only focus on the memorizing aspects, such as knowledge to translate the theories and terminologies and knowledge of ways that dealing with the specifics conventions, trends and sequences.

Feeling Stressed and under pressured

Obviously, with the minimum standard of the national examination that extremely high for students to be achieved, can lead the teachers and students to feel stressed and under pressured, in conducting several activities prior to the test day. This stress also has been triggered by announcement from school principals and parents in order to help students to pass the exam. It will apparently terrible for teaching and learning process if the teachers feel under pressured. Teachers can not enjoy their profession, and this can affect the creativity and the professionalism of a teacher. If this situation occurs, it will affect to the quality of national education.

Conclusions

National examination implementation is still needed in order to motivate students and teachers at school. However, the negative effects of UN have outweighed the positive. The need to reformulate the national exam in Indonesia is crucial due to the negative impact resulting from the current UN. The government should re-think the policy of using the minimum threshold to make a pass/fail decision which will incriminate the students. It is suggested to use the EBTANAS form of national examination in which the result does not affect the graduation decision but is used as a mapping tool so that the government can determine which schools need special attention and support. It is also recommended to adopt Australian standardize examination where the test result is used as an entrance to the university level. As a controversial national policy of examination, the government need to aware and recognize the suggestions and opinions from other parties about the national examination. The government can not always defend their statement, which states that the UN is an appropriate examination for the final assessment to students. They must be aware that the UN has brought significant negative impacts that influence the quality of national education.

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ISATE 2014
International Symposium on Advances in Technology Education
24 – 26 September 2014,Nanyang Polytechnic, SINGAPORE

AN INVESTIGATION OF TEACHERS' OPINION ON TEACHING DEVELOPMENT THROUGH PEER OBSERVATION OF THAI-NICHI INSTITUTE OF TECHNOLOGY

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Abstract

The purpose of this study was to examine and investigate factors affecting teachers' opinions on teacher development through peer observation regarding teachers' personal information. The sample group for this research was full-time teachers of Thai-Nichi Institute of Technology. The researcher used purposive sampling for data collection of 82 participants. The research instrument was a five-point rating scale questionnaire. The issues involving teacher development through peer observation were divided into two points: advantages and obstacles of peer observation.

The study found that teachers agreed with the advantages but faced high levels of obstacles. The single level Structural Equation Modeling (SEM) analysis was focused on the advantages and the obstacles of peer observation. The advantages and obstacles were analysed separately in order to identify the development of teaching after teachers participated in the peer observation. The advantages and obstacles were analysed using six factors: age, gender, education levels, participants' faculties, years of teaching experience, and subjects' teaching characteristics.

From the analysis result, these variables were considered as a noticeable/observed variable (χ^2 = 19.210, *df* = 14, *p* = 0.1571, CFI = 0.976, TLI = 0.984, RMSEA = 0.067, SRMR = 0.185 and χ^2 /*df* = 1.37). The result from single level SEM analysis for the model latent variable of advantages and obstacles indicated that gender and years of teaching experience were factors affecting teachers' opinion on teacher development through peer observation.

Keywords: *peer observation, classroom observation, teacher development, teaching development, collaborative*

Introduction

Thai-Nichi Institute of Technology (TNI) has been founded for 8 years. The institute offers undergraduate degree programs in three faculties, namely, Faculty of Engineering, Faculty of Business Administration, and Faculty of Information Technology. The Faculty of Engineering offers six undergraduate degree programs consisting of automotive engineering, production engineering, computer engineering, industrial engineering, and electrical engineering. The Faculty of Business Administration offers five undergraduate degree programs consisting of industrial management, business and industrial management, Japanese business administration, international business administration, and accountancy. The Faculty of Information Technology offers three undergraduate degree programs consisting of information technology, business information technology, and multimedia technology.

TNI's teachers have responsibility in teaching various subjects to students from different faculties. Naturally, students from different faculties have different characteristics and learning styles. Montgomery and Groat (1998) address that if teachers know their students' learning styles, they could choose the teaching styles that match with the students' learning styles. With this way, students would be able to empower their learning in the classroom. Diaz and Cartnal (1999), from their study, found that not only students' learning styles could affect students' learning potential, but their characteristics also did. Therefore, teachers should adapt their teaching styles and methods to students' preferences.

With the awareness of students' different characteristics and learning styles, it is necessary that teachers need to develop their teaching styles and methods all the time. One significant way that teachers could do to develop themselves is to learn from their fellow teachers or their peer. Peer observation is considered as a useful tool for professional development. Peer observation refers to teachers observe their colleagues in the classroom in order to develop themselves by learning from their peers (Shortland, 2006). In observing their peers, Richards (2005) states that teachers aim to "gain an understanding of some aspect of teaching, learning, or classroom interaction" (pp. 85). He explains that through observation, novice teachers could learn from experienced teachers as well as experience teachers could learn from each other. It provides a chance for them to share ideas and help each other some problems.

Hence, it does not only develop teaching skills, but it also improves social relation among colleagues. Lomas and Kinchin (2006) and Willerman, Mc Neely and Koffman (1991) also agree that peer observation could help teachers to work in a collaborative way with each other in order to improve their teaching quality.

However, not all teachers are willing to participate in observation. They might feel uncomfortable to have colleagues to sit in their classroom and watch while they are teaching. Pattanapichet and Charoensuk (2010) found that feeling uncomfortable and afraid to be judged by others were the most raising obstacle that made teachers hesitate to do the peer observation. Some teachers reported that they thought peer observation was a waste of time and did not think they could learn any things new since their colleagues did not share any new ideas to them. As a result, teachers' attitude toward peer observation is one important issue that is needed to be considered before using the peer observation. Lomas and Kinchin (2006) indicated that teaching quality could be enhanced only if teachers valued the peer observation. Also, Martin and Double (1998) found that teachers or participants who were committed more on the peer observation process gained positive views and more benefits from their observing experience than the ones who were not.

Consequently, the researcher believes that peer observation would be a useful tool that could help teachers develop their teaching styles by observing each other's teaching, and sharing ideas about teaching problems, students' characteristics and students' learning styles. However, as there might be some obstacles that are against teachers to be willing to participate in peer observation, the researcher decided to investigate teachers' opinion toward peer observation and factors that affect their opinion. Moreover, in order to gain more insight on the issues, the researcher has used the Structure Equation Model (SEM) to build a model that demonstrates the relationship between teachers' opinion, factors affecting opinion, and teaching development.

Research Objectives

1. To investigate teachers' opinion on teaching development through peer observation of Thai-Nichi Institute of Technology.

2. To investigate factors affecting teachers' opinion on teaching development through peer observation of Thai-Nichi Institute of Technology**.**

Hypothesized Model

The present study aims to investigate the relationship among teachers' opinion toward peer observation, teaching development and the factors that affect teachers' opinion. From the literature review, teachers' opinion was divided into advantages and obstacles of using peer observation. The factors that affect their opinion were their background including gender, age, education levels, faculty they belong to, teaching experience, and teaching characteristics of a subject. Figure 1 presented below is the hypothesized model of the relationship among teachers' background, opinion on peer observation and teaching development regarding to the literature review. Teachers' background is an independent variable while teachers' opinion and teaching development are dependent variables.

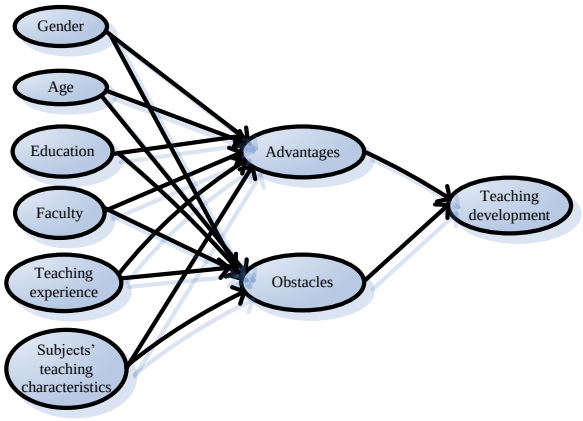

Figure 1: Hypothesized Model

Materials and Methods

1. Participants

The participants of the study were 82 TNI teachers from all three faculties and the College of General Education and Languages. There were 47 males and 35 females with the ages range from 20 to over 41. All teachers had the Bachelor degree or higher. 60 teachers had teaching experience less than five years. 16 teachers had teaching experience 5 – 10 years and only six teachers had teaching experience more than 11 years.

2. Research Instrument

The research instrument was a questionnaire consisting of three parts. The first parts was the participants' general information including their gender, age, education, faculty, years of teaching experience, and subjects' teaching characteristics. The second part as the main part of the questionnaire was the teachers' opinion towards peer observation focusing on advantages and obstacles of peer observation. This part contained 17 items, 10 items on advantages and 7 items on obstacles, using a 5 point-Likert scale, ranging from; 1 means strongly disagree, 2 means disagree, 3 means somewhat agree, 4 means agree, and 5 means strongly agree. The last part was an open-ended question for comments and suggestions.

Research Instrument Development

The researcher adapted the questionnaire from "Questionnaire Survey about opinions towards The Buddy Observer Project" developed by Pattanapichet and Charoensuk (2010) and literature reveiw. The questionnaire was examined for its content validity by three experts to find the index of item objective congruence (IOC). Then the questionnaire was revised and tried out with 30 teachers who had similar characteristics with the sampling group in order to find its reliability. Cronbach's alpha coefficient was used to

analyze the data. The questionnaire was revised again before its actual use.

3. Procedures

The researcher used simple random sampling to choose the sample group. Therefore, 87 teachers were selected and asked to complete the questionnaire. The participants did not need to identify themselves in the questionnaire and were allowed to spend their time as much as they needed to complete the questionnaire.

The data were first analyzed for their descriptive statistics. After that, to find the relationship among all variables, the data were analyzed by the single level SEM using M-plus program version 5.21.

4. Data Analysis

The data were analyzed using two main statistical analyses:

4.1 Descriptive analysis was used to analyze general data of participants for percentage, means, and standard deviation.

4.2 Single level SEM analyzed by M-plus program was used to analyze the relationship of all variables in order to create the model. The model was modified based on Modification indices until it fitted with the empirical data. The Goodness of Fit Index (GFI) was used to calculate the data fit with the model.

Results and Discussion

All participants completed and returned the questionnaire. From the data analysis, the results reported in this section include the overall teachers' opinion on peer observation, their opinion on advantages and obstacles of peer observation, and the model representing relationship of all variables.

Table 1 below demonstrates the demographic data of all participants. Participants' personal information is one important variable that affects their opinion on peer observation. The results are reported later on this article.

Table 1: Demographic Data of Participants

Details of Participants	No. of Participants	Percent (%)
Gender		
Male	47	57.3
Female	35	42.7
Age		
20-30 years old	38	46.3
31-40 years old	31	37.8
41 years old or over	13	15.9
Education Levels		
Bachelor Degree	11	13.4
Higher than Bachelor Degree	71	86.6
Faculties/Units		
Engineering	30	36.6
Information Technology	11	13.4
Business Administration	21	25.6
General Education and Languages	20	24.4
Years of Teaching Experience		
Less than 5 years	60	73.2
10-5years	16	19.5
11years or over	6	7.3
Subjects' Teaching Characteristics	17	20.7
Lecture	8	9.8
Math	2	2.4
Language	4	4.9
Activity base	24	29.3
Lecture and Math	13	15.9
Lecture an Activity base	14	.171
Lecture, Math, and Activity base		

The number of male teachers (57.3%) is over female teachers (42.7%). Most teachers are at ages 20-30 years old (46.3%) and most have education higher than the Bachelor degree (86.8%). Most of participants are from the Faculty of Engineering (36.6%). The number of teachers who have less than 5 years of teaching experience is the highest (73.2%) while the number of teachers who have 11 years or over teaching experience is only 7%. The number of teachers who teach the subjects that need lecturing and math is the highest number (29.3%). The second one is the number of teachers who teach the subjects with the lecture type.

Table 2 below shows the teachers' opinion towards peer observation focusing on its advantages and obstacles.

Table 2: Mean and Standard Deviation of Teachers' Opinions on Advantages and Obstacles of Peer Observation

Table 2: Mean and Standard Deviation of Teachers' Opinions on Advantages and Obstacles of Peer Observation

	N	Mean	Std. Deviation
Advantages	82	4.0732	.64369
Obstacles	82	3.7683	.75847

From Table 2, the mean of advantages of peer observation is 4.0732. It means that teachers agree with the advantages of peer observation. However, the mean of obstacles is 3.76 meaning that teachers also agree that there are obstacles in using peer observation to develop teaching. Hence, to clearly see how teachers agree on each item of advantages and obstacles, the findings are reported in Table 3 and Table 4.

Table 3: Mean and Standard Deviation of Teachers' Opinions on Advantages of Peer Observation

Items	N	Mean ($\bar{X}$)	Std. Deviation
I think the peer observation …			
helps teachers to improve their teaching practice.	82	3.6341	.77797
gives teachers new ideas to manage their classroom.	82	3.7195	.82063
encourages teachers who are observed to try out new teaching techniques.	82	3.6220	.88388
provides teachers as observers an opportunity to learn new teaching styles.	82	3.9024	.79520
helps teachers to reflect their	82	3.7561	.74637

teaching practice more clearly			
arouses enthusiasm for teaching profession.	82	3.5488	.80358
establishes a collaborative learning community among teachers.	82	3.6220	.86980
increases trust among teachers.	82	3.3659	1.03652
encourages teachers to want to share ideas with other teachers.	82	3.7683	.80582
encourages teachers to exchanges their experience to each other.	82	3.7439	.79832
Total	82	4.0732	.64369

Table 3 reports the teachers' opinion on advantages of peer observation. The results show that teachers are aware of the advantages of peer observation. Most items are rated over 3.51 (agree with the items). Teachers thought that the most advantage from peer observation is to provide them as observers an opportunity to learn new teaching styles ($\bar{x}$ =3.9024). However, teachers believed that increasing trust among teachers ($\bar{x}$ =3.3659) was the least advantage from peer observation. The mean that is lower than 3.51 referring that teachers still had some doubts about the particular advantage.

Table 4: Mean and Standard Deviation of Teachers' Opinions on Obstacles of Peer Observation

Items	N	Mean ($\bar{x}$)	Std. Deviation
I think the peer observation…..			
adds more work load to teachers.	82	3.2073	.84236
takes too much time.	82	3.1951	1.02366
makes teachers feel uncomfortable to be observed.	82	3.4512	1.06750
is hard to ask every teacher to participate.	82	3.3415	1.11355
is useless because different teachers have their own styles.	82	3.0732	1.14159
makes teachers feel like they are judged by others.	82	3.1951	1.14869
is no use because different teachers teach different subjects.	82	3.1098	1.03048
Total	82	3.7683	.75847

From Table 4, the results reveal that teachers were aware of obstacles from peer observation. The total shows the mean of 3.7683. However, when considering each item, there are not any items that teachers really agreed that they could be obstacles of participating the peer observation (all items were < 3.51). Teachers seemed to think that the most obstacle was to made them feel uncomfortable to be observed ($\bar{x}$ = 3.4512) while the least obstacle was peer observation was useless because different teachers had their own styles ($\bar{x}$ = 3.0732).

Table 5: Statistic Analysis of Structural Equation Model (SEM)

Observed Variables	Structural Equation Model (SEM)			
	Factor Loading β	SE	Z	R^2
Advantages	0.072	0.833	1.986	0.118
1. Gender	1.429	0.050	28.762	0.097
2. Age	-0.151	1.567	-0.096	0.614
3. Education Levels	-0.969	0.608	-1.593	0.048
4. Faculties	4.447	1.566	2.384	0.933
5. Years of Teaching Experience	0.166	1.118	1.990	0.278
6. Subjects' Teaching Characteristics	-1.114	0.654	-1.704	0.067
Obstacles	0.413	0.808	1.971	0.118
1. Gender	1.429	0.050	28.762	0.097
2. Age	-0.931	1.517	-0.613	0.614
3. Education Levels	-1.007	0.600	-1.678	0.048
4. Faculties	4.363	1.613	2.404	0.933
5. Years of Teaching Experience	-0.364	1.112	-1.977	0.278
6. Subjects' Teaching Characteristics	-1.179	0.636	-1.855	0.067
χ^2 = 19.210 , df = 14, p = 0.1571 CFI = 0.976, TLI = 0.984, RMSEA = 0.067, SRMR = 0.185				

$|Z|$ > 1.96 means p < .05, $|Z|$ > 2.58 means p < .01

Table 5 shows the result of using SEM to analyze the data. The result revealed the effects of six factors (sex, age, education levels, faculties, years of teaching experience, and subjects' teaching characteristics) on the opinion of using peer observation for teaching development. These six factors were observed variables. Teachers' opinions towards peer observation including its advantages and obstacles as well as teaching development were defined as latent variables.

The result from SEM analysis using M-plus program confirmed the construct validity of the hypothesis model. The Chi-square statistic (χ^2) of the hypothesized SEM model was 1.372 (χ^2 = 19.210 / df = 14) which was a non-significant χ^2 (p = 0.1571) as required for SEM (p > 0.001 and < 2). The model had the good fit with the empirical data according to the fit indices, CFI = 0.976 and TLI = 0.984 (both closing to 1). RMSEA = 0.067 and SRMR = 0.185 (both closing to 0).

Considering the factor loading of teachers' opinion towards the effect of peer observation on teaching development, it shows the statistical significance at the .05 level of both advantages and obstacles of peer observation. However, the factor loading value of obstacles (β = 0.413) was higher than advantages (β = 0.072).

The factor loading (β) of all six variables shows that for the opinion on advantages of peer observation, only one variable showing significant at the .01 level was gender (β = 1.429). Two variable showing significant at the .05 level were participants' faculties (β = 4.447) and years of teaching experience (β = 0.166). Moreover, education levels (β = -0.969) and subjects' teaching characteristics (β = -1.114) had holding the lowest values of factor loading. For the opinion on obstacles of peer observation, the factor loading also reveals the variable that was significant at the .01 level was gender (β = 1.429) while the variable that were significant at the .05 level were participants' faculties(β = 4.363) and years of teaching experience

(β = -0.364). Education levels (β = -1.007) and subjects' teaching characteristics (β = -1.179) had holding the lowest values of factor loading for opinion on obstacles as well.

For the validity (R^2), Table 5 shows the value of covariance of both observed variables and latent variables. The table shows that the R^2 was between 0.005 to 0.933.

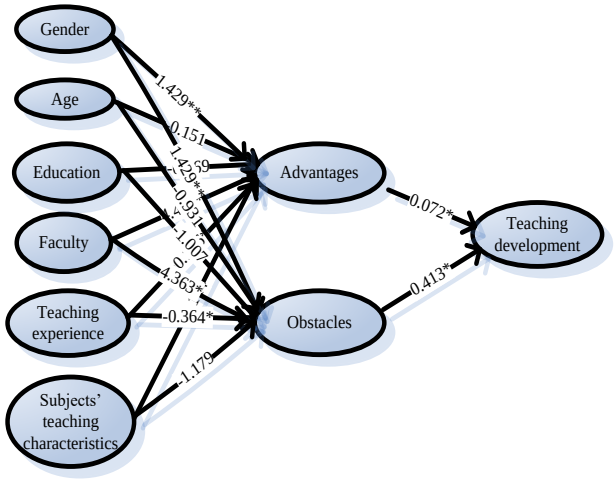

Figure 2: Structural Equation Model of Teachers' Opinion on Teaching Development through Peer Observation Discussion and Conclusion

The results from using SEM analysis to investigation teachers' opinion on teaching development through peer observation focusing on advantages and obstacles of peer observation revealed that participants' six demographic background, consisting of gender, age, education levels, faculties, years of teaching experience, and subjects' teaching characteristics, affected teachers' opinion on peer observation.

For the opinion towards the advantages of peer observation on teaching development, all variables serve as factors affecting teachers' opinion. Indeed, there were three variables that seemed to be the main factors. Those were gender, faculties, and years of teaching experience. The SEM analysis showed the good fit between the hypothesized model and empirical data.

For the opinion towards the obstacles of peer observation on teaching development, all variables serve as factors affecting teachers' opinion as well. In fact, there were three variables that served as the main factors affecting teachers' opinion. Those were gender, participants' faculties and years of teaching experience. The SEM analysis showed the good fit between the hypothesized model and empirical data.

As a result, using peer observation for teacher development needs to consider all kinds of demographic background investigated in this present study especially, teachers' genders and years of teaching experience since these two variables were the main factors that affected teachers' opinion on both advantages and obstacles. On the other hands, education levels and subjects' teaching characteristics, with the lowest factor loading values, might not affect much on teachers' opinion towards peer observation.

From the results, it could be concluded that peer observation is a sensitive issues since personal background of teachers reflected their opinion on the use of peer observation. Even though they realized the advantages of peer observation, they felt that the obstacles of using peer observation may have more. Hence, they might hesitate to participate in the peer observation although it could help them to develop their teaching. Pattanapichet and Charoensuk (2010) state that peer observation is complicated and sensitive because "it involves issues of individual's sense of apprehension, vulnerability and anxiety" (pp. 139). Therefore, Sharashenidze (2013) addresses that observation should help teachers to improve their professional growth, not make them feel threatened. Teachers should have good attitudes towards the peer observation first. They should be aware that collaboration should help them develop. Sharashenidze also suggests that "teachers just have to be more open-minded and willing to accept the criticism and advices" (pp. 48).

Furthermore, the practiced model of observation is needed to be considered. Akbari, Samar, and Tajik (2006) indicate that observation always terrorized teachers as it seemed like an evaluation process. Hence, in order to eliminate the negative attitude of teachers towards observation, new model of using observation is needed to be created. Then it would help change teachers' negative reaction and empower the classroom observation in order to promote teachers' professional development.

Conclusions

From literature review and the results of this study, it could be said that teachers were aware of peer observation's advantages on their professional development. However, they also concerned about the obstacles that could happen from peer observation. Teachers with different personal background may have different opinion about peer observation. Consequently, as universities contain teachers with different background, if they need to use peer observation as a teacher development tool, they need to begin with preparing their teachers by building positive attitude towards peer observation. Moreover, they need to select the peer observation models or processes that would fit with the nature of their teachers. Then peer observation would be an effective tool to help them develop their teachers.

The future studies could focus on the in-depth of factors affecting teachers' opinion such as why each personal background (demographic background) affects teachers' opinion differently. Other kinds of personal background could be added. The studies could be

conducted with bigger samples so that the results can be generalized.

Acknowledgements

I would like to thank my institute, Thai-Nichi Institute of Technology that provided me the research fund and my fellow teachers who gave me all supports for doing this research.

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