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Fostering Creativity and Innovation through Technology among Students with Special Needs

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Developing creativity and innovation demands the formation of a suitable environment that promotes the flow of new ideas, curiosity and innovation. This occurs in integrated forms of learning that facilitate problem-solving in realistic, authentic situations. Creativity is complex and multidimensional and has been defined in varied ways by different researchers. Among scholars of creativity, some define it in fairly simplistic terms, such as "creating something new", whereas others give more elaborate definitions that identify multiple phases in the process, such as "being sensitive to problems, searching for solutions, testing hypotheses and disseminating results, The development of creativity among university students has important implications for their personal and professional lives after graduation. Specifically, research indicates that creativity is important to the success of individuals, industries, and societies, Consistent with many of the previously identified precursors to creativity, some common approaches to enhancing creativity are; Providing incentives to increase motivation, Imparting knowledge to increase expertise, Structuring interactions to improve the creative process in groups, Targeted improvement of very specific skills, dispositions, or characteristics and Improving micro-level environments to impart a culture that explicitly values creativity, by encouraging risk-taking and allowing for failure without repercussions. Teachers' conceptions, beliefs as also their technology related attitudes are linked to self-efficiency in technology acceptance process. Information and communication technology (ICT) experiences and are preconditions for decisions and actions regarding professional learning, teaching improvements and change, The educational technology has an important role in facilitating digital literacy of students with Special Needs and teachers. Within the renewal of the educational technology curriculum. The study recommended that ICT assisted learning environments can be used for fostering student centered teaching and enhancing individualization with tools for learning and evidencing students learning achievements and progress.

Keywords: Creativity and innovation , Technology , Students with special needs.

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Introduction:

Developing creativity and innovation demands the formation of a suitable environment that promotes the flow of new ideas, curiosity and innovation. This occurs in integrated forms of learning that facilitate problem-solving in realistic, authentic situations. If we want to promote the development of innovation, then work in school cannot be separated from the local community and the production process. Of course, encouraging pupils to generate new ideas is only an initial step. Good ideas must also be developed, made tangible, and put into action, and perhaps one day also marketed (Likar, 2004). This entails pupils attempting to pass creative ideas along the entire invention and innovation chain to the point where useful results are produced that could also be of interest to others.

The history of the Individualized Education Plan (IEP) originates in the Education for all handicapped children act, and its successor, the Individuals with disabilities education act. These laws guarantee every child has the right to be evaluated for disabilities and to receive any and all special education services that would assist in augmenting that child's education, should they have a disability, to insure that each student has equal opportunity to succeed in school. EHA mandated that every state excepting federal money for school provide services to students with disabilities. IDEA expands that idea to a wider age range, a wider range of disabilities, and provide support services. With IDEA becoming law, not only was every student with a documented disability given the legal right to a Free and Appropriate Education (FAPE), they were also granted an individualized education program, or IEP, that would give each student the best access in the least restrictive learning environment to the general curriculum. The IEP is a document that considers the student's present level of performance (PLOP) in relation to state standards for learning in all subject areas, occasionally including activities in daily living (ADL), such as hygiene, community skills and communication.

Definition of Creativity:

Creativity is complex and multidimensional and has been defined in varied

ways by different researchers. Among scholars of creativity, some define it in fairly simplistic terms, such as "creating something new" (Vygotsky, 1978), whereas others give more elaborate definitions that identify multiple phases in the process, such as "being sensitive to problems, searching for solutions, testing hypotheses and disseminating results" (Torrance, 1966).

More recently, several scholars appear to be converging on agreement that creativity is best defined as the production of ideas, processes or objects that are simultaneously novel (unique, original, atypical, cutting-edge) and appropriate (relevant, useful, applicable, fitting, effective.

Important of Creativity.

The development of creativity among university students has important implications for their personal and professional lives after graduation. Specifically, research indicates that creativity is important to the success of individuals, industries, and societies (Ford & Gioia, 2000; Moran, John-Steiner, 2003), resulting in improvement and progression in the arts sciences (Sternberg, 2000), economy and individuals' standard of living and overall well-being. Furthermore, projections for job growth within the United States continue to focus on fields such as healthcare and technology (Bartsch, 2009) – sectors that emphasize the need for creativity (Ensor, Cottam, & Band, 2001) Indeed, results from an AAC&U survey indicate that most (65%) employers value creativity as an important learning outcome among college students (Hart Research Associates, 2015). Despite its importance to maintaining a functional society, Kim (2011) found evidence that overall creativity has been declining across all ages in the United States, suggesting a need to foster this capacity among youth and young adults who will soon be the driving forces behind our increasingly complex and globalized world.

Developing Creative Potential and Fostering Creative Accomplishment

Consistent with many of the previously identified precursors to creativity, five common approaches to enhancing creativity are (Scott, Leritz, & Mumford, 2004):

1) Providing incentives to increase motivation

2) Imparting knowledge to increase expertise

3) Structuring interactions to improve the creative process in groups

4) Targeted improvement of very specific skills, dispositions, or characteristics (e.g., openness to risk-taking within the dimension of person or problem-identification skills within the dimension of process)

5) Improving micro-level environments to impart a culture that explicitly values creativity, by encouraging risk-taking and allowing for failure without repercussions

6) Multiple skills within a dimension of creativity (e.g., divergent and convergent thinking skills within the dimension of process)

7) Teaching creative skills to improve individuals' creativity across contexts, which has been by far the most prevalent type of approach to cultivating creativity

8) Broader approaches that simultaneously address multiple dimensions of creativity (e.g., problem identification and divergent thinking skills within the dimension of person combined with fostering a classroom culture that espouses creativity and encourages risk within the dimension of press)

9) Experimentation leads to creativity and Innovation: Art inspires creativity, and in today's world, the computer is the tool for design and creativity. Digital art is particularly well suited for trying out new ideas, and this easy experimentation allows the freedom to create and innovate.

Creativity versus innovation

Some creativity scholars emphasize that a creative product must also be applied, implemented, or accepted by either the general public or authorities of the domain in which the creativity took place in order for it to be considered "creative". For instance, for a work of art to be considered creative, it must be accepted by expert art critics or purchased by an art collector. Likewise, a tangible object invented to solve a problem or improve the quality of individuals' lives must be produced in large quantities and purchased by the general public to be considered creative. However, others suggest that application and/or broad acceptance of a product represents innovation rather than creativity (Daly, Yilmaz, Christian, Seifert, & Gonzalez, 2012; Genco, Hölttä-Otto, & Seepersad, 2012). Some researchers describe innovation as the combination of creativity followed by exploitation, which encompasses

development, commercialization, or persuasion of others to acknowledge a product (Luecke & Katz, 2003). creativity is a necessary but insufficient component of innovation, and therefore, the ability to innovate is explicitly captured in a distinct learning goal (Third Century Initiative Student Learning. A detailed description of innovation and how it can be assessed can be found in a separate Occasional Paper. Consistent with the distinction between creativity and innovation, researchers also distinguish

between everyday achievement and creative achievement within the realm of creative accomplishment. Everyday achievement includes less significant, personal creative accomplishments, such as painting a portrait for leisure or coming up with a novel "fix" for a household problem. Creative achievement refers to accomplishments that are shared with, acknowledged, and accepted by the public (Jauk, Benedek, & Neubauer, 2014). In a similar vein, some researchers use the terms "Little-c creativity" and "Big-C Creativity" to distinguish between everyday creative accomplishments and renowned or publicly influential accomplishments (Kaufman & Beghetto, 2009; Simonton, 2012).

Skills to nurture innovators:

1- Critical thinking and problem solving: most public school educators

recognize that teaching for the test does not foster the deeper thinking needed for 21st Century citizens. should be attention to critical thinking and problem solving.

2- Collaboration across networks and leading by influence: that as institutions become learning organizations, team learning exceeds the knowledgeable individual. Also, the individual in a network can lead by influence with or without a title.

3- Agility and adaptability: Adding Internet options as well as applications for the tablet may be support of the learners.

4- Initiative and entrepreneurism: Initiative and entrepreneurism Successful large corporations thrive, in part, by encouraging entrepreneurs within the company. And the fastest growing sector of the world economy remains small businesses.

5- Effective oral and written communication: Learning to speak and write well is obvious for 21st Century schools. Yet, the long held belief that only the elite needed these higher order skills combined with demands of standardized test to decrease the time spent on developing speakers and writers in schools must end. Put positively, as the National Writing Project recognized more broadly, writing, reading, speaking, listening and thinking must become prominent in education across the curriculum.

6- Accessing and analyzing information: we needed to develop national information literate people. Such information literate people could locate, evaluate and create information. in addition to that the process of creating information requires more than analysis. It demands for synthesis of information literacy.

7- Curiosity and imagination: Imagination is the only renewable fuel. Developing curiosity and imagination are surprise keys for teaching innovation today.

Inclusion or integration is an important part of equal opportunity in education. Demands for inclusive education have increased and fostered major changes to schooling and education. Students with disabilities are educated alongside their peers within the local community therefore mainstream schools are required to adapt to accommodate a diverse group of students with a variety of needs (O'Gorman, 2005, p. 377). Approaches to the inclusion of children and young people into mainstream classrooms, and the identification and recognition of special educational needs, is an integral part of daily school work. The wellbeing and actualization of developmental and learning potential within a diverse student population is challenging the organization of learning settings. In the European context, educational policies have tended to be proactive with regard to the challenges and demands. Standards and competencies for all teachers are defined in The Joint Interim Report by the Education Council and the European Commission on Progress towards Education and Training (Istenic Starcic, A., Turk, Z., 2010).

Teacher education programmers, specifically, have responded to the needs and challenges of inclusive education within the Bologna Study Programmed Reform. Within the new teacher education curriculum, the Tuning Report (González & Wagenaar, 2003, p. 83) refers to key generic competences which provide the basis for inclusive education. These include: a) the appreciation of diversity and multiculturalism in the process of identifying learner disadvantages; b) team work and skills which enable the teacher to collaborate with professionals, parents and fellow teachers in dealing with special education needs; c) sensitivity about ethical issues and ethical commitment and d) inter-personal and communication skills.

Against the background of these competences, it is my argument that educational technology and information communication technology play an important role in creating an effective and adaptable learning environment, especially when teaching pupils with special educational needs and inclusive classrooms. However, the use of ICT in addressing special educational needs has, to date, been inadequate so far. Most hardware and software is designed for the mainstream population and does not pay sufficient attention to a wide range of capabilities and to people with disabilities (Wong et al., 2009, p. 109). Despite the current emphases on inclusion have stimulated much interest in using various ICT

applications for integrating students with disabilities into the mainstream school environment, the review of existing literature indicates a lack of attention to the application of ICT for people with special educational needs (Williams et al., 2006). ICT for special educational needs assists the different types of disabilities with assistive technology (Turner-Smith & Devlin, 2005). The main gap is within development of learning environments and systems which facilitate inclusion of persons with different types of disabilities. Teachers are not aware of e-learning environments and their potentials for individualized instruction,

exploratory environments, collaborative learning and facilitating social skills, individualized study plans, classroom management for accommodating students with disabilities in the inclusive classroom Research findings show that the use of online communication by young people has become a most common activity, and that the internet and virtual environments have been highly integrated in the young people's lives, where young people with special needs are vulnerable and marginalized (Söderström, 2009; Livingstone & Helsper, 2007). Learning environments and systems which prepare young people with special needs for participation in information society foster implementation of the developing ICT competences based on equal opportunities which is highlighted in The concrete future objectives of educational systems.

This action plan consists of five practices that unite the four major constituent groups of the school community; Students, Teachers, Administrators, and Relatives (that being parents, guardians, and other family members of the student).

Goal 1: Improve communication amongst school staff and students, between the school and students' homes, and in the larger school community, by creating and maintaining a staff-led and student-made school newspaper/newsletter (Vang, p. 21, 2006).

Students will work independently, in small groups, and larger groups to create, form, and sustain the newspaper, its publication, and its content. Although each student is unique and has individualized learning goals, students will be able to find commonalities in their shared interests and strengths.

Students will collaborate with peers to improve communication and cooperation amongst themselves. The nature of the project will foster teacher and staff collaboration, and even student-teacher collaboration, as students and teachers work together to complete news articles, its layout, and its publication. The newspaper will also improve communication

between all members of the school community, relating news, editorials, and events to all staff, students, and parents/guardians (Lam, 2006).

Goal 2: Improve communication and collaboration between staff, students, relatives, and administrators by organizing special school events (Vang, 2006). Special school events will highlight student work, providing positive reinforcement.

Learning Goal 2 - Students will be able to work collaboratively with peers for greater understanding and assimilation of writing skills. Computers with word processing and layout program for creating a self-published document, printer with ink and paper, one social studies block per week, one ELA block per week, and one half-hour to distribute the paper to classrooms every week.

Goal 3: Volunteer to participate in and/or host an inquiry team to collaborate on lesson plans, curriculum modifications, assessments, and behavior modeling (Stolp, 1994). The ideas gleaned from collaboration will improve the quality of the lesson plans enacted for students.

Goal 4: Create, promote, maintain, and supervise a classroom and/or school podcast. This effort will encourage collaboration among students as well as staff, employing proximal development for both parties (Stolp, 1994). Authoring a podcast allows students to share what they learn in the classroom with their friends, teachers, and/or relatives who have a computer or iPod, reinforcing their involvement and investment in their classwork.

Goal 5: Begin a "Wake-Up Wednesday" potluck breakfast in the classroom. Invite teachers to come in before school hours and share student work, as well as ideas for units or lessons, and collaborate on ideas that could improve the school community and instruction delivery. Invite students during morning bus arrival to meet and greet with other students, also to share their work gallery style, work on puzzles and games together, and socialize in a positive environment.(Barth, 2002). The socialization that comes from these events will allow students to meet and become acquainted with students from other classes, offering access to the general curriculum, opportunities for proximal development, and positive socialization skills (Eggen & Kauchak, 2007).

Different program characteristics influence different creative outcomes

When developing an assessment plan and deciding which measures of creativity to use, it is important to think about program characteristics such

as the duration, scope, and specific content, as research suggests that

these characteristics influence creative outcomes in different ways (Perry, 2014). For example, because creative achievement results from the confluence of multiple factors, long-term, multiple intervention approaches can better facilitate "moving the needle" than one-time, short-term interventions. However, short-term interventions can be most successful in fostering creative potential when they are 1) targeted toward specific skills, such as identifying problems or thinking divergently and 2) based in specific disciplines, such as engineering or creative writing. This implies that short-term interventions lasting a term or less may exhibit some successful outcomes when they focus on a specific set of skills within a single dimension, such as convergent thinking within the dimension of process.

In such cases, gains may be best measured by an instrument that taps into the specific skill, such as the remote associates task, which gives a series of three seemingly unrelated cue words and requires respondents to think of the fourth word that is linked to them. For example the prompts "rocking," "wheel," and "high" are all linked to the word "chair." In a similar vein, everyday achievement may be more sensitive to short-term training than creative achievement. In this context, the subscale within the Inventory of Creative Activities and Achievements (Jauk, Benedek, & Neubauer, 2014) that focuses specifically on everyday achievement may be more useful than the subscale that focuses on creative achievement. Within the scope of programs that teach creative skills, Scott, Leritz, and Mumford (2004) conducted a meta-analysis of 70 creativity programs to explore their overall effectiveness on four types of outcomes: 1) divergent thinking, 2) problem solving, 3) attitudes and behaviors, and 4) performance. They found that, in general, creativity development had positive, sizable effects on all four types of outcomes, although these effects tended to be larger for divergent thinking and problem solving outcomes. Furthermore, interventions that focused on cognitive processes were the most effective for outcomes associated with creative potential (i.e., divergent thinking, problem solving, and attitudes and behaviors), whereas interventions that focused on personal dispositions and motivation were most effective for creative accomplishments (i.e., performance). This implies that interventions that focus on the development of creative processes may not result in immediate performance gains as assessed by the products that students create, but gains in skills or behaviors may be more apparent. Conversely, interventions that focus on the facilitation of motivation or risk-taking may be more likely to result.

Teachers' conceptions, beliefs as also their technology related attitudes are linked to self-efficiency (Isman, 2009) in technology acceptance process, and ICT experiences (Cavas et al., 2009) and are preconditions for decisions and actions regarding professional learning, teaching improvements and change. To measure the impact of teacher training, the focus is on the influence of training on teachers' attitudes, self-efficacy,

enjoyment, usefulness, and behavioral intention towards the use of internet (Akpinar & Bayramoglu, 2008). In teacher training, the need for a shift from technical competences to competences in directing one's own

professional development is needed (Istenic Starcic & Brodnik, 2005) in order to equip teachers to respond to changes and incorporating innovation in teaching (Buchberger et al., 2000). Professional development in ICT has to address professional needs and cultures and not primarily focus on training for ICT skills (Loveless et al., 2006).

E-learning environment for special educational needs

The "Equal eLearning – Students with Learning Difficulties Using ICT and Learning on the Web" project was aiming at further developing, localizing and implementing the SEVERI e-learning environment. Originally, the SEVERI system was developed for students with special learning needs in vocational education. The Equal eLearning project facilitated its further development, localization and implementation in the various learning and training environments of Finland, Slovenia, Hungary, Lithuania, Portugal and Romania. The main challenges include a more extensive implementation in special schools, its integration into regular primary school and training environments for the improved integration of students with special educational needs. In Slovenia, theintroduction of SEVERI e-learning environment and methods was also focused on teacher pre-service educational curriculum and its testing on part-time students at the University of Primorska Faculty of Education.

The SEVERI e-learning environment caters for students with special educational needs which include range of physical, communicational, emotional and cognitive disabilities, causing learning difficulties in reading, writing and perceiving. SEVERI provides the working environment, where tools are designed according to students' abilities. Clearly structured activities are focused on attracting learners and enhancing the students' motivation and autonomy providing the tracing and monitoring of one's own progress. Graphic interface design is provided in large and clear fonts, colors, symbols, pictures and speech so

as to assist a variety of disabilities and special educational needs. Audio-instructions are included as well.

The student interface is presented in the Equal e-Learning project was awarded within the competition for innovations which positively affect the lives of young disabled people and help them adapt to education, working life and society. The competition is organized by ONISEP (French National Office for Information on Education and Professions), European Disability Forum (EDF) and right to learning. In 2009, the Equal eLearning project was awarded the ACCESS-IT 2009 good practice label in the field of e-accessibility and inclusive ICT.

CONCLUSIONS

Digital literacy is considered as one of main enablers for the participation in the knowledge society (Istenic Starcic & Turk, 2010) and has to be provided based on the principal of equal opportunity. The educational

technology has an important role in facilitating digital literacy of students and teachers. Within the renewal of the Educational technology curriculum, the ICT competences had been recognized as important in the process of the formation of teachers' professionalism which is based on autonomy, inquiry, creativity and innovation (Istenic Starcic, 2009). The project work had been applied to provide the learning environment of "Living practice" for students when developing didactical and technical component of their ICT competences. The implementation of the SEVERI e-learning environment for students with special educational needs took place at two levels: monitoring, observing and studying its introduction in Slovenian schools and planning and conducting lessons based on SEVERI. The pre-service educational technology course has linked the theory and practice. The work in an IT laboratory was connected with teaching practice in schools. The group of part-time students who participated in the evaluation had a unique opportunity to transfer new knowledge to their day to day teaching practice of their normal professional work. Project idea, lesson and learning material design was based on the needs assessment of pedagogical practice. Evaluation was accomplished through the process of the project work and at final course assessment. The focus was on the lesson planning and lesson performance and on the learning material design and usefulness of the material in lesson performance. In the process of evaluation, students' learning was considered as was the alignment of learning objectives, activities and outcomes. Student teachers develop expertise in using ICT for their pedagogical work, both planning and teaching, were provided with the opportunity to contribute to increased

equality, diversity and inclusive education. Inquiry-based learning within the work of the Project facilitated the use of ICT tools, with a follow on effect within the pedagogical context.

RECOMMENDATIONS AND IMPLICATIONS

- that digital divide of young disabled people can be reduced with improved access to computers and internet in the context of school work which could enhance digital literacy and e-participation of students in a society;

- that ICT assisted learning environments can be used for fostering student centered teaching and enhancing individualization with tools for learning and evidencing students learning achievements and progress.

- Educational technology curriculum has to incorporate the ICT competences, in conjunction with competences of cooperation, management, organization, and of other generic and subject-specific competences.

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تعزيز الإبداع والابتكار باستخدام التكنولوجيا لدى الطلاب ذوي الاحتياجات الخاصة

أ.د/ عادل محمد العدل

أستاذ علم النفس التربوي

كلية التربية . بجامعتي الزقازيق والسلطان قابوس

ملخص :

يتطلب تطوير الإبداع والابتكار تكوين بيئة مناسبة تعزز تدفق الأفكار الجديدة والإبداع والابتكار، ويحدث. هذا في أشكال التعلم المتكاملة التي تسهل حل المشكلات في مواقف واقعية حقيقية، مفهوم الإبداع والابتكار معقد ومتعدد الأبعاد وقد تم تعريفه بطرق متنوعة من قبل باحثين مختلفين؛ يعرّفه البعض بعبارات مبسطة إلى حد ما ، مثل "خلق شيء جديد" ، بينما يقدم البعض الآخر تعاريف أكثر تفصيلاً تتمثل في تحديد مراحل متعددة في العملية ، مثل "أن تكون حساسًا للمشاكل والبحث عن الحلول واختبار الافتراضات والحصول على النتائج، إن تطوير الإبداع والابتكار بين الطلاب له آثار مهمة على حياتهم الشخصية والمهنية بعد التخرج. تشير الأبحاث إلى أن الإبداع مهم لنجاح الأفراد والمجتمعات، تماشياً مع العديد من الدراسات السابقة في الإبداع ، هناك بعض أساليب مشتركة لتعزيز الإبداع منها؛ توفير الحوافز لزيادة الدافع، ونقل المعرفة لزيادة الخبرة، وتنظيم التفاعلات البيئية لتحسين العملية الإبداعية في المجموعات، وتحسين المهارات أو السلوكات أو الخصائص المحددة، وتحسين البيئات ذات لإضفاء الثقافة التي تقدر الإبداع والابتكار بوضوح، وكذلك تشجيع المخاطرة والسماح بالفشل دون تداعيات. ترتبط تصورات ومعتقدات المعلمين نحو المواقف المرتبطة بالتكنولوجيا الخاصة بهم بالكفاءة الذاتية في التعامل مع التكنولوجيا وخبرات تكنولوجيا المعلومات والاتصالات وهي شروط مسبقة لاتخاذ القرارات والإجراءات المتعلقة بالتعلم الخاص وتطوير عمليات التدريس والتغيير؛ حيث تلعب التكنولوجيا التعليمية دوراً مهماً في تسهيل المعرفة الرقمية للطلاب ذوي الاحتياجات الخاصة والمعلمين ضمن تطوير منهج تكنولوجيا المعلومات، وأوصت الدراسة إلى أن بيئات التعلم المدعومة بتكنولوجيا المعلومات والاتصالات يمكن استخدامها لتشجيع التدريس الذي يركز على الطلاب، وتعزيز التفرد بأدوات للتعلم، وتوثيق انجازات تعلم الطلاب وتقدمهم.

الكلمات المفتاحية: الإبداع والابتكار، التكنولوجيا، الطلاب ذوو الاحتياجات الخاصة.