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TOJQIH welcomes you.

The Online Journal of Quality in Higher Education (TOJQIH), Governors State University, and other international universities will organize International International Conference on Quality in Higher Education (ICQH-2016) on November, 2016 at Sakarya University in Sakarya, Turkey. (www.icqh.net). ICQH series is an international educational activity for academics, teachers and educators. This conference is now a well-known higher education event. It promotes the development and dissemination of theoretical knowledge, conceptual research, and professional knowledge through conference activities. Its focus is to create and disseminate knowledge about quality in higher education.

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A COMPARATIVE LOOK AT DESIGN STUDIO IN USA AND TURKEY

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Abstract: Despite widespread availability of information across the world, immediate distribution and availability of various media on architecture and its education, certain local realities are highly effective in shaping the design education in Turkey. Having taught architectural design both in USA and Turkey during my 15 years of teaching, I come to observe that pedagogical differences in design studio are strongly tied not only to the general architectural culture and practices of built environment in two countries, but they are actually shaped by deep underlying attitudes to research and experimentation, thus knowledge production and larger educational system in general. Even if there is a certain globalism to architecture in today's world, where common forms of architecture are produced everywhere in the world, the degree of originality and innovation shifts dramatically between the professionals of different countries, and these qualities not only determine the shares of the architectural world market, but also construct the present discourse on architecture and its education. One of the sobering observations to be made about architecture in Turkey is that our professionals are not recognized beyond our borders, and Turkey still suffers from the lack of a strong architectural culture beyond a very limited number of universities. Based on personal experience of being an educator in both countries since 1999, I will identify the differences in architectural education, specifically in design studio, and tie these findings to practices of built environment and broader cultural attitudes towards knowledge production in the two countries.

INTRODUCTION

I started teaching architecture in Turkey in 1999 at Orta Dogu Teknik Universitesi [ODTU], one of the top schools of architecture in the country. One main difference of this school from other programs of architecture in Turkey is its pronounced affinity to global architectural culture. With its curriculum based on models from North America, with the language of instruction being English, it is the closest school to American and European architectural education in Turkey. Most of its faculty, if not all, have degrees from USA or Europe.

I came to USA in 2002 and started teaching studios in 2003. I started at University of Florida [UF], and am currently teaching at University of South Florida [USF] since 2010. Between 2011 and 2013, I had the chance of teaching back at OTDU as a visiting professor for three semesters. In the mean time, I was also involved in the curricular development of newly established TED Universitesi [TEDU] and had opportunities of studio reviews there. In addition to education, I was also able to practice, and had the opportunity to design projects both in USA and Turkey.

In what follows, I will present my observations about studio education in USA and Turkey, and speculate on the reasons for the vast differences both in viewing architecture as a discipline / profession and the quality of work and research produced.

PROFESSIONAL DEGREE REQUIREMENT

One main difference between USA and Turkey in architectural education is the length of study for professional degree. In Turkey, a four year undergraduate degree is sufficient for professional licensure. Graduate study is mostly pursued as a matter of academic development, and usually involves a research based thesis. In USA, a two year graduate

degree in addition to a four year undergraduate degree is the requirement for professional licensure. While there are some variations to this, the professional degree is a graduate degree, which is usually a combination of further design studios and a form of a thesis project, which is mostly a design based research.

This difference in the length of study for professional degree not only translates into less number of design studios, but also less number of support courses. Less number of design studios means a narrower and more building oriented design education, whereas less number of support courses means narrower knowledge base to sustain the technical and intellectual aspects of architecture. The longer term of study for the professional degree allows the programs in USA to establish a notion of design research discipline, explored hands-on in the studios, and technically and intellectually fed by a larger number of support courses along the curriculum. The shorter study in Turkey limits the education almost to the degree of a vocational school and does not leave much room either for development of design as a research discipline or for cultivation of some sense of architecture as an intellectual field ¹.

CURRICULAR STRUCTURE

While the curricular structures look similar on paper, as the design education starts with fundamental design studios and advance towards architectural design studios throughout the years of study, how these studios are conducted in two countries are vastly different. In USA, the fundamental studios span at least a year and a half, where the students are taught basic structures of design thinking in the form of systemic making of space and tectonic resolution without really discussing buildings at all. The exercises in the foundational studios are usually rapid and fragmented exercises that underline again and again systemic makings in various modalities spatial and tectonic order. Heavily immersed in hand making of models and drawings and a variety of other presentation techniques, the students cultivate a distinct ability to think and speculate in spatial and tectonic terms. The tools of making is almost elevated to a level of second language where spatial and tectonic ideas take tangible shape in phenomenal experience. And this all happens before any discussion of buildings that are out there in the real world occupied by real people. Foundational studios in USA establish design thinking as a form of research into human experience by the ability to modulate spatial and temporal structures. This design thinking is beyond making buildings, it is an intellectual endeavor into the very notion of making itself.

Similarly in Turkey, there are foundational studios, or basic design studios, that aim to establish a sense of systemic making as the core discipline of architectural making. However, in Turkey, this notion of systemic making is derived from and remains in the domain of making buildings, thus operates at a very elemental level of pattern and order relations distant from deeper possibilities of spatial experience or tectonic resolution. Thus the basic design exercises rapidly fold into simple habitable structures and site relations of small scale settlements. So, rather than letting experiential, hands-on makings develop into a way of thinking in broader possibilities of spatial and temporal structures, these become only intermediary tools for understanding what *good* architecture is deemed to be at any given moment in the cultural system of education. Born in and developed by a prior sense of architecture as making buildings, foundational curriculum falls short of establishing an intellectual discipline of thinking through making ².

¹ See Harriss and Froud 2015 for how the length of architectural studies determines a programming of the curriculum and the recent discussion in Britain.

² See Chedwick 2004 for a discussion of the importance of research aspects of design education and its implications for shaping the profession.

Beyond the foundational studios, differences continue to follow this initial split of seeing architecture as making of buildings versus an intellectual discipline of thinking through making. While the students meet with the buildings as early as the second term of their first year in Turkey, in USA it takes at least two years to get to the point of dealing with questions of buildings as entities that are built somewhere to serve a use. From simple structures to large and complex buildings, design studios advance on scale in Turkey. Simple or complex, there is some kind of a program, and some kind of a site. Exercises mimic real world scenarios. From small to big, the way the thinking is challenged does not change. It is some kind of problem solving, of a program on a site, with increasing requirements of structural and technical skills. In USA, not only students start the talk of buildings late, it is usually very fragmented and partial at the start as well. Design studios introduce notions of program and site, very gradually with focused, thus fragmented, exercises, dealing with only a certain set of issues at once. Design studios in USA advance not only on scale, but more importantly on the degree of intellectual speculation on various aspects of spatial and tectonic making, which then eventually finds its way to making of buildings. Making of buildings is freed from a narrow notion of problem solving, becomes a research into making of human experience ³.

PRACTICES OF BUILT ENVIRONMENT AND PROFESSION

In addition to the short term of study, the professional life of architecture in Turkey is also with its own challenges. Losing the initial impetus of the new republican ideals around 70's, which emphasized art and culture as part of the building program of the new Turkey, the institutional structures of country shifted towards consumerism and easy consumption of media, especially after 80's. With the housing boom of late 80's, the urbanism favored contractor built apartments lacking any character or notion of place. Architects were relegated to facade design. Stuck in a narrow market of institutional projects, mostly acquired via design competitions, the professional field became a small arena with only a few important figures. Defined in such small and narrow frame, architecture as a profession in Turkey did not see the freedom of experimentation or research it did in the West in the late 20th century. While USA, Europe, Japan, and even the developing countries of South America, were advancing the modern architectural ideas in a more diverse world, Turkey kept repeating what it saw as good in the West, unable to bring its own professional impact on the global architectural scene. Thus lacking a cultural and economic support from the larger society, architecture in Turkey never really became the profession it is for West. Limited to academia, most architectural discussion, that otherwise could impact the profession, remained abstract and baseless in the lack of a sustainable building practice.

Next to the widely spread attitudes of producing built environment reduced to a mechanical senseless pragmatism, Turkey also saw rather unique ramifications of Post Modernist speculation in architecture. What was only a brief period of hiccup for the West, became a defining period for architecture in Turkey. The Post Modern critique of singularity and universalism of architectural making gave way to a richer modernism in the West, advancing research and experimentation on spatiality and materiality in the service of phenomenal experience ⁴. But Turkey got stuck in the idea of representational symbolism, just an anecdote in the larger critique. Possibly, never really had established architectural design as material research into spatial and temporal experience, architecture in Turkey saw an easy escape in

³ See Temple 2011 for the disciplining of thinking in making in the foundational studios and its ramifications for later years of design education and practice.

⁴ See Frenzen 1999 and Holl 2007 for how an internal critique of modernism, both in education and practice, is also tied to its very proliferation into a richer and complex experimentation in spatial / material research.

the symbolism argument of Post Modern critique. Given the religious and cultural sentiments of the country, and the great heritage of centuries of establishments, architecture in Turkey completely left the modern school of architecture after probably a very brief period of affair in the early years of the Republic. This last statement may sound inaccurate when you consider that most new architecture in the country, apart from the ones built by the state, *are* modern buildings. As a designer, my view is that they are not. They only *look* modern, *mimic* modern, without any palpable attitude on space. They are designed for easy consumption. Their forms are derived from what is trendy. The references of symbolism change, symbolist attitude is the same.

DISCUSSION

The professional practice of architecture and its education in a country are always necessarily in a constant dialogue. This dialogue is not one of apprenticeship in societies where academia actually produces and advances knowledge as does the profession. Education and profession constructively challenge each other, and answer challenges posed by the other ⁵. For this to happen, the institutions of knowledge production and research need a widely supported social and economic background. In the absence of a culture of knowledge production and research, architectural education in Turkey is more a form of apprenticeship, a vocational training. The challenge to education from the profession is development of skills to make *proper* buildings where the proper is what is already done properly according to the professional norms set by competitions, commissions, architectural magazines. As the profession itself is unable to find a breathing space of research and experimentation in a field of practice very narrowly structured by the cultural and economic systems, it simply cannot pose a research challenge to the academia. Similarly, burdened by training architects in four years with the ability to make proper buildings, next to being unable to see a promise of contribution to the making of the built environment, academia is also helpless in bringing research to its educational agenda.

While it is easy to blame both sides of academia and profession for the lack of an architectural culture in Turkey, this will be missing the larger social frame where actually there is no such demand for an architectural culture in Turkey. Happy with its mediocre built environment, sustained by consumerist traditionalism, Turkey sees built environment first and foremost an economical instrument rather than place of life. Reduced to a commodity, built environment does not need to be designed with the interest of enriching life and culture of a society. Numbers of square meters, in kitsch make up, of some reference, are the determining agents of meaning in such a built environment. This is evidenced once more in recent years with the advent of what is called 'urban renewal' projects. A cursory look at the new residential and commercial architecture produced in Ankara and Istanbul shows either a kind of traditionalism with symbols blended from all parts of Turkish history and Islam, or a kind of high-end look that mimics Western facades, both basically enclosing the same kind of mediocre habitats lacking humanist values of place making. In the absence of an informed demand for designed environments enriching life, even the symbolisms become fake, and neither academia nor profession can meaningfully intervene with this crude state of affairs.

⁵ See Nicol 2000 for a discussion of how education can respond and shape a new reference frame for professional practice.

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A KEY STUDY FROM TURKEY: NECESSITY OF MODIFICATION IN EDUCATION AT COMMUNICATION FACULTIES WITHIN THE CONTEXT OF DIGITALIZED STUDENT IDENTITY

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Abstract: Digital media, smart phones and tablets have become an inseparable part of people's daily life. Producing knowledge, communication and getting information has become easier but at the same time, the reality and trueness of these became a discussion subject. Students can get any information through the internet; they can reach data fast and copy paste. Therefore, this is why creativity and individuality of papers and projects have to be queried. Academicians, lecturers have to use technology better than ever and almost have to become a specialist in technology.

Digital students like to watch and record. They almost never write; they just take photos of the subjects. In this kind of education model, something has to change in terms of quality. Needs of today's journalism classrooms are different from the past. Teachers have to change their teaching ways from classical models to more interactive and multimedia user concepts.

New generation is growing up in a digital media age; they socialize and cultivate themselves by user-friendly applications. This situation causes the generation to get used to an easier life. Lean back and wait to be taught without any effort. Consumption culture is propping stolidity even in learning practices. In this case, this paper aims to understand what must be done as modification. A small research is done with 50 students asking what are the three things needed for a quality education. The same question was also asked to 12 lecturers as a focus group. This paper discusses advantages and disadvantages of technology for students. The results of the questionnaire is interesting; it seems need of freedom is more demanded than technology etc.

Keywords: Digital students, journalism students, quality in education

INTRODUCTION

It is possible to define today's society as the digital individuals' society who lives in a digital era. Thus the youth, the students, of this society are digital identities. "Identity is an ambiguous and slippery term. It has been used—and perhaps overused—in many different contexts and for many different purposes, particularly in recent years" (Buckingham 2008: 1). This paper examines identity within the context of online accounts and cultures. Societal, political, economic and technological developments happen almost in the blink of an eye and students follow all of these on the internet. There are currently thousands of online spaces that allow students to experiment with identity in an artificial world (Gonzales and Shohat and Stam, 2003: 300). Lecturers' observations of university students, shows that digital students live in a digital world and they do not even know how to note down.

In a fast changing world; quality, especially in education, is accepted as one of the most prominent and irreplaceable features. Before laying out the essential conditions for quality in education, notion of quality has to be defined. First, it has to be decided whether we are talking about quantitative elements like luxurious facilities and educational tools or content and quality. According to Oxford dictionary, the definition of quality is "The standard of something as measured against other things of a similar kind; the degree of excellence of something." The definition according to Cambridge is, "How good or bad something is..." Quality is a very important parameter that differentiates an organization from its competitors. Because it gives the best product and it is competitive. There are surveys worldwide published

revealing which universities offer students the best quality of life, ranks institutions by analyzing a range of other surveys and data including surveys on living costs, employment and salary on graduation and student satisfaction. However, in this study when we talk about quality it is mostly about the contextual knowledge; it is not about properties of schools. Education is a long-term investment for a human being. Based on this statement, it would be true that academic achievement should not be the only criterion when judging the success of the universities.

Digital students often express themselves by starting blogs. As it is widely known, “Live Blogging combines conventional reporting with curation, where journalists sift and prioritise information from secondary sources and present it to the audience in close to real time, often incorporating their feedback” (Thurman, 2013:1). Journalism is more than just a homework or a job. For example a photojournalist can send ripples across the world with the publication of an iconic photograph, for social change. In a modern media environment it is almost impossible for journalists and students not to be aware of the impact of technology on their ways of working there are different ways of working and media platforms that publish their work (Chapman and Nuttall, 2011:99).

Amy Guttmann did ask an important question at Spencer Foundation Conference: What should universities aim to achieve for individuals and society?

“It is reassuring to those who believe in the worth of a university education—and all the more so in a high-unemployment, low-growth economy—to show that the average person with a college education earns a lot more over her lifetime than the average high school graduate, even after subtracting the cost of college. But it should not be too reassuring, because the economic payback to university graduates is not the only—or even the primary—aim of a university education. To know whether a university education is worthwhile, we need to identify and defend the mission of a university education. Call this the mission question: What should universities aim to achieve for individuals and society? What is our ethical mission with regard to educating undergraduates? I defend three fundamental aims of an undergraduate education in the 21st century.

The first aim speaks to who is educated and calls for broader access to higher education based on talent and hard work, rather than income and wealth: Opportunity, for short.

The second aim speaks to the core intellectual aim of a university education, creative understanding, which I will argue calls for a greater integration of knowledge not only within the liberal arts and sciences but also between the liberal arts and professional education: Creative Understanding, for short.

The third aim is an important sequel to the successful integration of knowledge, enabling and encouraging university graduates to contribute to society on the basis of their creative understanding: Contribution, for short (<http://www.upenn.edu/president/meet-president/what-makes-university-education-worthwhile>”).

Some people believe that the aim of university education is to provide graduates better jobs. Whereas some others believe, that there is much more benefits of university education both for individuals and society. It is clear that a degree does help someone get a better job to a certain extent, but it gives no guarantee. According to Althusser, one of the dominant Ideological State Apparatus is the schools. Universities have to provide a student the world culture more

than a job oriented education and this has to be discussed. Journalism is a kind of job that does not even need a diploma. This profession needs more sense of wonder, talent of questioning more and investigation. So journalism education in this digital era has to contain much more culture than before. It has to give students more curiosity and more will of creative writing. Education has to teach journalism students the ethical codes of the profession specially to avoid from this infollution on internet.

METHODOLOGY

In this study, a literature review, observation and questionnaire that consists of one open-ended question are used as the method. Afterreview of literature and conveying the previous 7 years of observation in communication faculty, the results of the questionnaire that made with the students and faculty members is shared. The interview was carried out with 50 students and 12 faculty members. The students were randomly chosen from the Communication Faculty of Maltepe University. They were only asked to write down their age and gender on the questionnaire form. The data that also includes age and genderinputs of faculty members are evaluated on Excel.

FINDINGS

The research question is set as: “What are the top 3 important things in higher education according to you?” The questions were asked face to face and the answers were recorded as written. 12 lecturers and 50 students answered the question by writing 3 sentences each. Lecturers’ first criterion was self-determination. The most frequently touched upon issue among the students turn out to be endowed with the freedom of debate. Apart from this, the students’ demand for quality in education follow as this:

- not being under pressure in class,
- freedom of speech in classes,
- active debate environment,
- raising responsible and participant individuals,
- advanced technological infrastructure; availability of sources, a good library, availability for practice at school
- lecturers who are experienced, academically successful and able to speak foreign languages
- giving importance to foreign language education,
- field experienced academicians who care about students’ comprehension level,
- faculty members without arrogance,
- mutual understanding,
- Academicians who are neither very intimate nor very distant,
- Creating projects such as newspaper, civil society initiative, social activity etc.,
- Not having too many private universities. The existing private schools should not prioritize income before everything.
- Students should be prepared for professional life through personal development seminars, interviews with journalist from the sector and forums about professional topics
- Minimum theory; maximum practice
- Dignity, discipline, stability.

Demands of lecturers (for academicians) include:

- Autonomy, independent education policies in classes, production of free thought and respect to this production,
- A well-equipped library, being fully provided with technical and physical conditions necessary for education,
- Teaching staff that is enthusiastic and enjoys producing. Having chance to do interdisciplinary studies,
- Being scientific, having practice and theory under the same roof,
- Enthusiastic and interested students,
- Indorsement to participate national and international conferences, seminars, workshops,
- Educators who are able to follow the developments around the world and financial support for it,
- Not teaching only in the classes, being able to relate students to real life outside the class,
- Sports, arts and cultural activities should be given importance at the campus,
- Transferring correct knowledge through right techniques,
- Changing the system which makes students merely exam oriented,
- Environmental planning within the campus should be made suitable for producing together and letting students socialize.

DISCUSSION

Lecturers should motivate students to be success oriented and should encourage them, give them confidence. However, this confidence should not create a sense of being superior and drive the students apart from ethical behaviors. It should not make students cruel and indifferent to each other or to society, it should make them world citizens who know about human rights and respect global values.

There are various forms of learning. “These diverse forms of learning are reflected in expressions of identity, how individuals express independence and creativity, and in their ability to learn, exercise judgment, and think systematically (Buckingham: 2008)”. Digitalized ‘journalism students’ have to improve their writing techniques and should consider that it would be even better to see their works published. This thought would give them the motivation and desire to create more. Erich Fromm says in his book *The Art of Loving* that “Love isn't something natural. Rather it requires discipline, concentration, patience, faith, and the overcoming of narcissism. It isn't a feeling, it is a practice.” Therefore, when the lecturers themselves learn and try to teach, they have to be patient. “To be successful at what we do requires making it as charming as a game. Just like the professional athletes turning the game into a profession, we can also turn a profession into a game” (Casson 2000). It is possible not to have monotonous classes. Gathering news and writing is an adventurous business; it is almost as fun as a game to those who are truly interested in. Whereas it is tiresome and torturous for a student who is not into it. Here, it is important for a lecturer that he/she should love what she does and tries her best to endear it to students too. While maintaining this adventure, one should also keep in mind that one should not forget his/her responsibility regarding the correctness of the news.

University students should be taught at least one foreign language. A person who cannot speak any foreign languages in today’s global world cannot possibly make best of the international culture as much as he/she should. He/she would be destined to live with stereotypes and the limited experience he/she gets from where he/she is. Whereas university

education is not –and should not- be something that provides students with diplomas to enable them get jobs. Before anything else, it should endow students with an understanding of culture. For instance, it should raise individuals who follow traffic rules and who do not commit to another person's life. It should provide its graduates with individuality, should encourage them to become questioning and productive people. Unlike what most people think, universities are not places that only provide students with a profession; there are technical high schools for that purpose. Thus, the ones who prefer it that way can quickly start working. A person who prefers university education should be equipped with a certain level of intellectual profundity. He/she should get to know different parts of the world and his/her own country by reading books, going to theater and movies, watching documentaries; maybe even by being physically mobile if possible. Nowadays there are different opportunities as EU Erasmus and Farabi Programs, various internship chances and ability to take part in volunteer projects. Faculty members should let students know about these issues and encourage them to be active.

A student is not a tabula rasa. They all have different cultural, economic, sociological, religious and political backgrounds. They have their own norms and value judgements. It certainly is difficult to change prejudices.

CONCLUSION & RECOMMENDATIONS

If we generalize the results of this study, academicians should be able to follow scientific and technologic developments around the world closely, and should renew themselves accordingly. They should convey the knowledge they gather to others through panels, seminars, conferences, symposiums and workshops. After all, sharing leads to improvement. Lecturers should compare traditional teaching methods to technologic-scientific methods and they should improve new teaching models depending on their situation. Even in the year 1937, Muvaffak Uyanıkhad emphasized in his work that newspapers could be used in education as a part of teaching plan. He said students has to be informed of daily news of the country and of the world. His book recommending teachers to use newspapers as teaching material was published in 2007 by Gazi University Communication Faculty (Güngör, 2013:31). Today's world, gives a lot of different opportunities to teachers such as documentaries and video news to understand the world and to teach itto digital studentsby more effective ways. Lecturers can use this new technology products in the classes whenever is needed to strengthen the subjects.

Lecturers should also try to develop their own talents as well as students' talents. They should teach creative writing. Students should not write papers for only getting marks; they should write for themselves and for feeling the joy of creating something. Students should be connected with the sector, they should be provided with chances of internships at the newspapers with journalists. People from the industry should often be invited to campuses and should keep in touch with students to enable them follow the improvements and changes. Students should be given the opportunity to practice. They should subscribe to agencies in order to provide news for their own student journals, student should be able to do fieldwork and experience the production of real news for a paper.

One of the obstacles before high quality postgraduate education is that students choose their departments after an exam which most of the time lead them to go to the different departments from their original wish. The unconscious choices made during this processes cause lack of enthusiasm, lack and loss of motivation and most of the time disappointment towards life in general.

Quality in education requires a holistic approach. If someone or an institution says that, he/she/it has great quality –be it as a university, a lecturer or as a student, this statement mostly causes a delusion. Considering oneself good enough is important, but at the same time it requires sustainability and improvement. Monitoring whether you have reached the standards, demanded quality or checking and correcting the missing points are very significant issues. New plans and programs have to be enhanced if needed. University administrators and lecturers should note the negative and positive aspects of their systems. They should immediately address the failures and problems. Having a superficial view of the problem actually never solves small problems and small problems get bigger with time. Thus, we should end by remembering the anecdote:

“For want of a nail the shoe was lost.
For want of a shoe, the horse was lost.
For want of a horse, the battle was lost;
For the failure of battle, the kingdom was lost
All for the want of a horse-shoe nail.”

Quality education requires ideals and diligence of the teaching staff.

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A STUDY ON THE ASSESSMENT OF SEA TRAINING AS AN INTEGRAL PART OF MARITIME EDUCATION AND TRAINING

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Abstract: One of the most prominent objectives of maritime education and training (MET) is to supply manpower for the shipping industry. MET provides seafarers not only with theoretical knowledge on maritime issues but also practical training on ship duties. The sea trainings of cadets are executed in defined periods according to national and international standards and includes all kind of on-the-job training methods for ships. This study covers an in-depth investigation of the assessment of the success of cadets during a sea training. The assessment has been made based on both a final written exam and additional achievement reports prepared by the lecturers and ship training staff. The results are tested and verified using empirical methods. This study not only will help to realize the problem areas in the sea training of MET but also will provide essential data for the other education models which require on the job training.

Keywords: Maritime Education and Training (MET), Maritime Standards, Sea Training,

INTRODUCTION:

The International Maritime Organization's (IMO) international convention on Standards of Training, Certification and Watch-keeping for seafarers (STCW-78/95) ratified by all maritime nations, regulates the principals and standards of Maritime Education and Training (MET). The education and training programmes which meet the requirement in the STCW have been clearly defined by IMO Model Courses. IMO Model Courses 7.01, 7.02, 7.03 and 7.04 covers all details of operational and managerial level deck and marine engineering education. In line with these model courses, ISF (International Shipping Federation), representing maritime industry, has published structured Sea Training programmes. The ISF recommended programmes have been accepted as a base line and approximately all maritime administrations submitted their sea training requirements with very small modifications.

Sea Training is an integral part of MET and assessed as a part of academic programmes of maritime education institutions. Today all cadets are obliged to complete successfully at least one year sea training programme on board ships to become navigation and marine engineering officers. This training is normally conducted on board suitable merchant vessels and should be assessed by both the ship staff and lecturers of the schools. The training records including evidence book prepared by cadets and evaluation records of the ship officers are sent to schools then lecturers at the school make interviews with cadets to verify their achievements and make a/the final assessment. Some countries have training ships and they provide sea training under the supervision of the maritime lecturers deployed on board for some phases of the training in particular for initial stages.

T/S (Training Ship) Piri Reis University was deployed as a sea training ship for cadets in July 2015 as a first experiment since 40 years for the Turkish merchant fleet. 196 cadets and 17 maritime lecturers participated in this sea training as well as 57 crew members on board. The training period was 2 months covering the Black Sea and Eastern Mediterranean sea areas and conducting 12 port calls between 20 July and 20 September 2015.

192 deck cadets were divided into 8 teams, each of which consisted of 24 students led by 2 Team Leaders who were the final year cadets. 4 engineering cadets also conducted their sea training directly under the supervision of the Chief Engineer. 196 cadets were selected mostly freshmen, from 10 different maritime faculties and maritime higher vocational schools in Turkey and the Turkish Republic of Northern Cyprus (TRNC). 26 of 196 students were female cadets. A structured training programme consists of both classroom and practical training including watch duties was applied under the supervision of both the ship staff and lecturers who were mostly oceangoing ship masters.

The training programme was planned based on the first stage of the sea training programme advised by ISF. The training mostly covered a large spectrum of practical sea trainings including seamanship duties, repair and maintenance, safety and security, survival at sea, basic navigation, watch duties, proficiency in use of survival crafts, fire and damage control drills, access to enclosed spaces, rope work, ship handling etc.

The training continued at sea and in ports following a structured daily routine. The students lived on board with the basis of 7 days and 24 hours except 8 hours day-leave at each port unless there was no unsuccessful training in the previous phase. Any missing/ unsuccessful training was compensated with repetition. Being in uniform was a requirement and a special Code of Conduct for Sea was applied as well.

The final phase of the training based on the assessment of the cadets' achievement during the sea training including the stages below was also executed;

- Observation of the ship staff assigned as trainer,
- A written exam covering all aspects of the training conducted,
- Interview with each individual cadets for final assessment conducted by a commission which was consisted of 3 lecturers.

The written exam was prepared by 6 lecturers and covered the subjects only delivered and practised during the sea training. This exam has been designed as multiple choice questions. Additionally, in order to define the problems met throughout the trainings, a questionnaire has been designed and applied after the sea training (Appendix 1). The 54 students have responded the questionnaires.

The following parts of the study covers evaluation of assessment results supported with empirical methods.

RESEARCH METHOD

The aim of the study is to figure out shortcomings of the sea practical training executed on board a particular training ship. Therefore, defining and assessment of the qualification achieved by cadets on board was put in the core of the problem of the study.

The research is conducted in three phases. The first phase covers the evaluation of the results of the observation of the ship staff and interviews conducted by the commission which are rather subjective and could not have been evaluated by using a measurable method. The second phase is dedicated on the evaluation of the results of the written exam and responds to questionnaires which could be applied to a measurable method. The last phase is based on an overall assessment of the results of the previous phases to define the problem areas which may lead to some proposal for reclamation for the future.

RESEARCH

Assessment strategy and principals

Assessment is the process of gathering and discussing information from multiple and diverse sources in order to develop a deep understanding of what students know, understand, and can do with their knowledge as a result of their *educational* experiences; the process culminates when *assessment* results are used to improve subsequent learning (Huba & Freed, 2000).

The assessment process has a significant importance not only to achieve evaluation the learners but also to define the problem areas in teaching and assessment. The first issue to be discussed is the quality of assessment. Some main principles should be followed during assessment process. Scottish Qualification Authority defines their assessment principals as “all assessment methods, whether internally or externally assessed must meet our principles of assessment. All SQA assessments must be categorised as: *valid, reliable, practicable, equitable* and *fair* (SQA, 2015). This principal will also be used in this study during discussion of assessments made at the end of the sea training.

Assessment of On the Job Training

On the job training has many differences from the academic studies considering aim, objectives, content, and place, supervision of the students and in particular mode of delivery. Considering all of these differences, the assessment methods applied for on the job training should be different. Mostly, assessments of the on the job training are made using oral examinations and sometimes supported with an assignment which may be used as evidence to prove what is being achieved. The written exams are applied very rarely.

Nursing students traditionally have been evaluated with an objective written examination. This method has shown some benefits and disadvantages. In one study, the value of oral examinations was examined in evaluating nursing students. Five groups of students were evaluated with different forms of testing, some with only written tests, others with only oral examinations, some with a combination of both types of evaluations. The results of the mentioned study showed that oral examinations can effectively evaluate the student's comprehension and application of clinical information in a clinical situation, as shown in higher test results, compared with oral written examinations, and positive student comments. *Oral examination can be as effective or more effective in evaluating student understanding of medical/surgical content and its application in clinical situations* (Rushton and Eggett, 2003).

An evaluation which compares the success of the nursing students with success of the maritime cadets in written and oral exams is quite understandable. Nursing education consists of both academic and on the job training with special emphasis on practises in clinical situation. There are some similarities between maritime and nursing education concerning the importance and long duration of on the job (practical) training.

Similarly, the common understanding of the maritime lecturers is to make the assessment of the sea training by oral examination. Furthermore “seafarers’ certification examinations” in many countries is supported with an oral exam followed by a written exam and in case of any failure in the oral exam is assessed unsuccessful.

By taking into account the above concepts, the study should focus on what lessons learned could be developed to improve subsequent learning by evaluating the results of different methods used to assess particular sea training.

Analytical Strategies

The most widely used probability distribution is the normal distribution. This is a bell-shaped curve which describes many natural phenomena, such as heights of tree, harvest from an acre of land, weight of horses and daily temperature. Figure 1 shows examples for normal distribution (Wares, 1998). The normal distribution curve is continuous, symmetrical about a mean value, has mean and median value and mode of equal, has total area under the curve equal to 1, in theory extends to plus and minus infinity on x-axis. A symmetric distribution is one which 2 halves of the histogram appears as mirror images of one another.

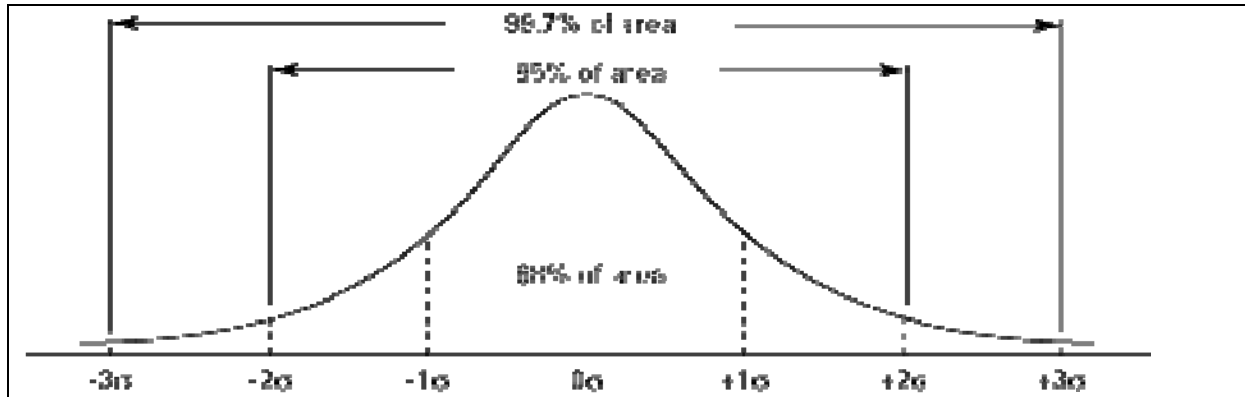


Figure 1: example for normal distribution

A skewed (non- symmetric) distribution is a distribution which there is no such mirror-imaging. A skewed distribution is one in which the tail is on the right side. The histogram in the Figure 2 is for a distribution that is skewed right (NIST/SEMATECH, 2013).

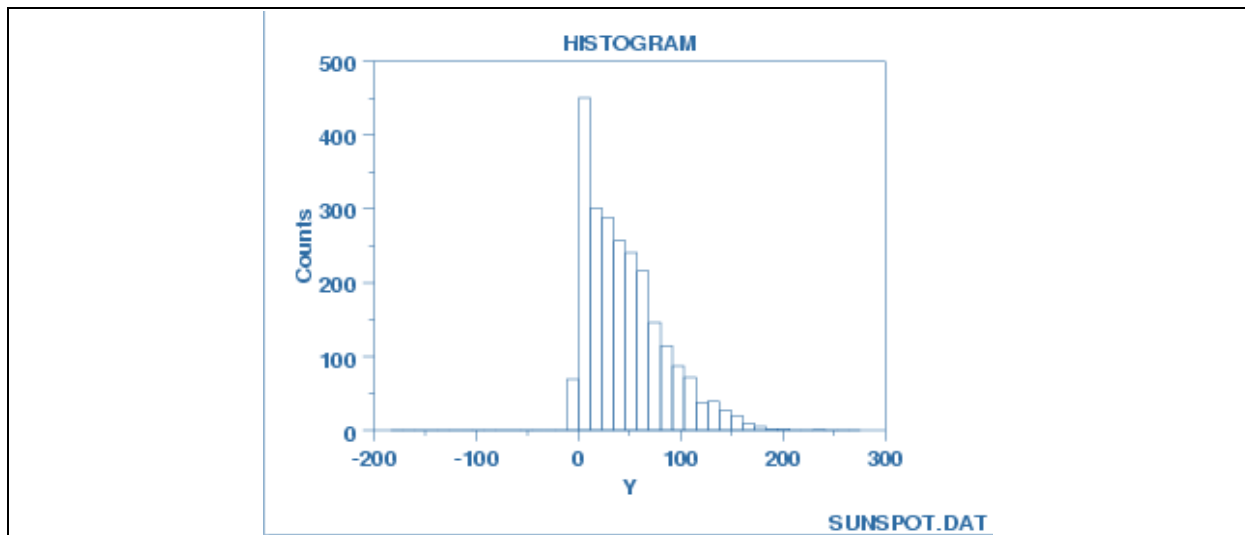


Figure 2: example for right skewed distribution

Pareto Analysis

The principle of the Pareto Analysis states that for many events, roughly 80% of the effects/problems come from 20% of the causes (Surhone et a., 2010). It is a type of chart that contains both bars and a line graph, where individual values are represented in descending

order by bars, and the cumulative total is represented by the line. This technique helps the users to identify the top causes that need to be addressed to resolve 80% of the problems.

Other Analytical Methods

Analytical methods can be used to evaluate reliability and validity of an assessment. A simple method had been introduced by Wuhan University of China. The procedure for the analysis of a particular case was as follows (Yuan et al, 2012). Firstly examination results of inorganic non-metal materials engineering specialty students in the first term of 2011-2012 school years of Wuhan University of Science and Technology were extracted from the scripts. Subsequently relative parameters including difficulty, discrimination and reliability were calculated. Third, the values of above parameters have been compared and discussed in order to identify possible sources of problems. To achieve the objective, the parameters will be first described according to specialized technical literature.

Their study covers difficulty, Discrimination and Reliability. In this study it is focused on difficulty only.

Difficulty: The difficulty of an item is understood as the proportion of the persons who answer a test item correctly. When this proportion is higher, the difficulty is lower. Usually this proportion is indicated by the letter P , which indicates the difficulty of the item. It is calculated by the following formula;

$$P_i = A_i / N_i$$

where: P_i = Difficulty index of item i , A_i = Average scores to item i , N_i = Full scores of item i

For the whole script, the average difficulty index P can be calculated by the formula as below;

$$P = \frac{1}{100} \sum_{i=1}^n P_i \cdot N_i$$

Generally the **average difficulty index P** should be controlled near **0.7**.

*If P is more than 0.75, it indicates that the exam is **quite easy**. While P is less than 0.45, it indicates the exam is **rather difficult**.*

For the subject written exam P is found as 0.47 which may be accepted difficult.

DISCUSSION

This part of the study covers an evaluation of four assessment methods which are;

- Assessment conducted by the Ship Staff,
- Assessment conducted by the lecturers deployed on board,
- Evaluation of Written Exam and
- Evaluation of the results of the questionnaires

Analysis of the Assessment conducted by the Ship Staff

The ship staff assigned for training was Master, Chief Officer, 2nd and 3rd Officers. They met the students during their stay on board and their watch periods on the bridge. They could not find enough time to work closely with the students because of the huge number of the students. So, their assessment was based on some distinctive students or ineffective students who drawn their attention. They received the advice of the lecturers on the students rather than making their own decisions. The staff hesitated to make a negative decision to avoid any misleading, but provided their positive decision for some cadets who were very active and helpful for the bridge team. Their decisions have been requested to be made on three categories; “very successful”, “successful” and “under the standards”. After having their assessments, it has been seen that their responds were focused only in two categories (“very successful” and “successful”) such as follows;

Number of the very successful cadets: 24

Number of the successful cadets: 170

In accordance with the Sea Training Regulation, the assessment of the cadets should be done by the Master, Chief Officer and Designated Ship Training Officer (DSTO). As it has been stated before, they could not find enough time to work closely with the students considering huge number of the students. So their assessment was based on very limited observation and advice of the lecturers on the students rather than their own decision.

In the light of the assessment principal, this assessment cannot be assumed valid and reliable, equitable and fair. This situation dictates that some rearrangements should be made in the current evaluation system. As a result of the sub discussions, it was found that if the number of the students involving on the job training is too high, the existing employees in the work place cannot make a reliable evaluation. To solve this difficulty, some teaching staff would be deployed for on the job training and they make the evaluation instead of the employees in the workplace. By deploying teaching staff on the training ship, the evaluation/assessment part of the training records should be filled by the teaching staff assigned by the training institute. This solution was deemed as an alternative action to solve that deficiency.

It is not possible to evaluate this result in a Gauss Curve because it does not represent a normal distribution. But the percentage of the very successful cadets which is 12.5 % may be assumed as in the reasonable boundaries.

Analysis of the Assessment conducted by the lecturers deployed on board

The lecturers made the assigned interviews for assessment were 3 Oceangoing Masters, 1 Chief Officer and 1 Officer of the Watch. They carried out the planned training in the classroom, in the drill stations and on the bridge. They were able to find enough time to work closely with the students although there were a huge number of the students from different institutions. They had the results of the staff assessments and written exams in their hands when they conducted interviews. They would also have an opinion on the students based on their attitudes in the class, on the bridge and in the drill stations. They had previous impressions on some students because they had already met with them during the academic year when they delivered their courses.

The maritime lecturers who are qualified on MET have made the assessment by filling the form of interview. The interviews for each student took 10 to 12 minutes due to the time constraints which was not sufficient to make a perfect assessment. The lecturers also hesitated

to make a negative decision to avoid any misleading, but provided their positive decisions for some cadets who were very active and eager during the training and drills. Their decisions have been requested to be made on three categories; “very successful”, “successful” and “under the standards” such as requested from the ship staff. Similar to the assessment of the ship staff, their responds were also based in two categories (“very successful” and “successful”) such as follows;

Number of the very successful cadets: 28

Number of the successful cadets: 164

It is not possible to evaluate this result in a Gauss Curve because it does not represent normal distribution. In the light of the assessment principal, even if this assessment may be assumed valid and reliable, equitable and fair, some kind of evaluation methods are needed to generate a tangible result by making a comparison.

In many studies, different types of scales are used to measure the achievement of the students. The most commonly used scale is based on “very successful, successful and referral”. The Pearson which is the one of the most world-spread education accreditation organization uses a system based on “distinction, merit, passed and referral”. Comparing with very “very successful” “distinction and merit” are rather distinctive and clearer to make discrimination of the success of the students.

There are also many methods (scales) used to evaluate the human success in the organizations. Celik and Telman (2013) defined 8 scale groups of scale to measure the efficiency of the person in the organization/industry such as; Personal Specifications, Professional Tendencies, Dimensions of the Personal Problems. Organization and Culture, Interaction between Individual and Organization, Individual and Leader etc. By taking into account the examples mentioned above, we understand that new scales are needed be extracted to measure the student’s achievement.

All of a piece, the percentage of the very successful cadets which is 14.58% may be assumed as in the reasonable boundaries. This result is very close to the results of the assessment made by the ship staff. But we should also consider the impact of inducement of the lecturers on the ship staff.

Analysis of the Evaluation of the Written Exam

The questions have been prepared by 6 maritime lecturers who participated in the sea training. The questions covered the subjects delivered in the classroom and practised in the work stations. All questions were multiple choices having 4 options.

The results are not encouraging due to low grades. The averages for the students from different cohorts are as follows;

Freshman (1st year cadets): 45.7

Sophomore (2nd year cadets): 43.5

Junior (3rd year cadets): 46

General average: 45.07

Distribution of the grades in the written exam is shown in Figure-3. The values in the right end covers 13 “0” values. When this part is ignored the data distribution would be more meaningful. Making this arrangement “Statistical parameters of data set” is as follows;

Variance: 32.87

Standard Deviation: 5.73

Mean Value: 6.22

Median: 4

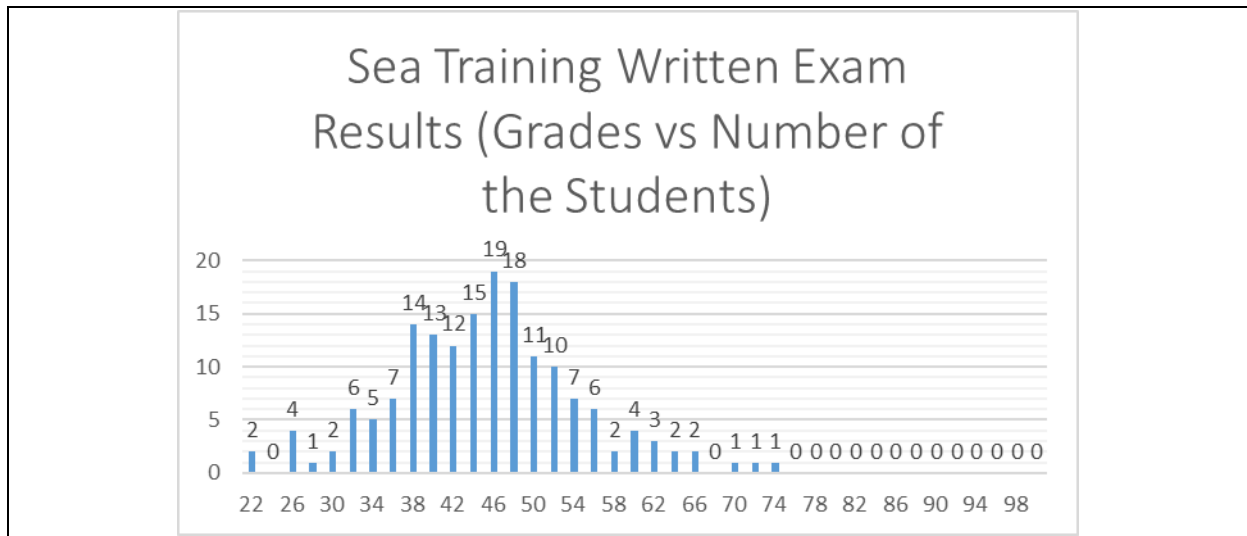


Figure 3: the graphic of data distribution

Taking these values into account, the graphic of data distribution is getting closer to a right skewed distribution with some small deviations which are negligible.

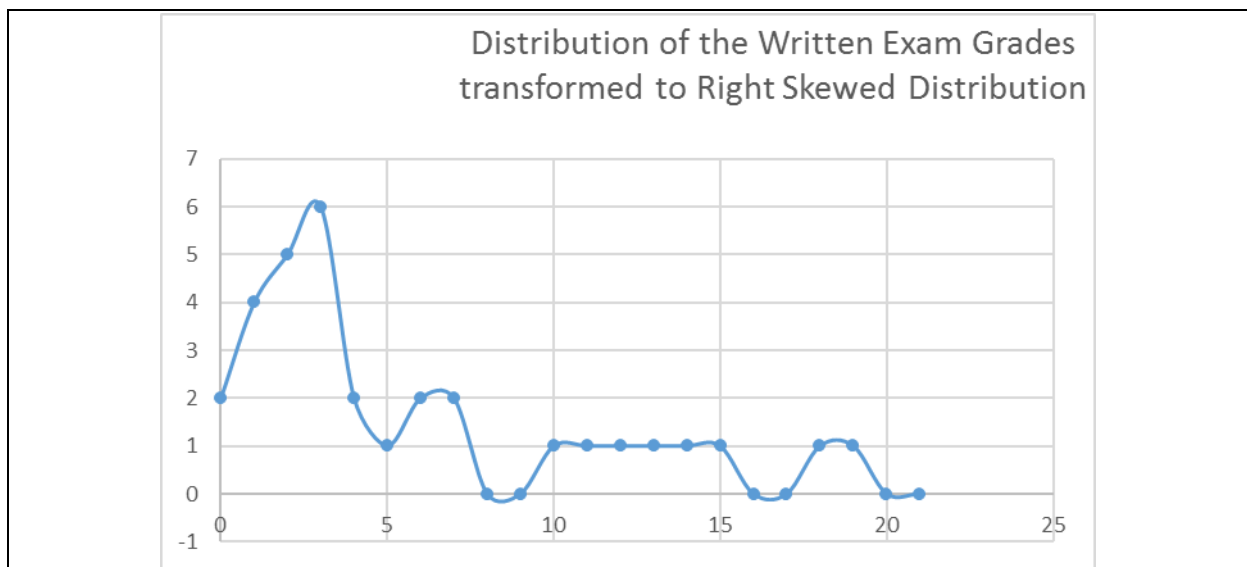


Figure 4: histogram of written exam grades transformed to right skewed distribution

Since the results are not encouraging due to low grades, to investigate the level of cadets deeply, a questionnaire has also been applied for the some parts of the students who took this exam.

Analysis of the evaluation of Questionnaires

Because the results of the written exam were not encouraging, a dissection has been started. In the first step the content, quality and the hardness of the questions are tested. The content was exactly in line with the programme applied. There were no questions unrelated to the subject delivered or exercised. As far as concerning hardness of the questions, the applied questions were compared with the questions asked in the academic year and it is found that applied questions were simpler from the others. The quality of the questions was tested under the rules to prepare multiple choice questions and everything was in line with the principles and techniques.

To this end, it was decided to take the view of the students by a survey. A questionnaire has been prepared to find other reasons which affect the results. The questionnaire consisted of the following questions:

The reason why I was not successful in the written exam at the end of the sea training;

- *I did not expect that I would be taking an exam at the end,*
- *I did not prepare for this exam,*
- *I did not take the training session seriously,*
- *The life at sea reduced my effectiveness,*
- *The number of the participants in some training sessions was so high that I was distracted as a result,*
- *The questions were extremely/unusually hard,*
- *I was asked unrelated questions,*
- *There were many confusing questions,*
- *There was no sufficient time to respond to the questions.*

The participants have also been requested to add any other reasons if required. They were asked to mark maximum 3 reasons.

The questionnaires have been distributed to 61 students. 54 students have responded the questionnaire correctly. Only two reasons are added in the list by 2 students and could not be taken into account because the number of the students were not enough for making a sound comparison. The result of the questionnaire analysis is shown in Table 1.

Table 1: The results of the questionnaire

-	I was not expecting I will take an exam at the end : 40
-	I did not prepare for this exam: 34
-	I did not take the training session seriously:30
-	The number of the participants in some training session was so high that I was distracted as a result :14
-	The questions were extremely/unusually hard :13
-	I was asked unrelated questions: 10
-	There were many confusing questions: 8
-	The life at sea reduced my effectiveness: 7
-	There were no sufficient time to respond to the questions: 6

The Pareto Analysis is applied to the results of the questionnaires and introduced in the Table 1. The Pareto charts for the questionnaire is introduced in the Figure 5 with all the details.

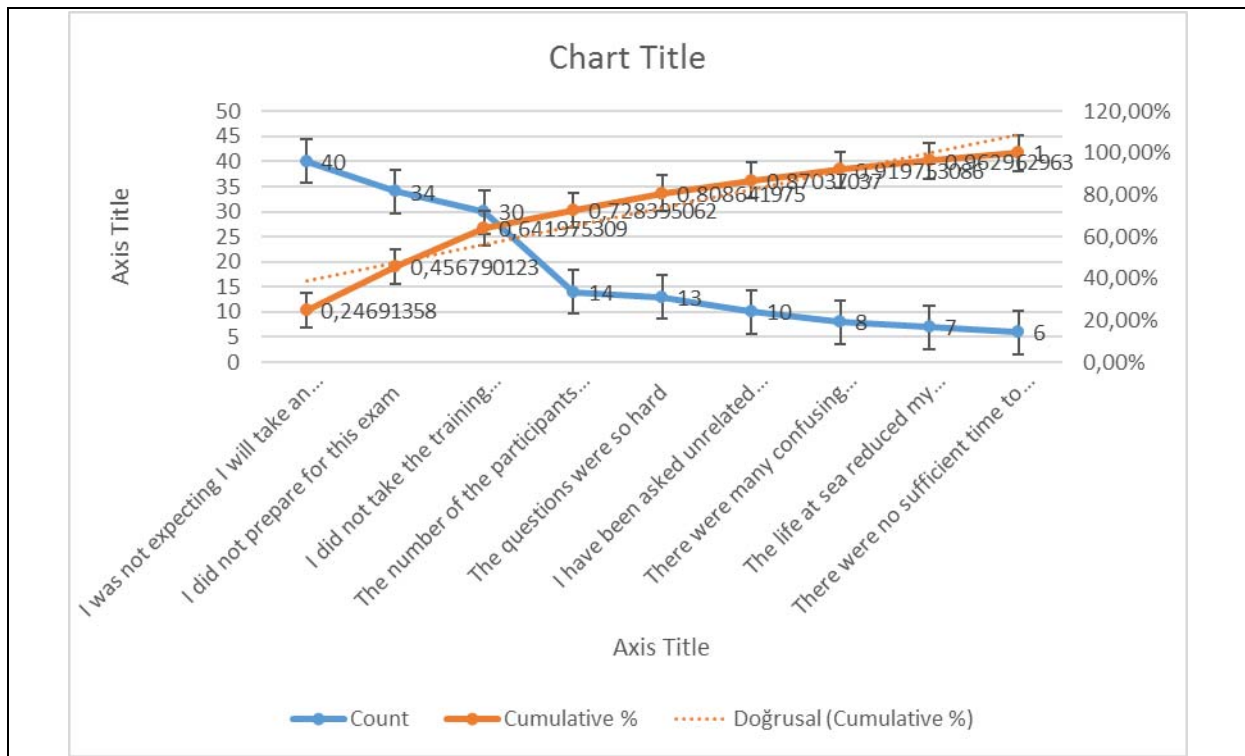


Figure 5: the Pareto charts for the questionnaire

There are three break points (1st, 2nd and 3rdth points from the left) in the cumulative percentage line of the diagrams. These points occur when the slope of the line begins to flatten out. The factors under the steepest part of the curve are the most important ones. Hence, “I was not expecting I will take an exam at the end” has the most significance level compared to other causes. “I did not prepare for this exam” and “I did not take the training session seriously” are the two other significant reasons. “The number of the participants in the

same training session was so high that I was distracted as a result” and “The questions were extremely/unusually hard” have approximately the same importance level and these are rather important when compared to “I was asked unrelated question” and “There were many confusing questions”. “The life at sea reduced my effectiveness” and “There were no sufficient time to respond the questions” which have the lesser significance level compared to the causes are indicated at the left side. As a result of the analysis, three reasons are found rather important by the participant; “I was not expecting I will take an exam at the end”; “I have not prepared for this exam” and “I did not take the training session seriously”.

CONCLUSION

At the end of this study the following results are found and subsequent proposals related to these results are introduced.

1. Nowadays on the job training become rather important to improve the practical knowledge and the skills of the students in particular for the jobs directly related to use of the equipment to achieve their mission such as engineering. On the job training will also help the students to get familiarized to their future work places. Understanding this situation the education and training institutes should pay more attention to on-the-job training. That means they should prepare better on the job training guidance and produce procedures to conduct an effective on the job training.

2. The education and training have no value if it is not evaluated perfectly. Every education institute has an evaluation system to measure their academic achievement. Assuming that on the job training is an integral part of the academic education, they should also improve their on the job training evaluation as well.

3. If the number of the students assigned for on the job training is out of the control capability of the work place employees tasked to control and evaluate the students, sufficient number of the teaching staff should be assigned as trainers to plan, conduct and control the training as well as making evaluation and assessment of the students.

4. The students should be informed in advance that they will take both oral and written exams at the end of the on the job training as well as they are obliged to keep all required records to prove their achievements.

5. The oral examinations are rather effective to understand the students’ achievement. But these oral examinations should be based on well-structured questions directly related to on the job training rather than the subjects already taught in the schools.

6. The following reasons introduced in the Pareto Analysis are found important to evaluate effectiveness of the on the job training,

a. Many students stated that “I have not prepared for this exam”. This shows that the students are not spending extra time to review what they have learned during the practice phase; even they do not prepare themselves for the exam at the end of the training. So, additional measures such a structured exam which proves student achievement is necessary to conduct an effective training.

b. Again many students said that “I did not take the training session seriously”. This claim unveils that many students accepts that on the job training is not an integral part of the academic training and they do not pay enough attention to training sessions.

c. Some students claimed that “the number of the participants in the same training session was so crowded and this distracted my attention”. The number of the students who will participate a practical training should be defined clearly taking into account the content of the practice conducted, dimensions of the workplace and students’ direct involvement with the practice.

7. There are many methods for the assessment of students. The commonly used system is based on “very successful, successful and referral”. The Pearson which is the one of the most world-spread education accreditation organization use a system based on “distinction, merit, passed and referral”. Comparing with “very successful”, “distinction and merit” are rather distinctive and clearer to make discrimination of the success of the students. Taking into account related studies on the measurement scales, we should investigate new scales to measure the student’s achievement to discriminate success level as a further study.

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LEARNING TO CODE, CODING TO LEARN THE WORLD OF ALGORITHMS IN HIGHER EDUCATION

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Abstract: Computer and internet give essential features to our life. Should all students learn programming? The message of this paper is a plea to improve the quality of higher education via bringing forward the importance of algorithms by stating their role in different sectors of our society as well as the learning and teaching process. Algorithmic thinking should be part of all subjects at all levels of education, because it improves the chances of our students in many directions and reflects the responsibility of education for our society. But coding in that sense is different from traditional programming.

Teaching coding has three aspects:

- a technical approach - what are we talking about
- a social approach - why are we talking about
- a didactic approach - how are we talking about

Keywords: algorithm, digital society, coding, programming, education

INTRODUCTION

Let us spring from data. We commonly understand data as information, values or findings, which has been discovered by measurement or observation. Data are object of political discussion in form of data protection or data security. We affiliate their possession with economic power.

A definition of an algorithms by Wikipedia is „a self-contained step-by-step set of operations to be performed” either in real life or virtually on a computer. „Algorithms exist that perform calculation, data processing, and automated reasoning”.

Anyway algorithms are proposed actions. They occur everywhere in our life, cooking recipes, instructions for technical installations, turn-by-turn directions for a route, there are many other examples. So we all have internalized the concept of an algorithms. By defining them we structure a problem into pieces and doing so we prepare it to be operated in a machine.

Teaching algorithmic thinking conveys two important competences:

- problem analysis and
- problem solving.

Their importance for our life, for science, society and education is commonly underestimated. Algorithms allocate power and distribute chances. Especially because of that we propose that the preoccupation with this topic should be part of education at all age levels.

Where in society do we meet algorithms. We identified four major areas, all of them with great influence on our life.

1. Science and technology

They have a great relevance in IT studies. But there are numerous examples in many other disciplines where algorithms play an important role.

2. Society and economy

Algorithms and their ownership provide clout and power in our society, but they also offer creativity and fun, they facilitate advancement and value.

3. Pedagogy and human development

In general (full development of the human being via education) and invocational training (the imparting and acquisition of specific skills) teaching algorithmic thinking and the knowledge how to deal with coding improves the chances of our students in different ways.

4. Didactics and education

Using coding as a principle of teaching improves education by offering new ways of creativity, connection to real life and allow to have fun via learning. It is our experience since the introduction of IT into education that this can intensively change and improve the process of teaching and learning.

SCIENCE AND TECHNOLOGY

Paradigmatically we want to have a look on different areas where coding is playing a major role in science and technology.

Automatisation

Industry 4.0 is defined as the „informatization” of production technology and logistics by machine-to-machine communication. It is also named as smart or networked production. Within industry 4.0 robots can take a lot of hard work from the shoulders of their human companions. They work on the basis of cyber-physical systems and what is called the internet of things.

But automatization will reach nearly all areas of our life. That leads to the question: Are we in danger to loose our jobs to a robot? BBC has published a web-site „Will a robot take your job? based on a study done by Oxford University and Deloitte (<http://www.bbc.com/news/technology-34066941>). Oxford University academics Michael Osborne and Carl Frey calculated how susceptible to automation each job is based on nine key skills required to perform it; social perceptiveness, negotiation, persuasion, assisting and caring for others, originality, fine arts, finger, manual dexterity and the need to work in a cramped work space. Students can investigate the future chances of their profession and find amazing facts.

Robotics

Undoubtedly their are numerous fields for the use of robots. It can be inspiring and informative to present them in lesson.

Robots are fundamental of modern military strategies. We find them as drones, secret agents, fighters and helpers for soldiers. Associated with the technology we have to rise questions like:

- Is the inhibition threshold dropping?
- Who then decides on life or death?
- Will less or more people killed in an electronic war?

But beside military forms of usage there are many other areas where robots can make our life easier. Robots can be used in medical care where they can replace nurses in some situations.

They can save, entertain and release patients. On example is the therapeutic robot seal PARO. He is a cute 57cm long artificial animal designed to act as companion for elderly people. According to his manufacturers he is a machine with emotion.

But robots will play other different roles in the future. They will act as servants, tour guides, play mates for kids, aid worker, lawnmowers and toys. At it we should discuss the following questions with our students:

- Under what conditions should robots replace humans?
- Can robots have human qualities like creativity, real emotion and spontaneity?

We have to discuss what Joseph Weizenbaum, famous for ELIZA, the first algorithm with human behavior, turned during the last years into an „old any man” asking: Are we in danger that when robots simulate man, humans are more an more simulating robots? Robots touch very much our self-conception.

Autonomous Transportation Systems

Autonomous logistics describes systems that offer unmanned, autonomous transfer of equipment, baggage, people, information or resources from one pointto another without human intervention. This is a new area for research and developmentand therefor of great interest for higher education.

Visualization and coding of processes plays an ever-growing role in our society and therefor represent an emerging market. Examples are image editing, the revolution of music industry caused by the invention of the MP3 algorithm or the development of the digital presentation technique. An example of future trends in visualization can be seen in an advertisement for the upcoming video product HoloLens (www.microsoft.com/microsoft-hololens/en-us?video-url=vdeHHP). Microsoft HoloLens is the first fully untethered, holographic computer, enabling high-definition holograms to integrate with your world. It offers the possibility to combine real and virtual objects to one perceived reality. A sentence quoted from Microsoft describes the impact of visualization: „If you can change the way you see the world, you can change the world you see!”. According to Marshall McLuhan a change in media technology implicates a didactic commission for higher education.

Meteorology

Meteorology is one of only two more examples of natural sciences that we show, where algorithms are involved in the process during the last decades. The success in the prediction of weather is mainly depending on the speed of the computer systems and the quality of the algorithms used. The improvement of both factors made it possible to increase the complexity of the models for computation.

IT is also used for the fast processing of the big amount of data produced by weather satellites, the prediction of natural disasters and the online visualization of weather forecasts.

Biology

The importance of algorithms in biology is usually underestimated. Therefor knowledge in their usage is rarely part of the curriculum in biology. But without adequate algorithms the decoding of the human genome would not have been possible in a short time. This has big influence in medicine, pharmacology, agriculture and forensic examination.

But also IT is learning from biology. In artificial intelligence, an evolutionary algorithm (EA) is defined as a generic population-based optimization algorithm. It uses mechanisms inspired by biological evolution, such as reproduction and selection. Bionics is the use of methods taken from biological systems to the design of modern technology. In robotics the study of bionics has produced efficient designs for robots, artificial neurons, artificial neural networks and swarm intelligence. Algorithms are used for the simulation of biochemical processes and in the workflow management of clinical research.

Therefore a lot of European universities offer special studies in bionics. They can be seen as an example for the improvement of higher education by an interdisciplinary approach.

SOCIETY

There are many samples how algorithms influence our society and subsequently our life. For illustration it is enough to demonstrate three of them.

Politics

The participation of citizens in political decisions is based on the following mechanisms in the political process:

- Elections
It has been a long debate in Europe to what extent voting can and should be maintained by IT. But the fundament of free elections is the trust of the participating citizens in the system used to collect the votes. As people are always confronted with the misuse of their data in Austria there is no electronic voting at the moment. In Bulgaria there is a living public discussion on electronic voting.
- Grassroots democracy
At the end IT supported ways of collecting the public opinion could lead to a stronger civic involvement. But the attempts of the Pirates Party to foster civic participation in Germany using a software called „Liquid Democracy” shows that there are limits and their violation obstruct the political process and the contribution of a political movement, because sometimes it takes too much time to come to an end.
- Open data and open codes
We need ways how responsible citizens come to the information which they need for participation. In the EU we see an ongoing debate on how the access to governmental data should be organized. The majority of the algorithms we are subject to is not in possession of governments but in the hand of a few global players in IT industry. We propose a discussion of their role and how the rights of the people on data and the algorithms used for their processing can be saved.
- Communication
For example the political processes in northern Africa in the last years have shown the importance of open communication for a progress in society.

Economy

Among the various possibilities of the use of algorithms in economy we want to present only two but a very characteristic examples:

- User profiling
User profiling is used in different ways. One example is individually designed advertising. To do this you have to collect data about your clients, but the main factor for success is an algorithm for a suitable analysis. The most extreme use of client profiling we found in Switzerland. COOP tried individual pricing. The price of a specific good was not only determined by time and the location of the shop but also by

the analysis of the buying behavior of the client detected by a clandestine algorithms. This project has been terminated because it caused a storm of protest.

- Share market

A considerable part of the trading of shares is currently done by algorithms. This led to a competition concerning the quality of the algorithms used between the major players in stock market. The quality of the codes used has a big influence on the performance of trading companies. The CEO of an Austrian bank told us that he prefers mathematicians instead of economists in his treasury department.

Arts

The influence of algorithms on arts is widely unknown, but there are interesting and numerous examples for the use of algorithms to generate artistic expression. Artists use algorithms since ancient times. For example you will find them by Leonardo da Vinci, Bach, Mozart, and Escher. Beside visual design algorithms are also used for computer generated music and poetry today.

Linz in Austria has a special and world wide know center for electronic art, the AEC - Ars Electronica Center. It's FutureLab is a place for researching and trying out new cyberarts technologies. Once a year, Ars Electronica invites artists, scientists and researchers from all over the world to a conclave in Linz to confront a specific, interdisciplinary theme in the context of speeches, workshops, exhibitions and symposia. A yearly competition called u19 is dealing with questions like: Who decides, how the next generation will be in 20 years? Which technologies will be used then? How is our society developing? Which artistic ideas can help us?

The Ars Electronica Festival 2015 was an inquiry into how cities of the future will have to be configured when there are more robots than people working in factories, everything is intelligently interlinked, autos drive autonomously and drones deliver the mail. The rethinking of urban living spaces has already begun—all over the world, people are coming up with exciting ideas for new architectures and forms of social organization that are able to keep up with the changes the next few decades will bring.

PEDAGOGY AND HUMAN DEVELOPMENT

Beside all the societal, economic, creative or somehow other good reasons to talk about algorithms in university courses, there is one, and we think to is probably the most important for teachers, „Dealing with algorithms in education increases the chances in life of our students.”. And we can see this in various directions.

According to our experiences during the last decades and proven by many studies, teaching coding and algorithmic thinking leads to an enhancement of the competences of our students.

This affects at least four areas of competences:

Professional Competences

- cognitive competences, because they learn how a decision as a structure of choice have an influence on an algorithm
- analytic competences, because for the solution of a problem they have to isolate, analyse and structure the necessary information
- logical reasoning and faculty of abstraction
- problem solving
- selection and application of suitable tools

Methodological competences

Students gain abilities in the use of IT-methods, the usage of digital media, acquisition of information and their evaluation and visualization.

Occupational outlook

The preoccupation with coding, the work on computers and the general competences in problem solving lead to proficiencies far wider than traditional IT-training. The excogitated dealing with algorithms in university courses lead to

- a widening of the spectrum of professions seen as possible and / or worthwhile
- improves the chances on the labor market

At the moment we face a shortage of programmers in US as well as in Europe. According to code.org in California there are 85.000 open positions in software industry and only 3.000 graduates per year. In Austria the situation is similar. This should be enough motivation for universities to start teaching and learning coding.

Personal Competences

Beyond doubt we could observe an alteration and enhancement of the personal competences of our students and the kids participating in the computer camps in Bulgaria touches especially their self-confidence and the self-assessment of their own prospects.

The better and proper handling of digital media facilitates the most important competences in job and life in general. This can be demonstrated by the findings in the evaluation study of the „Power Girls Project 2013” in Upper Austria done by Alfred Weinberger from University of Education Linz. Power Girl is an initiative of Education Group, a governmental agency aiming the integration of media and technology in schools. The results of the yearly evaluations since 2008 show clearly the positive effects of the engagement in technology of girls on occupational and personal competences.

Girls who participate in the „Power Girls Project” boast

- a more emancipated and stronger non-traditional role model,
 - value their own technical competences higher,
 - are more interested in technic-oriented jobs and qualifications and
 - choose more often higher technical education (schools, apprenticeships)
- than girls not taking part in this project.

DIDACTICS

We are facing a revolution in education similar to the time when Gutenberg invented printing. Internet and big data change teaching and learning radically.

Didactics is the fourth area where we can find coding. The quotation „learning to code, coding to learn”, which we have chosen as the title of our presentation, is taken from Mitchel Resnick

and shows the two aspects that occur when coding is part of the education process. On one hand there are good reasons to integrate algorithmic thinking and coding into the curricula of all disciplines, on the other hand doing this can lead to dramatic changes and improvement of teaching and learning. Why didn't it happen during the last decades?

When we started to integrate IT into education at the beginning of the eighties of the last century, we could feel that we had received a medium for revolutionizing didactics at school and university level. But during the years we unfortunately lost our feeling for this mission and a concept of IT as a medium for better employment gained ground. There are several reasons for that and it is worth to discuss them in order to redesign the whole process We see that

- IT lost it's special position
- persistence of the education system
- a wrong selection of content

There are two main reasons why Informatics lost a large portion of her attractiveness and the number of beginners in IT studies in Germany and Austria is declining in the last years.

1. The abnegation of core topics of IT, like programming, and the concentration on application software might accommodate the interests of economists. But this doesn't fit to the expectations of our students. They want to work creatively and choose their tools by themselves. Learning specific functions of MS Word might be necessary for writing a diploma work but shows a very limited view on IT's potential.
2. We do not pay enough respect to McLuhan's subtext „The medium is the message“. The message of coding is that it needs it's own didactics. When observed this can lead to fantastic results.

To support this view we want to show a model for creative learning presented by Mitchel Resnick. He was working with Seymour Papert and is the developer of the educational programming language LOGO. Now he is Professor at MIT and head of the Life Long Kindergarten Group.

Resnick proposed a model with four columns all starting with the letter P, the 4'P Model for creative learning:

- Projects,
- Peers,
- Passion and
- Play.

Resnick developed a new version of LOGO called SCRATCH designed only for creative learning by offering a very different approach to coding. Coding is not any more a set of technical skills but a new way of thinking and personal expression. Since 2007 when SCRATCH was launched more than 11 Mio. SCRATCH projects have been collected by the community. We the this SCRATCH and similar programming languages like BYOB and SNAP! as very good tools for students to organize, express and share their ideas. A few universities have now started to use SCRATCH to teach "The Beauty and Joy of Computing" introductory course in CS for non-CS-major students.

Projects

„Scratch was designed with projects in mind.” (Resnick)

Students learn better through active working on topics meaningful for them. Learning is more efficient via projects and when using proper tools.

This diversity of projects is a reflection of the diversity of interests of young people.

Therefore instructions should be:

- cross-disciplinary
- project-oriented
- targeted
- have a practical attitude
- and first and foremost be creative.

Peers

„Encourage collaboration, sharing and help children to learn to build on the work of others. Coding shouldn't be a solitary activity”. (Resnick)

Learning thrives as a social activity, when people exchange their ideas, work on common targets and share their results. We believe that interaction with peers should be a central element in the learning process. So much learning can be exciting when it is team-oriented and appropriate to age and background. When teaching coding we must also focus our attention to choose the right level of abstraction.

Passion

Teaching should raise enthusiasm, reason the doing and engender creativity.

When working on projects which are meaningful, challenging and kidding students work harder, longer and more efficient. That leads to success and sustainability of the learning process.

Play

Playing is the way of teaching that will support the creativity of our students.

Learning to code should support experiments, lead to personal limits, urge the students to rise and always allow to try new ways. Here we can learn from playing and in fact with the help of technology the borders between learning and playing are fading.

The computer camps in Varna, BG organized by Center of Advanced Educational Technology in Moscow show that very well. Children can learn much more effectively if they like what they do. Since most of the children is in love with Minecraft, the topic of Minecraft in Education is a very promising one. In JUNIO-R, the trainers explore how one can learn programming through a Minecraft MOD called ComputerCraft. It allows creating “turtles” in a Minecraft world which are programmable in the programming language Lua. The task was to create a program that generates large cities.

CONCLUSION

At the end we want to return to the starting point of the history of IT didactics and finally propose our conclusion and the idea which underlaying this paper.

BASIC (an acronym for Beginner's All-purpose Symbolic Instruction Code) is a general-purpose programming languages whose design philosophy emphasizes ease of use. In 1964, Kemeny and Kurtz created the original BASIC language at Dartmouth College. They wanted to enable students in fields other than science and mathematics to use computers and to

mediate them a feeling for algorithmic thinking, problem solving and the impact of algorithms on their professional and personal life. (see Wikipedia)

We see two reasons why we propose that we should again put a spotlight on coding and algorithmic thinking in tertiary education today:

- Algorithms have an underestimated power in many areas of science and society.
- Coding offers new ways of creative learning

Sometimes a step back can be a step forward.

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THE EFFECTS OF THE FLIPPED CLASSROOM APPROACH SHOWN IN THE EXAMPLE OF A MASTER COURSE ON MANAGEMENT INFORMATION SYSTEMS

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Abstract: Technology also has the ability to change the dynamics of time and space in higher education institutions. Education technology is increasingly important in light of the changed learning needs and styles of today's students. Today's students are growing up in a digital world and are masters of technology. The flipped classroom is a pedagogical method in which the typical lecture and homework elements of a course are reversed. The value of a flipped class is in using class time as a workshop environment where students can inquire about lecture content, interact with one another in hands on activities, and test their skills in applying knowledge. In this study the effects of the flipped classroom were analyzed to measure the impact of the flipped approach on student achievement. A master course on MIS was redesigned by using flipped classroom methods, combining short video lectures and in class activities like tutorials and workshops. Rubrics were created and applied for analyzing students' performance. The results of the study revealed that exam performance did not change in a significant manner, but the overall semester performance, measured in terms of paper, presentation, case studies and projects, improved significantly for the students attending this master course.

Keywords: Flipped classroom, student performance, student engagement, rubric.

INTRODUCTION

Student achievement is an increasingly important topic in education today, the goal for any instructor is to improve the ability level and prepare students for their future responsibilities in business world. Defining student achievement and factors that impact progress is critical to becoming a successful instructor. Student achievement measures the amount of academic content a student learns in a determined amount of time. Successful instruction of standards results in student achievement. Classroom instruction is the most important factor that impacts student achievement. Instructors influence the quality of instruction, set expectations for learning, and measure the level of understanding. They use strategies to gain student attention and to support the learning process. One of these innovative approaches is the flipped classroom model, which is a pedagogical approach in which direct instruction moves from the group learning space to the individual one. Instructional courseware, digital content and other electronic learning resources can help meet intermediary goals that can lead to improved student achievement, making technology an essential tool in teaching and learning in the 21st century. Quality electronic learning resources can provide many educational benefits, such as Engaging students through multi-media, interactive content; Strengthening understanding and thinking skills through exploration, collaboration and creation; Adapting to support differentiated or personalized learning for students who have a specific learning style, pace or needs; Keeping knowledge current and information accurate; Enhancing accessibility for physical or learning disabled students through assistive technologies and presentation of content in alternative modalities; and

Integrating testing and classroom management tools, thus allowing realtime tracking of student performance to inform instruction and provide accountability (Angelini and Garcia-Carbonell, 2015 and Grinager 2006).

LITERATURE REVIEW

Technology brings rich and diverse materials into the classroom and has the ability to change the dynamics of time and space in schools. By helping students work more independently, technology gives instructors more time to work one-on-one or with small groups of students. Assessment technologies also help instructors more efficiently identify students' strengths and weaknesses to better target instruction. With digital record keeping, phones in the classroom, and access to local networks to communicate with students, administrators and colleagues, instructors can spend more time teaching and less on paperwork. In addition, students can extend their learning if they can connect from home to their school's network and to other courses and resources (Bergman, 2014 and New Media Consortium, 2014 and Wallace, 2014, and Grinager 2006).

Technology has allowed students increased opportunities for individualizing, customizing and providing access to education through virtual or distance learning. When used effectively, technology applications can support higher-order thinking by engaging students in authentic, complex tasks within collaborative learning contexts. These important "learning skills" enable people to acquire new knowledge and skills, connect new information to existing knowledge, analyze, develop habits of learning and work with others to use information. Education technology is increasingly important in light of the changed learning needs and styles of today's students. Today's students are growing up in a digital world and are masters of technology. They seamlessly integrate multiple technology tools and digital resources into their daily lives (Grinager 2006).

The flipped classroom is a pedagogical model in which typical lecture and homework sections of a course are reversed, offering the benefit that it rearranges face-to-face instructions, attempting to create a more efficient and enriched use of class time. The flipped classroom model is part of a larger pedagogical model that overlaps with blended learning, enquiry-based learning, and other instructional approaches and tools that are meant to be flexible, active, and more engaging for students. The main benefit of flipped learning is the restructuring of class time, which is more of a pedagogical solution than a technological solution. Nevertheless, in-class benefits are dependent upon the utilization of technology tools, like content creation tools, tablet software, document-camera based solutions and distribution tools. Students had to watch lecture videos outside the classroom (no traditional in class teaching) and focused in class on group work activities, assessments and other online focused activities (Basal, 2015 and Helgevold, 2015 and Turan and Göktas, 2015, and Koon, 1995).

Table 1: Potential benefits of the flipped classroom model

Potential benefits	
Improved student-instructor interaction	Instructors do not talk ‘at’ students, they circulate and talk ‘with’ students
Opportunities for real time feedback	Instructors spend more one-to-one time with students, compared to the traditional classroom concept
Self-paced learning	Students are able to pace their own learning according to their needs.
More meaningful homework	Flipped classrooms alter the nature of homework, by having students practice and apply their learning in the classroom

THE STUDY

Studies that isolate a particular technology to study its effect on some measure of student achievement find that well-implemented technology use can lead to improved student achievement.

In this study the term ‘flipped classroom’ stands for an inversion of traditional in class learning; all activities traditionally done in class are situated outside classroom; with an in class focus on those activities, traditionally allocated outside the classroom.’ The typical flipped classroom achieves knowledge transfer of fundamental conceptual material via reading assignments and video lectures which students are responsible for before attending the in-person lecture. This lecture then becomes a setting for questions, joint problem solving, and targeted discussion of topics that require more in-depth treatment as well as short, interactive learning experiences that provide individual and group practice along with immediate feedback.’ (Redekopp & Ragusa, 2013).

The instructor has given a master course on management information systems following a traditional instructional approach in 2013 and 2014. In 2015 this master course on management information systems (MIS) was chosen to be re-designed, including flipped classroom elements. The study focuses on the course results in 2013, 2014 and 2015 focusing on the research questions, mentioned below.

Table 2: Section & student structure

Section	Students	Lecture style	Student demographics
1/2013	30	Regular lecture style methodology	Master students business, engineering, IT 2. year
2/2014	42	Regular lecture style methodology	
3/2015	36	Flipped classroom methodology	
Students were given the same course outline in each section including assignments, quizzes, and exams with identically weightings for each activity			

Research Questions

The following research questions were defined for this study: (1) What are students perceptions of the effectiveness of the flipped classroom model related techniques installed for the course? (2) How is student perception of the flipped classroom model aligned with student performance?

Students perception on the effectiveness of the ‘flipped MIS’ course and the relationship between perception and student performance should have been analyzed, to measure the impact of the flipped classroom methods on students achievements.

Design and Implementation of a “Flipped MIS” course

The MIS course selected for re-design, included coverage of fundamental management information systems related topics, focusing on information, data, communication, systems concepts, organizational structures, management basics, planning, decision making, elements of control, performance measurement, information and communication technologies for business and management, applications of ICT in MIS and MIS application.

While conceptual understanding of system related components, management requirements and organizational thinking, decision making and control management could be covered with the traditional lecture based course structure, the application of ICT in MIS and MIS applications in different business areas were a challenge for students in course sections organized in a traditional manner, since there was no practical part in the course to focus on these applications. In the traditional lecture based course structure MIS applications such as decision support systems, executives information systems, expert systems and other tactical and strategic MIS applications were theoretically ‘offline’ introduced.

Students had difficulties to apply their knowledge on MIS applications in their term projects. Students proficiency with tools and MIS applications, as well as their ability to evaluate this kind of systems, comparing, evaluating and choosing alternatives, were often underdeveloped.

One key for successful learning is an aligned curriculum. To re-design the curriculum the following adjustments were done: (a) definition of clear learning outcomes, (b) definition of learning experiences, which should help students achieve the learning outcomes defined, (c) creation of assessment tasks which allow students to demonstrate their achievement of those learning outcomes.

The following assessment tasks were included: short form tests (partly online), short answer tests, essay, performance test, written report, project, presentation, journal.

The course was designed for 14 weeks. Every week 1-2 videos, students watched outside classroom. In class activities: (1) tutorials, (2) case study analysis, (3) group work, (4) assessments, (5) role plays, and (6) practical sessions (Oberer 2015).

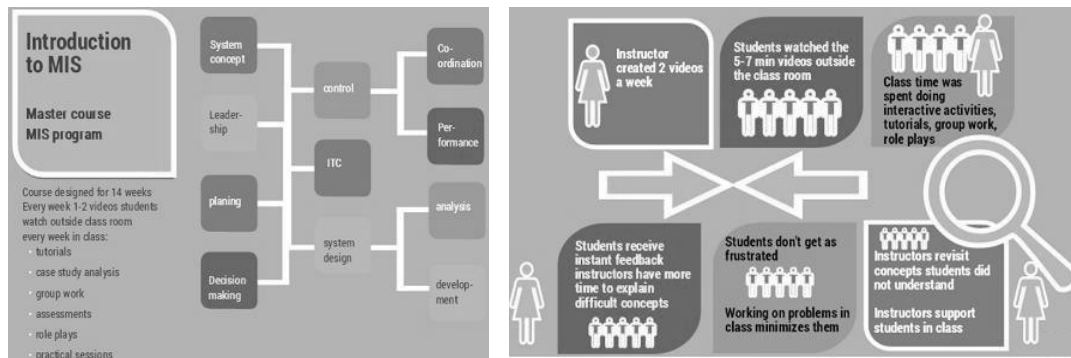


Figure 1: Course design

Flipped classroom activities:

ONLINE LECTURE ASSESSMENT: Whenever a video-based lecture was assigned, a brief, online, auto-scored, multiple-choice assessment (using Blackboard in our case) was provided to assess students' understanding of the concepts. >> *Students* know their mastery on the topic; >> *Instructors* know what to focus on more detailed in class; >> *Both* can address specific questions of the test in class

JOURNALS: Using Blackboard's online Journal feature, students were obligated to provide feedback (for at least one out of every two video lectures) after watching online lectures. Aimed at jumpstarting the students meta-cognitive processes, they were asked to list questions they had, what they found interesting, and what topics warranted more review. Before coming to lecture, the instructor sampled the questions posed in these journal entries and used them to start each lecture with a discussion of the questions and their answers.

In class activities:

IN CLASS PROJECT WORK: By moving content to video, more in-class face-to-face instructional time was available for projects and other group efforts. Students were often asked to perform pieces of their homework or projects in class where an instructor could roam the classroom monitoring progress, answering questions or addressing issues synchronously rather than hours if not days after students encountered them.

IN CLASS GROUP ACTIVITIES: reflecting the topics covered by the two videos each week, students discussed relevant topics in class, and analysed their group findings with their classmates.

CASE STUDIES: focus on (1) technologies, (2) companies, (3) innovations

Out of classroom activities:

WRITTEN ASSIGNMENTS: 2 questions, 1 week time to hand in, instructor feedback, multiple hand in possible.

WRITTEN REPORTS: every week students hand in a report containing a summary what they learned the previous week. Reports include a list of open questions, which the instructor should address the week after in class

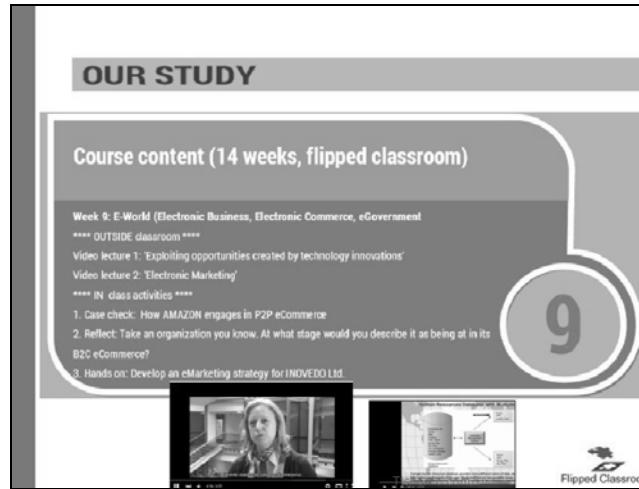


Figure 2: Course content shown for a sample week

Evaluation method

Students performance was evaluated by defining analytic rubrics. To develop rubrics, (1) learning objects were defined, (2) concepts or skills students need to demonstrate were identified, (3) levels of performance and their point values were defined, (4) criteria for each level of performance were identified and (5) a rubrics framework was developed. The following rubrics were developed: (a) group activity rubrics, (b) written report rubrics, (c) written assignment rubrics, (d) group project rubrics, (e) peer assessment rubrics.

Table 3: Rubrics framework developed to structure evaluation rubrics

Rubrics framework			
Level of performance / criteria for each level	Level 1	Level 2	Level n
Criteria 1			
Criteria 2			
Criteria 3			
Criteria n			

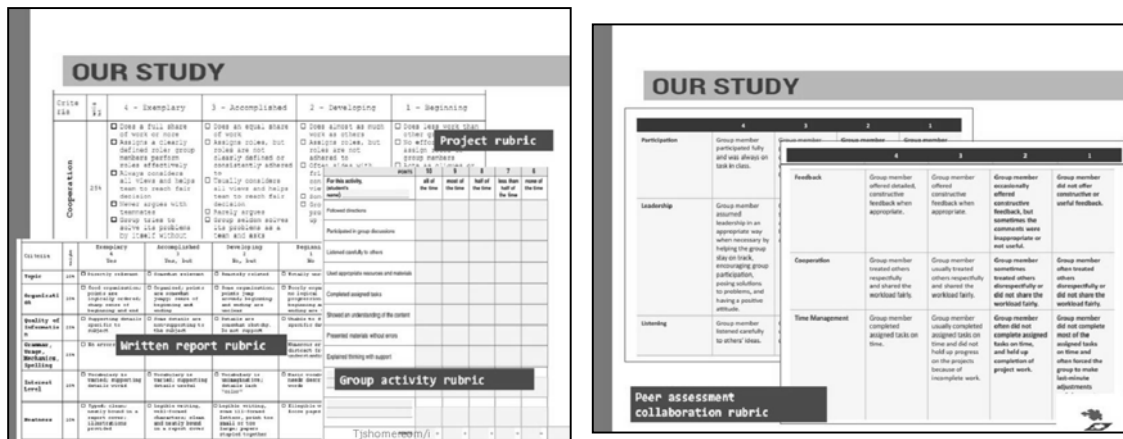


Figure 2: Rubrics developed for evaluating student performance

RESULTS

There was an expectation that grades would be higher in the flipped classroom based on the literature review findings. The primary findings from this study were that there were grade differences when comparing the flipped class with the two traditional-lecture style classes. Grades for students attending the flipped MIS course were higher than the results of students attending courses with traditional lecture style.

The results of the study revealed that exam results did not differ significantly. Average exam grades were 10.58 (traditional teaching, section 1), 10.48 (traditional teaching, section 2), and 10.86 for the flipped classroom section. This equals an increase of 3.15% on average. Results of quizzes conducted in the classroom increased by 74% from 3.12 to 5.58. The performance on presentations increased from 10.32 to 13.45 which equals an increase of 30.33%. Students achievements on case studies they worked on increased by 22% to 12.99 while project performance increased significantly from 11.56 to 14.99, which equals an increase of 29.67%.

The final grades increased from an average of 68.40 for section 1 to 79.79, which equal an increase of 16.65%.

Table 4: Comparison on course results (overview)

Section	Exam1	Exam2	Exam3	Quizzes	presentations	Case Studies	Projects	Final Grade
(1) non flipped	10.43	10.65	10.67	4.12	10.32	10.65	11.56	68.40
(2) non flipped	10.45	10.33	10.65	3.12	10.99	11.66	11.88	69.08
(3) flipped	10.89	10.67	11.02	5.78	13.45	12.99	14.99	79.79

Table 5: Exam performance

Section	Exam1	Exam2	Exam3	AVG	AVG % increase
(1) non flipped	10.43	10.65	10.67	10.58	+ 3.15%
(2) non flipped	10.45	10.33	10.65	10.48	
(3) flipped	10.89	10.67	11.02	10.86	

Table 6: Performance on Quizzes and Case Studies

Section	Quizzes	AVG % increase	Case Studies	AVG % increase
(1) non flipped	4.12	+ 74%	10.65	+ 22%
(2) non flipped	3.12		11.66	
(3) flipped	5.78		12.99	

Table 7: Presentations and Projects performance

Section	presentations	AVG % increase	Projects	AVG % increase
(1) non flipped	10.32	+ 30.33%	11.56	+ 27.67%
(2) non flipped	10.99		11.88	
(3) flipped	13.45		14.99	

Table 8: Performance Delta table

Section	Exams AVG % increase	Quizzes AVG % increase	Presentations AVG % increase	Case Studies AVG % increase	Projects AVG % increase	Final Grade AVG % increase
(1) non flipped	+ 3.15%	+ 74%	+ 30.33%	+ 22%	+ 27.67%	+ 16.65%
(2) non flipped						
(3) flipped						

Lessons learned

1	Student understanding of the purpose of the flipped classroom must be properly communicated and students given the opportunity to express concerns about their responsibilities to this new style of learning.
2	Student buy-in must be gained so they will be committed to the learning process.
3	The instructor must be willing to let go of traditional teaching practices and be fully trained in how to effectively implement a flipped classroom as it is not as simple as recording a video and letting students do homework in the class.
4	The instructor must be willing to let go of traditional teaching practices and be fully trained in how to effectively implement a flipped classroom as it is not as simple as recording a video and letting students do homework in the class.
5	It is the intention of the authors to conduct further flipped
6	Classroom experiments once formal procedures for communicating the process to students were defined.

CONCLUSION

Technology that is carefully deployed in learning can engage and motivate students; it can assist with aspects of professional development that ultimately can lead to better teaching and is an effective tool to improve productivity and efficiency.

Applying the flipped classroom model of instruction, students watch recorded lectures for homework and complete their assignments, labs, and tests in class. Flipped classroom is not a synonym for online videos. The main focus of this models lies on the interaction between instructor and students and the learning activities applied in a face-to-face manner in class.

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