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Creative Teaching Method in Higher Education for Industrial Design Programme

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Abstract--- *This article discusses the criteria for emphasizing creative teaching methods in design education specializing in the programme of Industrial Design. Creative teaching in educational fields is a must in today's extremely competitive world, particularly in design education. Teaching and learning for a new era, especially design programmes, requires a new model of education as design technology changes every year. This means that design education strategy needs a set of teaching methods which influence innovative development. In this manner, the content explore to assimilate the theories, strategies, techniques and platform of both innovative and mixed teaching, including the use of lively, transferable skills and computer software. A set of teaching techniques and strategies were applied to guide Industrial Design educators through problem-solving in teaching design, and the implementation of new ideas. It is hoped that creative teaching can improve learning effectiveness and help to achieve teaching goals. The objectives of this article are to create a concept of creative teaching methods for an Industrial Design programme; to identify techniques and strategies for creative teaching methods which provide students with a good outcome; and to explore how processes of creative teaching methods in Industrial Design programmes work. This article compiles secondary data on a topic by accredited scholars and researchers; critically reviews existing research on the topic; and analyses contrasting perspectives and theoretical approaches. This article uses meta-analysis to indicate the strength of variable relationships for creative teaching methods for an Industrial Design programme including the definition of Industrial Design, learning theories, creative techniques, creative platform and creative teaching methods in common practices. In summary, this paper consolidates the concept of teaching methods for Industrial Design programmes and the importance of creative elements in a higher education setting.*

Keywords--- *Industrial Design Education, Creative Teaching Method, Design Programme, Higher Education.*

I. INTRODUCTION

Creativity is the relationship between the use of the imagination and original ideas in order to create something new (Oxford English Dictionary). This definition shows that being creative does not always require an end result. The playfulness of the teaching and learning process is equally important. Minet [1] stated that when implementing creativity in the classroom it is important to consider the idea of promoting students to think "outside of the box". Creativity skills help educators and students to be motivated and ambitious for change; confident in their capabilities and the validity of their own viewpoint; able to transfer their creativity skills to other contexts; and able to lead and work well with others [2]. The purpose of creative thinking is to improve an educator's ability in delivering learning in more creative ways as well as improving strategies to design and deliver instructions in creativity as a content

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area, especially for a design course [3]. With creativity as an essential aspect of 21st century learning, there is a clear understanding and greater demand for more creative approaches to teaching and learning. Mastering an educator's content area specialization, combined with creative approaches to pedagogy and knowledge of the discipline of creativity provide the foundations for effective educational practices [4].

II. BACKGROUND OF RESEARCH

Creative thinking and teaching in the field of education is a must in today's extremely competitive world, particularly for design education [5]. Creative thinking is the first step towards innovation, which is a desirable feature of design students. Innovation is the process of selecting, combining, refining and turning the best creative ideas into reality [6]. The arrival of an innovative and technology-driven teaching era has changed the way in which educators and students interact [7]. Nowadays, basic theory teaching methods used previously cannot provide enough for the learning of design students. Integrating technology that can create a student-oriented teaching environment, including internet use, digitalization, and virtualization. However, incorporating information and communication technology (ICT) applications into teaching does not assure the enhancement of learning effectiveness [8]. In addition, the characteristics and readiness of students, the technology used, the curriculum and network environments must also be considered. This study thus aims to combine the ideas, methods, techniques, strategies and platform of both innovative teaching and blended teaching, including the use of vibrant, transferable skills and computer software. A set of teaching techniques and strategies were applied to direct Industrial Design educators through critical thinking in showing teaching material design and execution of new thoughts. It is hoped that creative teaching can improve learning effectiveness and achieve teaching goals for Industrial Design programmes.

III. OBJECTIVES OF THE STUDY

Nowadays, design programmes are very common in many countries; creativity is increasingly important for educators both for their professional success and that of their students, particularly given the complex and evolving knowledge ecology [9]. Regardless of whether it is cutting edge innovation, monetary structures, natural arrangements, or a refreshed code of morals of 21st century instruction, everything requests creative and "outside of the box" thinking. The weight of rehash, obviously, liew with today's generation of students. It accordingly follows that instruction should concentrate on encouraging development by setting interest, basic reasoning, profound comprehension, the guidelines and devices of request, and imaginative conceptualizing at the focal point of the educational programme.

The objectives of this study are:

1. To study components of creative teaching methods required in Industrial Design programmes.
2. To identify techniques and strategies for creative teaching methods which provide students with a good outcome.
3. To explore processes of creative teaching methods in Industrial Design programmes.

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IV. META-ANALYSIS

Meta-analysis is a set of techniques used to combine statements from different journals, papers and articles into one report. It is a more precise estimate of an effect [10]. In this article, meta-analysis combines information from multiple associations, educators, scholars and researchers to increase the chances of finding valuable ideas. In Table 1, eligibility, identifying studies, abstracting data are defined and the results are discussed.

Table 1: Important Issues of Creative Teaching Method for Industrial Design

Accredited Educator, Scholars or Researchers	Education of Industrial Design	Theories of Learning	Techniques of Learning	Creative Platform	Creative Teaching Methods in Common Practices
Pratt Institute, 2012	Importance of critical thinking: the art of observation and discovery, and ability to uncover and formulate real-world problems in need of design solutions.		Practice design as an iterative process that includes ideation, sketching, prototype making, and testing of projects		
IDSA (Industrial Designers Society of America)	Design institution, educators and students are Program of Industrial Design teaches student how to develop and design products.	Students learn to develop marketable solutions for design concepts while accounting for the social, environmental, functional, financial, aesthetic, and ergonomic aspects.			
Stephen Downes & George Siemens		Connectivism is a relatively new learning theory, however its emergence within the field of e-learning and distributed learning networks are appropriate for a technical field such as Industrial Design.			
G. Renda & B. Kuys, 2015	Ceativity pedagogy needs to address current issues to overcome creativity barriers for improving creativity in Industrial Design education.	The connectivism theory can provide Industrial Design education the agility that the design and manufacturing industry requires.			
Stuart G. B, 2012			Problem based learning encourages knowledge construction and integrates design process with real life dynamics, where learners learn how to develop flexible knowledge, and effective problem-solving skills.		
Nilson, 2010			Problem based learning provides students with the opportunity to develop skills related to explaining concepts, critical thinking and analysis, problem solving across discipline.		
Hao J. & M. X. Tang, 2010	Social media have become the main means of communication between the students and educators, to enhance learning efficiency.			Social media to support education to build pedagogical model by using social networking and the study tried to identify the balance between developing individual creativity with group activity of collaboration	
Dron, J. & Anderson, T., 2014				Social media for learning is a design-based research domain that creates, sustains and stimulates varieties of social r elationships and the tools for information sharing and knowledge construction.	

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Ken Robinson, 2005					Learning how to be more creative is very important for now that's what prepares students for life beyond the classroom.
Jon Kolko, 2005					Industrial Design education continues to refer the Bauhaus style studio courses centred around individual, hands-on product development.
College Values Online, 2016	The Industrial Design course of undergraduate study is an intensive program emphasizing the development of form that is derived from patterns of use, requirements for function, constraints imposed by industrial manufacturing and aesthetics driven by social context.		The curriculum includes all phases of design field study including ideation, scenario-building, concept selection, refinement, detailing to model-making, prototyping testing, refining and production.		University of Washington - Industrial Design practice in the corporate and institutional innovation sector where new technologies lead to the development of new forms of products, processes, and service from a human-centered design perspective.
University of Washington, 2016			Students are trained to identify design challenges and to envision promising strategies for design responses, communication, documentation, and organizational skills to conduct the design process from project brief to design implementation.		Industrial Design education in UW was all about problem solving and practical applications, the things learned in the program really help them solve problems in the various fields of design.

The scope of analysis constitutes the study of creative teaching methods for Industrial Design. This study acquired data from five sub-topics directly related to Industrial Design education. These five topics are; 1) Education of Industrial Design, 2) Theories of Learning, 3) Techniques of Learning, 4) Creative Platform and 5) Creative Teaching Methods in Common Practices. All of these topics play important roles in guiding Industrial Design educators to conduct creative teaching methods in higher education for Industrial Design programmes.

V. DISCUSSION AND RECOMMENDATION

All the information is focused on creative teaching methods for Industrial Design programmes and divided into five topics where more will be explained about the education of Industrial Design, learning theories and techniques, creative platform, and creative teaching methods in common practices. The topics clarify the understanding of teaching methods for design programmes specializing in Industrial Design as well as the importance of creative elements in teaching design programmes for higher education. The contents of these sub-topics are compiled from significant research published on the topic by accredited associations, educators, scholars and researchers. Existing research on the topic is critically reviewed and there is analysis of contrasting perspectives, theoretical approaches, methodologies, findings, results and conclusions.

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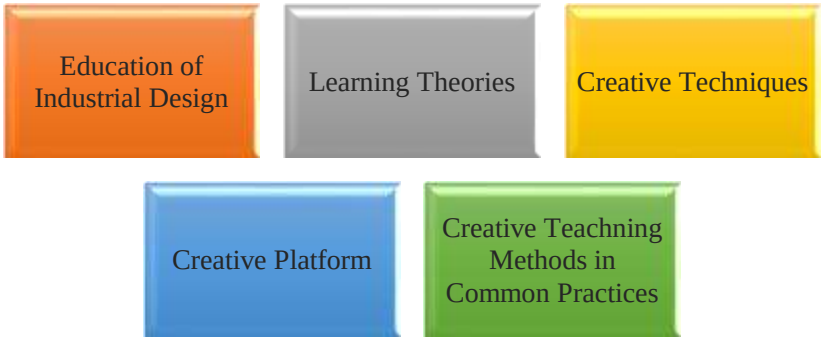

Figure 1: Overview of Creative Teaching Method

5.1 Education of Industrial Design

According to IDSA (Industrial Designers Society of America), design education is the place structure and learning are manufactured together to shape deep rooted propensities for obtaining, working with and changing information into new thoughts. Design institutions, educators and students all play important roles in the development of Industrial Design programmes. These programmes integrate logic, science, and engineering with production considerations. Students learn to develop marketable solutions for design concepts while accounting for social, environmental, functional, financial, aesthetic, and ergonomic aspects. Throughout the study, students will also develop useful skills relating to the design process from beginner to advanced level, including sketching skills, model making, computer modelling and web-based design. As an Industrial Design student, you can expect to be trained in designing furniture, packaging, automotive and domestic products. Nowadays, Industrial Design programmes are set to educate students to become professional designers of the 21st century [11]. Either collaborating with industry or operating as entrepreneurs, the students will be able to create products, processes and environments that will help to develop and enhance everyday objects and circumstances. Students learn aesthetic principles of visual representation from line and colour to the creation of dynamic three-dimensional structures in order to become professionals. Students study and practice structure as an iterative procedure which incorporates ideation, drawing, model making and the testing of their undertakings. Hands-on abilities, learned in a model shop, are supplemented by advanced aptitudes, which are rehearsed in computer labs. From the exceptionally starting, students are instructed the significance of basic considering, the craftmanship of perception and revelation, and the capacity to reveal and define real-world issues which require plan arrangements [12].

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5.3 Theories of Learning

G. Renda & B. Kuys pointed out that connectivism is a modern learning hypothesis, whose rise inside the field of e-learning and disseminated learning systems are suitable for specialized areas, such as Industrial Design. It is an expansion of traditional learning theories (behaviourism, cognitivism and constructivism) worldwide, deeply impacted by internet and technology. More specifically, promoted by Stephen Downes and George Siemens, called a learning theory for a digital age, this learning theory seeks to explain complex learning in a rapidly changing social digital world. The substance of the Industrial Design is unequivocally affected by outside variables, extending from modern fabricating procedures. The connectivism theory able to provide Industrial Design education with the deftness required by the design and manufacturing industry. From an Industrial Design view, imagination instructional method must address current issues to overcome imagination obstructions to improve creativity in Industrial Design education. "Facilitating staff development, providing students with creativity in training, encouraging group work and building a creative learning environment". All of this will be realized if connectivism, as a model, is promoted to help widen the thinking of Industrial Design students and instructors.

5.4 Techniques of Learning

Current education needs to be self-directed to empower individuals with lifelong learning skills, in order to educate them in their role as critical thinkers, problem solvers and analytics. Problem-based learning (PBL) approaches are structured to develop transferable skills and attributes, as well as applicable specific knowledge in the Industrial Design curriculum. PBL technique can make students take more responsibility for their own studies progressively. Besides, PBL technique encourages knowledge construction among students, stimulating students to integrate design process into activities in reality where students learn how to develop flexible knowledge, problem-solving skills, and exchange and collaborate idea [13]. Nilson [14] claimed that a well-design PBL project offers students the opportunity to develop skills related to concept interpretation, critical thinking and analysis, problem solving throughout the discipline. All of these can help facilitate the learning of educators by supporting, guiding and monitoring student's design progress in Industrial Design.

5.5 Creative Platform

One of the most exciting aspects of design education is the quantity of skills and awareness of students. With

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intense competition in real world, it is essential for Industrial Design students to create as well as design products with unique styles, which play a strategic role in their success in market. Making innovative and appealing products quickly available in the market to follow consumer trends is a key project success factor. To address this challenge, it is essential to design a platform requiring leading edge technologies and methodologies to accelerate creative and decision workflow, to boost design innovation. Social media is a good platform that develops, sustains and promotes a variety of social relationships and instruments for sharing information and building awareness [15]. Some of the famous social media, like Facebook (Facebook.com) and Twitter (Twitter.com), make it possible for millions of people to share interests on certain disciplines and provide members of these networks with various shared files and photos as well as videos, allowing them to create blogs and send messages, and conduct real0time conversations. Hao Jiang and MingXi Tang [16] addressed how to use the social media to support education to build a pedagogical model by using social networking, trying to identify a balance between individual creativity and the collaboration in group activities. This model is made based on a conventional directions model and picks up the characteristic of design education. This social media has ended up a primary implies of communication between the students and lecturers, which is predicted to improve learning efficiency.

5.6 Creative Teaching Methods in Common Practices

Jon Kolko [17] pointed out that a traditional way of Industrial Design is defined by craft. Although leading programs have evolved to include various complex problem solving and business planning, numerous Industrial Design education continues to refer to the Bauhaus style studio courses centring on individual development in hands-on products. In TED talk, Ken Robinson [18] pointed out that most of the students in your classrooms today will be a part of job force beyond your imagination. Learning a specific set of skills is not as valuable in today's world as it once did. Learning how to be more creative is very important for now, for which can well prepare students for their life outside of the classroom. According to College Values Online (2016), University of Washington is one of the 20 top-value undergraduate Industrial Design degrees in the United States, where Industrial Design is one of several undergraduate programs which has been evolving over the past forty years. It is a professional program aimed primarily at Industrial Design practice in the corporate and institutional innovation sector where new technologies lead to the development of new forms of products, processes, and service from a human-centered design perspective. The curriculum includes design study at all stages, including concept ideation, scenario-building, idea selection, refinement, detailing, product rendering to model-making, prototyping testing, refining and production. During all stages of the design process, Industrial Designers plan and participate in presentations and collaborative problem solving. Students reviewed that their Industrial Design education in UW was all about problem solving and practical applications, and what they learned in the program has really helped them solve problems in the various fields of

VI. CONCLUSION

The topics discussed above focus mainly on the literature definition and an overview of Industrial Design education, including learning theories and techniques, creative platform, and creative teaching methods in common practices, all of which are related to Industrial Design education and will facilitate the research and to gain a right

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research direction. It is important to have a full understanding of each topic and the relation between them. The creative teaching method for Industrial Design can be enhanced through literature review. The objectives of research were achieved based on these findings. It is hoped that this research can help design educators conduct the Industrial Design programme and propose guideline for further researches in order to improve the education of Industrial Design in higher education. Moreover, it is hoped that the proposed guideline is useful for any group or individual person who has the intention to enhance the quality of Industrial Design programme in higher education.

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