

Promoting University Community's Creative Citizenry

Kamaruzaman Jusoff, Siti Akmar Abu Samah and Posiah Mohd Isa

Abstract—Being creative in an educational environment, such as in the university, has many times been downplayed by bureaucracy, human inadequacy and physical hindrance. These factors control, stifle and subsequently condemn this natural phenomenon which is normally exuded by the tertiary community. If taken in a positive light, creativity has always led to many new discoveries and inventions. These creations are then gradually developed for the university reputation and achievements, in all fields of studies from the sciences to the humanities. This paper attempts to explore, through more than twenty years of observation, issues that stifle the university citizenry – academicians and students' – creativity. It also scrutinizes how enhancement of such creativity can be further supported by bureaucracy simplicity, encouraging and developing human potential and constructing uncompromising physical infrastructure and administrative support. These ideals – all of which can help to promote creativity, increases the productivity of the university community in aspects of teaching, research, publication, innovation and commercialization; be it at national as well as at international arena for the good of human and societal growth and development. This discursive presentation hopes to address another issue on promoting university community creativity through several deliverables which require cooperation from every quarter of the institution so that being creative continues to be promoted for sustainable human capital growth and development of the country, if not, the global community.

Keywords—bureaucracy, creative, productivity, sustainable human capital

I. INTRODUCTION

AS academicians that profess the dissemination of knowledge through creative impartation, it is of great interest to see that our academic creativity can inspire all, through our Midas touch. However, what have been encountered in years of being faculty members of the universities, have been challenges that require perseverance, strong self-belief and at the same time cajoling the ever rigid environment that surrounds. Another challenge here is also on how we could encourage creativity in ourselves, our students and colleagues.

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Politicians, industrial managers, academic administrators and other leaders often say that innovation is critical to the future of civilization, the country as well as their organizations. In contrary, what is practiced is that the same people often act as if innovation is an evil that must be suppressed, or at least tightly controlled [1].

Thus, this paper intends to firstly, explore some of the personality traits that are associated with creativity and innovativeness and secondly to provide intervention measures for the management and educational techniques that penalize or discourage creativity, the way to increase productivity of creative university citizenry. In brief, it can simply be providing those resources - time, equipment, and money - and stand out of their way! This paper also attempts to address some local issues of developing and nurturing innovativeness and creativity amongst varsity members. Through this discussion, some of the approaches that are used in the industry and other disciplines can hopefully help to enhance this natural human phenomenon called creativity.

II. DEFINITION OF BEING CREATIVE

First, consider a definition of creativity. A creative person does things that have never been done before. Particularly important instances of creativity include discoveries of new knowledge in science and medicine, invention of new technology, composing beautiful music or analyzing situations in all fields of studies in a new way. [2] states that it is the infinite capacity to experiment and being fearless of creating a new thought process and creativity is a reflection aimed at the world beyond oneself. Thus, it is important to distinguish these three different characteristics: intelligence, creativity and academic degrees. Intelligence is the ability to learn and the ability to think. Creativity as defined is the ability to produce new things or new knowledge. Academic degrees are what one gets after one has sat through years of classes, passed the examinations and completed all of the other academic requirements. From these three traits, it is important to note that most people who create significant things are intelligent and that there are many people with an earned doctoral degree who do not have a single creative idea in their head. They are intelligent and highly skilled problem solvers, but someone else must formulate the problem for them. Thus, intelligence and academic degrees are not evidence of creativity.

Throughout our cumulative years of university teaching, it has been found that students who are both intelligent and highly creative often make mediocre grades in school. The ability to be creative is the amalgamation of several different

kinds of intelligence and personality traits. Creativity is an amazingly complex subject. It is obvious that before one can do creative sciences, one must have some technical knowledge of facts, laws, and methods. If one compares highly creative scientists and engineers with their plodding, ordinary colleagues, one finds essentially the same kinds of intelligence and knowledge in both groups. Therefore, it must be the personality traits that distinguish creative from non-creative people. From reading of psychological literature, there are numerous hypotheses and theories of creativity that conflict with what that have been observed in creative colleagues and what have been read in biographies of creative scientists. There are three types of intelligence namely, synthetic, analytic and practical intelligence. The ability to combine existing information in a new way is synthetic while analytic intelligence is the ability to distinguish between new ideas that have potential, and new ideas that are not worth further work. This ability is essential to an effective allocation of resources, by evaluating the quality of new ideas [3]. Meanwhile, the ability to sell one's ideas to funding agencies, managers, editors and reviewers is labeled as practical intelligence. Without "practical intelligence" the creative person will not be allocated resources to develop their ideas, and the creative person may achieve recognition only posthumously.

Knowledge gives the ability to recognize what is genuinely new. The history of science shows that many good ideas are discovered independently by more than one person [4]. Scientists and engineers must be familiar with the technical literature, in order to avoid "reinventing the wheel". On the other hand, too much knowledge might block creativity, by immediately providing reasons why a new idea is not worth pursuing and by encouraging a person to be rigid in their thinking. Knowledge is also important to provide skills necessary to design experiments and new products or to analyze the results of experiments.

Creative people question conventional wisdom, instead of passively accepting that wisdom. Creative people question common assumptions and rules, instead of mindlessly follow them. This style brings creative people into conflict with society around them, so it is also essential to have a personality that tolerates this conflict, as explained below. Creative people genuinely enjoy their work and set their own goals. There are a number of extrinsic motivators: money, promotions, prizes, praises as well as fame all of which mostly focus on an end result, not the process of discovery or creativity. In highly creative people, extrinsic motivators appear to be less important than intrinsic motivators. Creative people take the risk to defy conventional wisdom and to be a nonconformist. Creative people have the courage to persist, even when the people around them provide objections, criticism, ridicule and other obstacles [2].

Many people who are famous for their creative output are highly diligent, often bordering on the obsessive. It is common to see creative professors working 60 to 80 hours/week for the sheer joy of the effort. Creative people have an inner need to express their creativity. They cannot keep their new idea inside their head forever; the idea needs to be born. In fact, many creative people would be creative, even if they were not paid for their effort or output, a situation that has lead society

and managers to a frankly shameful exploitation of many of the greatest innovators in the history of mankind.

A creative individual who could flourish in one environment can become a routine, ordinary worker in another environment. The optimum environment for creative people is where they can be paid to do their creative work, so creativity is a full-time job, not a spare-time hobby. Professor Sternberg's statement [5] that favorable environment necessitates creativity provides two side of the coin view. Many types of creative work, such as research in theoretical physics, writing books or composing music require minimal physical resources, so such creative activities can be accomplished in one's personal time. If one is employed in an environment that discourages creativity, one can still be creative on one's personal time. In this sense, a favorable environment is *not* necessary for creativity. On the other hand, other types of creative work like experiments in physics or chemistry or engineering, can require expensive laboratory apparatus. A scientist without access to such laboratory facilities is prohibited from doing creative work in experimental science. Professor Sternberg is accurate to state that a favorable environment can be necessary for creative work.

It is well known that, as a general rule, men are more aggressive than women, owing to testosterone. It may be that testosterone gives men an advantage over women in persisting, despite the disappointments and frustrations that are inherent in research. The subject of gender differences is complex. For example, one can observe that an appreciable fraction of undergraduate students majoring in biology or chemistry are women, while only a few percent of undergraduate students majoring in mathematics or physics are women [6]. Through decades of teaching experience, women tend to approach problems in a formal mathematical way. This earns them good grades in school on textbook exercises, but is not necessarily the best way to approach practical problems, whereas males are intuitive when approaching problems; the mathematical analysis comes later as one works out the details. In contrast, telling a man that he is not able to do something often serves as a challenge to prove the advisor wrong. This trait of perversity in men could be valuable in persisting in the face of inevitable disappointments and frustrations in creative work. It could probably be that males develop this intuition by building things during childhood and tinkering with automobiles and computers during adolescence. In contrast, conventional culture denies these experiences to females, by insisting that girls play with dolls, sew or cook.

Creative people need to express themselves through creative projects [7]. However, one should distinguish between a workaholic who puts in 80 hours/week doing routine work and a creative person who works long hours doing new things, often things that no one else thought could be accomplished. Many people with unusually great creativity are ambitious, and walking tall concerned with their reputation, and apparently need to prove them worthy. These characteristics formed the motivation for their diligence, which is necessary for success. Their need to prove themselves worthy may come from experiences early in life in which other children or other students ridiculed or taunted

them. Reading biographies of famous scientists and inventors shows that many of these men had an intense focus on their work. One could describe this intensity with pejorative terms: obsession and monomania or could recognize that the intense concentration was necessary to take them beyond the reach of ordinary men.

There is nearly always inadequate funding and inadequate laboratory resources, which makes the experiment take longer than it would with appropriate equipment. There is always inadequate time, because the project is in addition to one's regular daily life activities. Being creative is extraordinarily difficult but it seems to delight others by making it more difficult through denying resources to creativity that is essential to progress and people who need them. The way to succeed in spite of these artificially created burdens is to have some combination of the following character traits namely persistence, arrogance, stubbornness and tenacity.

Most people would characterize these traits as negative or undesirable qualities; however, they are essential to innovation. From reading biographies of famous scientists and research leaders from the Harvard University Press, one common personality trait becomes clear, that is, many of them are eccentric. Being eccentric does not imply that one is creative. Conversely, not all creative people are eccentric: some creative people have normal family lives and conventional values. Returning to the discussion of eccentric traits in creative scientists, a larger percentage of scientists were either atheists or agnostics [3], compared to the general population. These men simply applied the same objective standards of science to religion, and refused to believe dogma on faith alone.

Another reason that creative people are sometimes seen as eccentric [8] is that creative people genuinely enjoy their work, instead of working only because they need an income. Creative people enjoy their work, because it is significant and original. A vital example is of an experienced and prolific professor who helps academia of varying tenure to publish and who does not matter much about his sleeping hours as long as the academia of any level of experience are helped in getting their papers published in reputable international journals on a *win-win* basis. If he enjoys doing it, then he can possibly be categorized as a creative person for that matter.

III. HOW CREATIVITY OCCURS

One of the principal ways to be creative is to look for alternative ways to view phenomena or for alternative ways to ask a question. One often-cited example of creativity is perhaps to transform a common nuisance to a useful product. When one looks backward in time to analyze how a creative act was made, one often finds that creators made a novel interpretation of a well-known fact or occurrence. Often the interpretation converted a disadvantage into an advantage.

In citing an example of what creativity is, placing a handheld spectroradiometer or a satellite-based sensor on an aircraft platform and then flies with the aircraft. Prof. Dr. Hj. Kamaruzaman Jusoff developed a highly successful airborne hyperspectral sensor product that earns him so much money over commercial and research projects by flying the airborne sensor with the Royal Malaysian Aircraft Cessna 402B. However, not only did he need to develop the idea, but he also

had to sell the idea to his Universiti Putra Malaysia Business Centre (UBC) management and potential investors, that were initially resistant to his new idea. Now, after almost four years of non-stop creating research development application, his ideas have been fully well accepted and recognised by The Malaysian Ministry of Science, Technology and Innovation (MOSTI) with a RM250,000 *Innofund* grant for his Aeroscan Precision (M) Sdn Bhd based in the UPM-MTDC Incubation Centre eyeing for the Multi-Super Corridor status.

Conception of a new idea often occurs in an intuitive flash of insight, in which the more or less complete idea is revealed. Equations and logical analysis come later [9]. Someone who is reading scholarly publications in a library sees the final result in a format that is quite different from its initial conception. The fact that the public presentation is different from the way the idea initially occurred can lead to misunderstandings about how science is actually accomplished. Creativity is essentially a solitary enterprise. Most landmark discoveries in science and all major musical compositions are the work of *one* person. New ideas are often tentative, half-baked and difficult to communicate in a persuasive way. On the receiving side, most scientists and engineers generally react to someone else's new idea by discouraging it. Colleagues tend to reject unorthodox views, at least until those views are convincingly presented, in a complete form. But such a completed form occurs at the end of a research project, not at the beginning or middle. So, as a defensive measure, it is best to keep new ideas to one's self, until one reaches an irresolvable problem that requires someone else's assistance. However, when multiple people are involved, there are inevitably compromises and the final product is mostly a consensus view. Still further, the personality trait of stubborn and uncompromising makes it difficult for many creative people in local universities, especially to work in research groups, where compromises are routine practice.

However, in practice, these large projects are broken down into many small tasks, with a few people or a single person having the responsibility for each task [10]. If multiple people work together on one task, or different people supervise and approve the work on one task, the approach tends to move away from innovation and towards a consensus view that uses proven ideas. While this approach may increase reliability, it also thwarts creativity. Sometimes a scientist working on a problem is frustrated and discusses the problem with a colleague, who suggests a way of solving the difficulty. In this way, the final work may be published as a multiple-author paper, but each part of the solution was the responsibility of one person.

Another way to get multiple-author papers on innovative topics is for a professor to have more good ideas than he can personally develop. So the professor gives good idea(s) to a graduate student or a young academia, and the student does the work to develop the idea into a publishable paper. It is traditional for both the student's and professor's name to appear on the final paper: the student does nearly all of the work, the professor contributes the initial idea, equipment and resources, and helps the student with difficulties along the way. This process is more than merely preparing the student's doctoral dissertation: it is teaching in a Master-Apprentice style. Besides benefits to the student, it also increases the

productivity of the professor and, by increasing the professor's reputation, makes it easier for the professor to obtain future financial support. Carried to an extreme, the professor will become a manager who writes proposals for financial support, generates new ideas, and allocates resources, but is no longer personally involved in scientific research. In addition, he also acts as the paper *publisher link* to these young unknown authors to get their papers published in renowned and reputable international citation index with high impact factor journals. In the long-run, removing the professor from personal involvement in doing experimental or theoretical work could decrease the rate at which the professor generates significant new ideas, and make the professor less familiar with techniques for solving problems.

IV. MANAGING POTENTIAL UNIVERSITY CREATIVE CITIZENRY

On the management of creative employees, one of the *worst* things a manager can do to creative employees is having the employees adhere to a rigid schedule of delivery dates for assignments. Naturally, the manager will, in addition to the rigid schedule, insist that *all* of the employee's time be spent on projects that the manager has approved. Such a rigid policy of assignments and schedules kills creativity. History has shown that many important discoveries were made accidentally. If the discoverer had some "spare time", he could investigate this unexpected curiosity. However, if the discoverer was working diligently on a tight schedule, then there was no time to follow this detail that was not essential to the completion of the assigned project, and the discovery was forgotten.

For the kind of research that involves discovery of facts that were previously unknown, the results are unpredictable and many of the methods will fail, before there is any success. The kind of research done by physicists and chemists in Malaysian universities often falls in this category. For lack of a better name, this is conventionally called "pure research". However, there is another kind of research which is called applied research, in which the goal might be (a) to design a new product to meet certain specifications or (b) to evaluate a product, perhaps a drug, for safety and efficacy. Applied research *can* be managed successfully. The scientists and engineers who work in applied research definitely know what they are doing and they frequently *almost* meet their deadlines. The point to be made here is that scientists and engineers who are doing applied research can also have unexpected results, in addition to simply doing their assignment.

If they have some spare time, the unexpected results can be investigated and might become more significant than the original assignment. Commonly there is no time and the unexpected results are forgotten. True research involves a quest for the unknown that is inherently unpredictable. Even the people doing the research, who are experts in their field, have difficulty predicting the applications and consequences of their discoveries. If the experts cannot see the consequences, there is no reasonable hope that a manager without technical expertise can see the consequences. Some "insignificant" projects might become significant many years after they are published, when someone else recognizes a use

for the result of the old work. The most famous example of this was Einstein's use of non-Euclidian geometry in his gravitational theory – before Einstein, non-Euclidian geometry had been pure mathematics without any practical application [5].

Research is often highly personal. Researchers do not like to ask permission to explore ideas that may be tentative, intuitive and difficult to communicate. Many good ideas begin as a mistake or error, which produced an unexpected result, and few people like to mention their mistakes or errors to their supervisor! In looking at biographies of Nobel-prize winners and other famous scientists, there can be two classes of innovation, firstly, a competent scientist who has been in the right place at the right time. Some of these people apparently do not make any other truly great achievement during the remainder of their career. Perhaps this kind of significant innovation is a random event. Secondly, true genius, who is able to repeatedly develop significant innovative ideas. It appears that very few scientists are blessed with one great moment, even fewer are blessed with several great moments.

How can we, as professors, leaders and managers encourage great discoveries to occur more frequently? History shows us that many important discoveries are made by young scientists, during their time in graduate school or in the few years after they receive their doctoral degree. The conventional interpretation is that the time between ages 20 and 30 years are the "best" years of a scientist's life. The reason for this phenomenon seems to be that young scientist have learned the basic skills, but are inexperienced. In this way they are like a child in a new environment: the child is naturally curious and almost everything is unfamiliar. But, unlike a child, a young scientist is articulate, knows how to observe and record facts, and knows how to interpret the facts. When someone has worked or lived in an environment for more than about five years, they tend to be less observant and less curious, because they are familiar with the environment.

With this interpretation, the solution to increasing creativity is clear: professors and scientists should change fields approximately every five years, so they continue to seek big, new challenges, instead of becoming comfortable experts in their own comfort zones [11]. There is the need for scientists or academia to broaden horizons and work side by side with another academia from a different faculty, say Forestry and English. It does not necessarily mean radical changes, such as from languages to collecting butterflies in a rain forest, although an English Language expert would bring a rich collection of new techniques to the arts of language taxonomy. This is also a valuable cross-fertilization between areas: techniques that are well-known in one field can enrich another field.

V. ISSUES IN EDUCATION FOR CREATIVITY ENHANCEMENT

In Malaysian school education system, many instructors, from elementary school through undergraduate university courses, have a standard, orthodox, only "one right way" approaches to the teaching-learning materials. A student who does it differently from the instructor is labeled "wrong". Such an approach is often the result of limited intellectual ability of the instructor, who only knows one reliable technique.

Conventional instructors ask students to recite examination information from lectures or the textbook. This is a difficult task for creative students, because creative people naturally add something new to what ordinary people consider a straightforward problem.

Students who are both intelligent and highly creative often make mediocre grades in school, because they see issues and ambiguity in examination problems that the instructor does not intend. Creative students "misread the question", according to the view of the conventional instructor. This problem is particularly severe on multiple choice examinations where a creative student can quickly find situations in which either *all* or *none* of the answers are correct, whereas a noncreative student who knows the material in a conventional way simply selects the best answer and gets marked correct.

On an essay or problem-solving examination where the student is expected to explain his answer, the student has an opportunity to show the instructor other ways to interpret the problem. However, conventional instructors are often intolerant of such creative interpretations. Moreover, many creative students are bored by pedestrian classes that are pitched at the intellectual level of the middle of the class (or, worse, pitched at a low level so that everyone passes), so the creative students devote more of their time to their personal creative projects and neglect their regular classes, which often leads to a grade average between C and B. Hence, many intelligent and creative students may prematurely abandon their education due to boredom of the teaching methods.

Students need to see more homework problems in school that require creative solutions, namely (a) Instead of asking for one solution, require the A students to give two different methods of solving one problem. Encourage students to find creative solutions instead of prosaic solutions, (b) Give problems that are unreasonably difficult to answer correctly, and have the students find a rough approximation, (c) Give students problems without adequate information; let them go to the library and find the information that they need, (d) Give more problems that ask the student to design a circuit, interpret data, and design a method of doing an experiment, (e) Assign term papers that require reading from multiple sources, making a creative synthesis of the information, and finding contradictions or inconsistencies in authoritative, published works, (f) Occasionally assign exercises that show an incorrect solution to a problem (e.g., computer program that contains at least one bug, electronic circuit that will not function properly) and have the students find the defect and suggest a correction, (g) Assign laboratory experiments that allow students freedom to choose technique(s) and topics, and (h) Arrange or compose music, not merely playing music.

Creativity can be taught and encouraged in a Master-Apprentice setting, such as a student working in a research laboratory. It is much more difficult to teach and encourage creativity in a classroom with more than 20 students, however can be done in a small way, *if* the instructor makes a great effort. Of course, there is no reward for the instructor who makes that effort, and with the many other demands on the instructor's time in Malaysian universities, it is unlikely that the instructor will make the effort. Nonetheless, all is not lost if creativity is encouraged by changing the way that Malaysian universities and schools are operated. If schools produce more

creative people, our government must give financial support for creative activities, not just scientific research, but composition of fringe benefits, and other forms of creativity.

VI. CONCLUSION

On reflection, one would expect innovative people to be unusual, even eccentric, when viewed by normal society. If innovative people were ordinary, they would work like ordinary people and achieve little of historical significance, because they are only executing routine assignments. Creative intellectuals are normal when compared to the population in which they belong. Conventional people often put pejorative labels on creative people, to characterize their non-conventional and different personality traits. In addition to the "eccentric" label, which was discussed above, there are labels like "geek" and "nerd". Ordinary people often apply pejorative labels to intellectuals, who often do creative research, with expressions like "pointy headed intellectuals who can't park their bicycles straight" or "eggheads". Such pejorative labels may serve to identify individuals with unusually high intelligence or unusually great creativity, in effect making them an anomalous person, so that ordinary people have an excuse for not being able to compete with these anomalies.

Furthermore, this use of pejorative labels is a marginalization of creative people, by alleging that creative people are either defective or has a personality disorder. One of the principal ways to be creative is to look for alternative ways to view phenomenon or for alternative ways to ask a question. Conventional society heaps pejorative terms on creative people, such as obsessive, monomania, stubborn, uncompromising and eccentric. It would be better to see the behavior that is identified by these pejorative labels in a positive light as these characteristics are common among creative people and may be essential to creative success.

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