Journal of Modern Education Review, ISSN 2155-7993, USA
December 2017, Volume 7, No. 12, pp. 883–893
Doi: 10.15341/jmer(2155-7993)/12.07.2017/007

http://www.academicstar.us

Enhancing Creative Thinking and Innovation among Trainee Teachers during Game Project

Malathi Balakrishnan[1] , Cheng Lee Ooi[2], Chander Vengadasalam[3], Evelyn Gnanam William George[3]

(1. Institute of Teacher Education Malaysia, International Language Campus, Malaysia

2. Bayas Primary School, Pulau Langkawi, Kedah, Malayisa;

3. Institute of Teacher Education Malaysia, Technical Education Campus, Malaysia)

Abstract: The purpose of the study is to explore trainee teachers' creative thinking and innovation during physical education game projects. It was conducted in one of the Teacher Training Institutes in Malaysia for duration of four weeks. Thirty-six trainee teachers in twelve groups participated in this study. Qualitative research method was adopted as the researchers observed the participants' creative thinking and innovation process during games project. Data were collected from observational checklist, reflective journal writing and semi structured focus group interview transcriptions. All the qualitative data were later analyzed with Nvivo data analysis process. The proposed game projects and innovation process enables trainee teachers to develop creative thinking skill. Data revealed themes like decision-making, problem solving, creativity and teamwork. Kangas's (2010) Creative and Playful Learning Process Model were utilized in this study. The finding showed that trainee teachers' creative thinking skill enhanced during the game inventing innovation process. Therefore Teacher Training Institute will have more success using innovative games project to enhance creative thinking skill among physical education trainee teachers.

Key words: creative thinking, innovation, trainee teacher, games

1. Introduction

Education organization is moving towards creative schools, which emphasizes on creative learning environment (Davies, Jindal-Snape, Collier, Digby, Hay & Howe, 2013). Education is the basis for economic knowledge and growth through cultivating creative and innovative citizens as affirmed by many countries (Stables, 2009), which has advanced from traditional education (Sawyer, 2006). "The flourishing attention on creativity and its promotion in schools motivated many researchers to examine implicit and explicit theories to understand creativity" (Saracho, 2012). The teachers' implicit theories on creativity are refers to get the teachers' view, beliefs, or conceptions on creativity (Andiliou & Murphy, 2010; Kampylis , Berki & Saariluoma, 2009; Tin, Manara & Ragawanti, 2010). While, explicit theories on creativity are focused on researchers' empirical studies that contribute to creativity knowledge in schools (Babalis, Xanthakou, Kaila & Stavrou, 2012; Davies et al., 2013;

Malathi Balakrishnan, Dr., Senior Lecturer, Physical and Health Education Unit, Department of Science Cognitive, Institute of Teacher Education Malaysia, International Languiages Campus; research areas/interests: teaching games for understanding, creativity and innovation. E-mail: malathibalakrishnan@ymail.com.

Kangas, 2010; Konstantinidou, Michalopoulou, Agelousis & Kourtesis, 2013; Lassig, 2013; Piffer, 2012). Therefore, an increase attention on how to equip in-service and trainee teachers' with creative and innovative thinking, particularly in primary education is the main focus (Kampylis et al., 2009). Creativity involves mental process in solving problem, personality-mental competencies, and product (Babalis et al., 2012). Its development can be influenced by mood and emotion). Accordingly, an introduction of game project among the trainee teachers' in this research may take care of their "feeling" in creative thinking learning. Game has positive effect on learning qualities in term of actions and attitudes in playful learning environment (Kanga, 2010). This creative learning experience may enhance their future roles in pupils' creativity development (Davies et al., 2014). Creative learning maybe transferred by structuring physical and pedagogic environment as teaching for creativity based on command of the topic's relevancy, knowledge, creative learning process, and innovation (Davies et al., 2014). Moreover, peers collaboration provides an opportunity for sharing and applying knowledge, co-creation, and design the play processes (Kanga, 2010). Hence, it is essential to cultivate trainee teachers' creative behavior as role models and mentors for pupils' creativity development (Davies et al., 2014; Kampylis et al., 2009; Newton & Beverton, 2012). Creative thinking is the essence for innovation (Brand, Hendy & Harrison, 2015). However, there was limited research on how innovative game projects as learning processes that promoted creative thinking and innovation in physical educational classes at Teachers' Training Institution, and particularly in Malaysia. Therefore, this study assessed the extent of creative thinking and innovative experiences gained by the Malaysian trainee teachers.

2. Literature Review

One of the thinking goals is creative thought (Newton, 2012). Creativity concerns novelty or originality, appropriateness, plausibility, and rightness-of-fit or fitness-for-purpose (Newton, 2012; Newton, 2013). It also refers to development of creative knowledge by using imagination and possibility thought (Craft, 2005; Cremin, Burnard & Craft, 2008; Egan, 2005). The six creativity measurement are person, process, product, and/or press (Rhodes, 1961); persuasion (Simonton, 1995); and potential (Runco, 2003). Creative person refers to "information about personality, intellectual, temperament, physique, traits, habits, attitudes, self-concept, value systems, defense mechanisms, and behavior" (Rhode, 1961, p. 307). Creative process concerns a series of creative steps in search of "motivation, learning, thinking, and communicating" for creative production (Rhode, 1961, p. 308). Creative product is the creative engagement outcome in term of tangible product (Rhode, 1961), behavior or ideas (Richards, 1999). Creative press explores associations among (between) creative persons, processes, and products with the influential factors of social and environmental. Creative persuasion relies on how creator succeeds in influencing others to agree with them as creative person, processes or products (Simonton, 1995). Whereas, creative potential refers to the sensitivity of educators in recognizing youngsters' creative potential for translating new meanings and interpretations (Runco, 2003). Lassig (2013) adopted four approaches creative process of adaptation (modify the existing work), transfer (new application), synthesis (combination of ideas to form new idea), and genesis (originality) to study 20 adolescents' creative process engagement.

Past studies reported that creative teachers are high in intrapersonal awareness (Reilly, Lilly, Bramwell & Kronish, 2011), well-being enhancement (Grainger, Goouch & Lambirth, 2005), goal-oriented motivation through problem-solving, task-commitment, effective and collaborative strategies (Hong, Hartzell & Greene, 2009), and creative behaviors in term of curiosity, connectivity, autonomy, ownership and originality (Grainger et al., 2005;

Jeffrey, 2006). In addition, Davies et al. (2014) in their systematic literature review of 210 educational research reported that school supportive culture of teaching for creativity is important to boost teachers' creativity conceptual, creative skills and knowledge, collaborate constructively with a mentor, action research and reflection practices. In this research context, game project may provide an opportunity for them to develop and experience awareness of their own learning needs that can be transformed as awareness of future pupils' needs in their creative learning process as reported by European's case studies in Creative Partnership projects (Davies et al., 2014). Its significance has been highlighted as 132 Greek in-service and prospective teachers felt lack of training and confidence in releasing primary school students' creative potential (Kampylis et al., 2009). Besides, incubation period, unconscious process time-framed is deemed as part of the creative process for Australia three primary school pupils (Webster & Campbell, 2006). On the other hand, Davies (2006) reported that formative assessment with feedback is found to be more effective in promoting creative learning among in-service development courses.

Kangas (2010) developed the model of creative and playful learning (CPL) with four processes from orientation (knowledge co-creation), creation (game design and creation), game play (small group), and elaboration (small group or whole class levels — elaboration, reflection, and evaluation) for 68 children aged 7–12. Game co-creation requires constructive knowledge, joint negotiation, creative collaboration, and reflection. The importance of integrating fact, fiction, and playing learning environment in teaching and learning as the foundation for crafting creativity, imagination, and group work skills without neglecting academic achievement – physical, participative, knowledge co-creation, thinking, and media skills have been highlighted. It is also a meaningful across curriculum teaching and learning approach. However, the teachers are challenged with multi-roles such as being facilitators, instructors, learners, and tutors in this creative and playful learning processes that are different from traditional school system (Kangas, 2010). The significance of this game approach is supported by Davies et al. (2013) in their systematic literature review of 210 educational research particularly in attaining pupils' creative learning and teachers' teaching for creativity development. With similar principles, Quay and Peter (2012) integrated five models of physical education to create a creative physical education that emphasized on teamwork, game, season, and practice with health-related fitness for primary students. In another study, Konstantinidou et al. (2013) found that 220 physical educators' from 205 Northern Greece elementary schools demonstrated poor theoretical background on pupils' creative characteristics (cognitive aspects, motivation, and personal properties) and their creative outcome. They urged the European Council to improve creativity training as part of the educators' education for promoting creative schools. Furthermore, European Union has funded few types of Creative Activities in Learning for Innovation through entrepreneurial programs in order to examine how creativity facilitated entrepreneurial self-efficacy (one's belief in own skills and abilities) along the innovation processes (Barakat, Boddington & Vyakarnam, 2014). Furthermore, Figl and Recker (2016) urged that diagrammatic process representations provided more appropriate ideas than textual descriptions on process-redesign creative tasks as creative problem solving.

In other study, a direct relationship between creative thinking and ethical decision making in the process of forming and assessing new ideas to solving problems has been found in nursing education (Mumford et al., 2010). A creative decision-making and problem solving are essential skills in nursing profession (Bunkers, 2011; Schultz, Zippel-Schultz & Salomo, 2012). Four creative thinking strategies consisted of diversity of learning, freedom to learn, learning with confident, and learning through group work were categorized after systematically reviewed eight nursing articles (Chan, 2013). The researcher claimed that educators could develop students' creative

thinking and problem solving skills confidently and collaboratively with adequate freedom and guidance. In line with this, 100 students (IID group) of Malaysian Universiti Teknologi MARA who have engaged in innovation convention by presenting any innovation, inventions and design projects were also claimed to have more confident and motivated in their problem solving skills, communication skills and work as a team (Mahdi, Sukarman & Yok, 2015).

Collaborative learning has been differentiated from creative collaboration (Craft, 2008; Hämäläinen & Vähäsantanen, 2011). Collaborative learning refers to group-based intentionally shared knowledge and shared learning processes; while creative collaboration is based on socialcultural approach (Vygotsy, 1978) that emphasizes on a situated group interaction processes that evoked interdependency on shared knowledge, competencies, and goals in constructing new useful ideas or solutions for the community. Therefore, in order to promote creative collaboration learning, teachers are urged to set appropriate learning activities and contexts with updated theoretical, pedagogic, and technological integration (Hämäläinen & Vähäsantanen, 2011). Consistent with Wu, Wu, Chen, and Chen (2014), the three most influential factors of creativity have found under Community Dimension from 40 senior experts. The factors were “Integration of creative education” under “Social education environment” criteria; while “Oppressive of environmental behavior” and “Respect for intellectual property” under “Social cultural environment” criteria. “Integration of creative education” meant at each civil level, the government and private organizations jointly set policies for creative and innovation education. “Oppressive of environmental behavior” referred to adequate external pressure to push for creativity development. “Respect for intellectual property” reflected a protection on domain of knowledge and creativity in knowledge. In other words, the educators and policy makers play crucial roles in developing students’ creativity (Wu et al., 2014).

West and Farr (1990, p. 10) defined creativity as “the ideation component of innovation”, and innovation as “the proposal and applications of the new ideas”. Similarly, creativity is thinking something new, and innovation is implementing something new (Sloane, 2016). Both are closely interlink. To identify an innovation in learning, we must define the standard practice as well as the new way and determine that the new way is better. However, chasing after the next new desirable goal with little evidence of its efficacy wastes valuable time, money and risk students at risk of missed opportunity to learn true innovation. A proposed innovation can be tested via formative, iterative evaluations prior to the needed validation with randomized, controlled trials (Layng, Stikeleather, & Twyman, 2006) or through innovation contests (Adamczyk, Bullinger & Möslein, 2012).

Innovation contests were classified into five categories through systematically reviewed on 201 publications by Adamczyk et al. (2012). They were economic perspective, management perspective, education focus, innovation focus, and sustainability focus. Publication was highly recommended as a mean to develop initiative within and between organization(s) in the last three categories. In education focus, innovation contest was integrated into coursework for motivating students’ capabilities in generating ideas, design, technical, teamwork, and communication. While, management perspective referred to how the innovation contest management set the platform to encourage participation and innovative contribution. Therefore, this study incorporated innovative traditional game project as part of the coursework of a physical education course offered by one of Malaysian Teachers’ Training Institute.

Innovation is valued as a catalyst to growth, an add value to desirable objectives (Mobbs, 2010). As defined by Rogers (1983), an innovation is “an idea, practice, or object that is perceived as new by an individual or another unit of adoption” (p. 11). It provides an alternative solution or new way to a problem or creates a novel

solution to meet needs for an individual, group, or organization (Rogers, 1983, 2003). Rogers (1995) also argued that the four elements of innovation by diffusion were invention of the innovation, diffusion (or communication) through the social system, an adoption period, and consequences. Diffusion is the process by which an innovation is communicated through certain channels among members of a social system over time (Rogers, 2003; Cuban, 2010). In other words, innovation is the application of an idea or invention, adapted or refined for specific uses that fitted in its particular contexts (Gertner, 2012; Manzi, 2012). The implementation of an innovation proceeds over time, often with adjustments in course as the innovation is fitted to the context. An innovation replaces the standard product, program, practice, or process with something better, and as the majority adopts it, the innovation then becomes the new standard.

This research considered the first elements of Rogers' innovation by diffusion process. It engaged directly with the role of teacher education in progressing curriculum innovation from university coursework into schools as physical education teacher education (PETE) pre-service teachers translate the curriculum and pedagogical knowledge addressed in coursework into enacted curriculum while on professional teaching practice (PTP). In so doing, the study connected with a sustained line of critical commentary in the physical education field. This commentary suggests an apparent inability of initial teacher education to generate curriculum and pedagogy that can effectively challenge the longstanding dominance of sport-based multi-activity curriculum and associated, traditional pedagogies (see for example, Crum, 1983; Kirk, 2010; Locke, 1992; Penney & Chandler, 2000).

Innovation may be categorized as Closed Innovation and Open Innovation based on the policy whether ideas remain constrained within the organization or even shared externally. Henry (2006) defines Open Innovation as the use of purposive inflows and outflows of knowledge to accelerate internal innovation. Open innovation however explicitly incorporates business model as the source of both value creation and value capture. Therefore, present research focused on the open innovation to stimulate Malaysian trainee teachers' internal innovation in order to achieve greater learning outcomes. ICTs, e-learning and innovation are often considered by government and researcher greeters as effective solutions for providing equal opportunities for instruction and success in schools everywhere (Barbour, 2010; Canadian Council of Learning, 2009; Conseil Supérieur de l'Éducation, 2009). However the need for change and innovation in education has yet to provide enough orientation and time for teachers to change their practices in transforming students' learning environment into deeper understanding or knowledge creation. Teachers frequently cite lack of time as a primary reason for failing to implement an intervention with integrity (Dusenbury, Brannigan, Falco & Hansen, 2003; Klingner, Vaughn, Hughes & Arguelles, 1999). The demands of time also impact the acceptability of interventions more broadly (Elliott, 1988), as new interventions almost always require training of those implementing the changes and, often, personnel in other parts of the system. Furthermore, if teachers perceive no advantage to a new/innovative program or practice that incurred higher costs when compared to the current practice, they are unlikely to adopt it (Harris, 1979). Consequently, the expected changes rarely occur or are rarely sustainable (Cuban, 2010; Christensen, Johnson & Horn, 2008; Seidel & Perez, 1994). Therefore, deep educational innovation remains a major challenge for our schools and our society (Bereiter, 2002; Christensen, Johnson & Horn, 2008; Cuban, 2010; UNESCO, 2008).

In summary, by referring to the above literature review, present research focuses on trainee teachers' creative collaboration processes that explore creative thinking skills which may comprise attention, memory, information and associative processes, analogical thinking, metaphorical thinking, problem identification and solving, intuition, unconscious processes, and mindfulness. They were given four weeks to produce a game project creatively and innovatively based on traditional games as part of the coursework but optional for publication which has been

suggested by Adamczyk et al. (2012). Present research would adopt and adapt Kangas's (2010) CPL Model that emphasized on the linkage among curriculum-based learning, game co-creation, and play, except for the usage of new technologies or computer games in playing learning environment at different level of educational setting. The Game Carnival set as the innovation contest platform to realize innovative game project and to foster creative cum innovative among Malaysian trainee teachers.

4. Methodology

Qualitative research method was adopted for this study to collect and analyze data on thirty six Malaysian Trainee Teachers in twelve groups for four weeks related learning experiences of innovating traditional games systematically based on Kangas's (2010) CPL model. It consists of four processes from orientation (knowledge co-creation), creation (game design and creation), game play (small group), and elaboration (small group or whole class levels — elaboration, reflection, and evaluation). The model was adopted and adapted as follows:

4.1 Orientation

PJMS3092 physical education classes were considered as the orientation of knowledge creation level. Since Traditional Games was part of the course outline, the trainee teachers were given task to create innovative traditional games by providing opportunity to play traditional games, in addition to their past traditional game experiences. During the class, trainee teachers discussed the problem statements and brainstormed ideas. They modified and created innovative traditional games based on their initial ideas and past experiences. Knowledge co-creation requires trainee teachers to have some knowledge orientation to traditional games before they could create an innovative traditional game. Therefore the trainee teachers' used their own gained experiences from playing traditional games in this course successfully. Group discussion and teamwork also helped the trainee teachers to create innovative traditional game.

4.2 Creation

Innovative traditional game design and creation was assigned as part of the coursework task requirement in order to motivate creative and innovative participation (Davies et al., 2013). Group members brain storm problem statements and discussed few games based on their own experiences. On the first week all the group had some idea on what to create based on the need to create a new modified game. Traditional games are popular in Malaysia and played during free or leisure time activity (Balakrishnan, Ooi & Vengadasalam, 2016). Ancestors utilized these leisure time traditional games during their leisure activity. Some trainee teachers had the opportunity to experience playing the traditional games of their own, some don't. However, during the discussion session, all group members were able to contribute their rationale for choosing a particular game. The following week each team members justify reasons to create an innovative traditional game with modified game design and procedures.

4.3 Game Play

During the game carnival, the task was assigned to each group member and they carried out their task successfully. All the visitors who came to visit each game station were welcomed and briefed on the game innovation created by the group members. Trainee teachers explained how the game should be played to the visitors. In order to make the game attractive and interesting to the participants, the rule and the requirements of the game are made short and simple to understand. The entire group also designed creative posters, which explained very well on the game rules that they created. Interested participants were given chance to learn, to do

hands-on, and experience the fun movement in competitive situation in accordance to the needs, abilities, and interests.

4.4 Elaboration

In this study, the elaboration process was the data collection level. It comprised observational checklist, reflective journal, and semi-structured focus group interview. While the game carnival was setted as innovation contest to evaluate their innovative traditional games.

An inductive approach was applied to analyze all the various sources of qualitative data because it can capture and interprets meaningfully (Gioia, Corley & Hamilton, 2013; Lincoln & Cuba, 1985). Focus group interview data were collected after the game carnival. Participation in the focus group volunteered to be interviewed. Focus group interviews were semi-structured and were remained open for any additional questions that arose. Identification numbers were assigned to protect the trainee teachers' identity pseudonyms for data analyses. Audio recordings were transcribed verbatim and were then distributed to each author for content validity. The data then were then analyzed using six stages of thematic analysis: collect data, prepare data for analysis, read through data, code the data, code the text for description and code the text for themes. All the collected data were analyzed with Nvivo data analyses process. All the four authors then met to discuss their individual coding decisions and consensus was reached.

5. Findings and Discussion

Following Kangas' (2010) CPL Model, it initially shows the discoveries of the trainee teachers' learning point of view on innovative traditional games. Table 1 illustrated the four themes of decision-making, problem solving, creativity, and teamwork that emerged from the transcribed interview data.

Finding of this study supported trainee teachers' positive experiences innovating traditional game project for the games carnival. The experience of the carnival itself was much of an enjoyment for the participated trainee teachers. Innovation in these games were introduced by these trainee teachers by systematically playing with their friends. According to Kangas's CPL Model this is the Knowledge creation level. Another aspect that has been highlighted during the group discussions was the opportunity for enhancement creating and modifying traditional game for the new generation. "By infusing modern elements into the traditional game teacher trainees have given a new look to the games (VR/L8-9)." The findings indicated that the learning is not just about the cultural aspect of the games, but also about how trainee teachers' creativity thinking process developed during the modified game creating sessions. Past studies reported that more creative environment could enhance trainee teachers' creativity (Sternberg, 2003: Weston, 2007; Gardner, 1993; Howell, 2008)

The qualitative data also showed some themes like decision-making, problem solving, creativity and teamwork. The innovation of games project prepared a platform for trainee teachers to invent new games. The second Level in the Kangas model is the Creation Level. Trainee teachers were asked to brainstorm and modify the chosen game for their group project. During the innovation process, an atmosphere of cooperative competition was fostered among trainee teachers to value the teamwork. These experiences supported trainee teachers to apply the knowledge of innovation in school later. The finding also supported that they were happy and felt good to learn about their culture, as indicated by "We learned that there are elements from different culture." and "I felt proud because I was learning what my ancestors used to play". Trainee teachers thinking critically by decision making and problem solving. As reported in past studies (Howell, 2008; Padget, 2012). Trainee teacher's learned

how to create a new game design for the students in school later.

During the game carnival, the trainee teachers' portrayed good game organizing management and leadership qualities. This is the Level 3 of the Kangas Model that is Game Play. Findings from this study also added knowledge that the reflective practices helped trainee teachers' understandings of how their learning experience of innovation will be very meaningful in future. The trainee teacher reflected their learning experience as "By creating this innovative game, the experience can be used in my teaching in future".

This journal writing practice provided a great opportunity for trainee teachers to describe what they had learnt and engaged themselves by participating in these games during game projects. Moreover, learning innovation in games project itself will enhance trainee teachers' creativity. What discovered were the learning experiences and the trainee teachers' ability to use language deliberately to discuss their game learning experiences as a reflective practice. More and more reflective practices enhance trainee teacher's ability to bring out new ideas (Padget, 2012).

Table 1 Themes: Teacher Trainers' Learning Experiences

Themes	Free Notes
Decision making	"I got a lot of ideas innovating game" (Int/FG1/L46) "creating Innovative traditional game, I believe that I can attract young children" "We manage to brainstorm ideas"(Int/FG3/l34) "We innovate, did hybrid game where we mixed *gully* with mainstream modern game with Petanque" (Int/FG1/L57) By infusing modern elements into the traditional game teacher trainees have given a new look to the games" (VR/L8-9)
Problem solving	Students were able to identify problem arise while conducting the game and decided how to solve the problem while playing game" (OC/L5) The materials used for this game is environment friendly; such as old newspaper, tape, A4 paper's cover, and portable old newspaper court (VR/L38-40) We innovated how to make this game interesting so that we can reduce the waiting time and students excited to play this game anywhere.(Int/FG/L29) Trainees also reported that the experience helped them during teaching practice in school
Creativity	"I learned to become more creative (Int/FG3/L7) "By organizing this traditional game, I learned that making this activity make me able to think creatively and do critical thinking"(Int/FG3/L21) "By creating this innovative game, the experience can be used in my teaching in school later" (Int/FG2/L74) The students were able to adapt and innovate the traditional games which has been long forgotten (VR/L6-8) Students innovated this game; by replacing the gravel (batu kelilir) with items like rubber bands, bottle caps and buttons. Furthermore, to make the game more interesting they designed variation wheel (VR/L13-15) This game has indeed enhanced students' creative thinking whereby they could think of obstacles to infuse the element of fun to the game (VR/L29-31) Ceper Alkagi game enhanced participants' patience and creative thinking whereby they have to search for better strategy to knock down opponents' balls (VR/L40-42)
Teamwork	The element of cooperation and team spirit is very obvious during the game carnival game (OC/L2), (VR/L30) Students portrayed good leadership quality and teamwork such as addressing the visitors and explaining to them about their innovation to the visitors (VR/L18-19) Students revealed true teamwork when they took turn to demonstrate the procedure of their game to the visitors who visited their station (VR/L51-52)

6. Conclusion

The study explored trainee teachers' learning experiences innovating traditional games in few games' interactions sessions and during the game carnival. It can be concluded that this program, which was organized by th Teacher Training Institute in Malaysia was able to enhance trainee teachers' creative and innovative thinking

skills. Trainee teachers described that they have learned on how to innovate games and it is possible to learn creativity through these types of activities as discussed by researchers (Balakrishnan et al., 2015). Learners are likely to remember and understand what they have learnt because of their direct involvement in solving the problems while creating and playing games (Pickard & Maude, 2014; Balakrishnan et al., 2015; Balakrishnan et al., 2016). Besides that, the presence elements of creativity in the process make the art of learning more meaningful for teachers in Teacher Training Institutes.

References

Adamczyk S., Bullinger A. C. and Möslein K. M. (2012). "Innovation contests: A review, classification and outlook", *Creativity and Innovation Management*, Vol. 21, No. 4, pp. 335–360.

Andiliou A. and Murphy P. K. (2010). "Examining variation among researchers' and teachers' conceptions of creativity: A review and synthesis of contemporary research", *Educational Research Review*, Vol. 5, pp. 201–219.

Babalis T., Xanthakou Y., Kaila M. and Stavrou N. (2012). "Research attitude and innovative-creative thinking: Differences between undergraduate male and female students", in: *International Conference on Education and Educational Psychology (ICEEOSY 2012), Procedia – Social and Behavioral Sciences*, Vol. 69, pp. 1452–1461.

Balakrishnan M., Nadarajah G., Rahim N. and Mei A. (2015). "Teacher trainers' motivation in transformation of teaching and learning: The fun way approach", World Academy of Science, Engineering and Technology, International Science Index 108, *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, Vol. 9, No. 12, pp. 3993–3996.

Brand G., Hendy L. and Harrison R. (2015). "Mining the gap! Fostering creativity and innovative thinking", *Science Direct Procedia Technogy*, Vol. 20, pp. 79–84.

Barbour M. K. (2010). "State of the nation study: K-12 online learning in Canada", Vienna, VA: International Council for K-12 Online Learning, available online at: http://www.inacol.org/research/docs/iNACOL_CanadaStudy10-finalweb.pdf.

Bereiter C. (2002). *Education and Mind in the Knowledge Age*, Mahwah, NJ: Lawrence Erlbaum Associates.

Bunkers S. S. (2011). "What is not yet: Cultivating the imagination", *Nursing Science Quarterly*, Vol. 24, No. 4, pp. 324–328.

Canadian Council of Learning (2009). "State of e-learning in Canada", Ottawa, ON: Author, available online at: http://www.ccl-cca.ca/pdfs/E-learning/E-Learning_Report_FINAL-E.PDF.

Chan Z. C. Y. (2013). "A systematic review of creative thinking/creativity in nursing education", *Nurse Education Today*, Vol. 33, pp. 1382–1387.

Chandler T. J. L. (1996). "Reflection and further question: Teaching games for understanding method", *Journal of Physical Education, Recreation, and Dance*, Vol. 67, No. 4, pp. 49–53.

Christensen C. M., Johnson C. and Horn M. (2008). *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns*, New York: McGraw-Hill.

Conseil supérieur de l'éducation (2009). "L'éducation en région éloignée une responsabilité collective, Québec: Government of Québec, available online at: http://www.cse.gouv.qc.ca/fichiers/documents/publications/CEBE/50-0188.pdf.

Craft A. (2005). *Creative in Schools: Tensions and Dilemmas*, Abingdon: Routledge New York.

Craft A. (2008). "Studying collaborative creativity: Implications for education", *Thinking Skills and Creativity*, Vol. 3, No. 3, pp. 241–245.

Craft A., Cremin T., Burnard P. and Chappell K. (2008). "Possibility thinking with children aged 3-7 in England", in: Craft A., Cremin T. & Burnard (Eds.), *Creative Learning 3-11 and How We Document It*, Stoke on Trent: Trentham Books.

Crum B. J. (1983). "Conventional thought and practice in physical education: Problems of teaching and implications for change", *Quest*, Vol. 45, pp. 336–356.

Cuban L. (2010). *As Good as it Gets*, Boston, MA: Harvard University Press.

Davies D., Jindal-Snape D., Collier C., Digby R., Hay P. and Howe A. (2013). "Creative learning environments in education: A systematic literature review", *Thinking Skills and Creativity*, Vol. 8, pp. 80–91.

Davies D., Jindal-Snape D., Digby R., Howe A., Collier C. and Hay P. (2014). "The roles and development needs of teachers to promote creativity: A systematic review of literature", *Teaching and Teacher Education*, Vol. 41, pp. 34–41.

Boyd D. and Goldernberg J. (2014). *Inside the Box: A Proven System of Creativity for Breakthrough Result*, New York: Simon & Schuster Paperbacks.

Dusenbury L., Brannigan R., Falco M. and Hansen W. B. (2003). "A review of research on fidelity of implementation: Implications for drug abuse prevention in school settings", *Health Education Research*, Vol. 18, No. 2, pp. 237–256.

Egan K. (2005). *An Imaginative Approach to Teaching*, Vol. 1: *Thinking Skills and Creativity*, San Francisco: Jossey-Bass. pp. 108–119.

Elliott S. N. (1988). "Acceptability of behavioral interventions in educational psychology", in: J. C. Witt, S. N. Elliott & F. M. Gresham (Eds.), *Handbook of Behavior Therapy in Education*, New York, NY: Plenum, pp. 121–150.

Figl K. and Recker J. (2016). "Process innovation as creative problem solving: An experimental study of textual descriptions and diagrams", *Information & Management*, Vol. 53, No. 6, pp. 767–786.

Gertner J. (2012). *The Idea Factory: Bell Labs and the Golden Age of American Innovation*, New York, NY: The Penguin Press.

Gioia D. A., Corley K. G. and Hamilton A. L. (2013). "Seeking qualitative rigor in inductive research notes on the Giola Methodology", *Organisational Research Methods*, Vol. 16, pp. 15–31.

Grainger T., Goouch K. and Lambirth A. (2005). *Creativity and Writing: Developing Voice and Verve in the Classroom*, London: Routledge.

Hämäläinen R. and Vähäsantanen K. (2011). "Theoretical and pedagogical perspectives on orchestrating creativity and collaborative learning", *Educational Research Review*, Vol. 6, pp. 169–184.

Harris M. (1979). *Cultural Materialism: The Struggle for a Science of Culture*, New York, NY: Random House.

Jeffery B. (2006). "Creative teaching and learning: Toward a common disclosure and practice", *Cambridge Journal of Education*, Vol. 36, No. 3, pp. 399–414.

Kampylis P., Berki E. and Saariluoma P. (2009). "In-service and prospective teachers' conceptions of creativity", *Thinking Skills and Creativity*, Vol. 4, pp. 15–29.

Kanga M. (2010). "Creative and playful learning: Learning through game co-creation and games in a playful learning environment", *Thinking Skills and Creativity*, Vol. 5, pp. 1–15.

Kirk D. (2010). *Physical Education Futures*, London: Routledge.

Klingner J. K., Vaughn S., Hughes M. T. and Arguelles M. E. (1999). "Sustaining research-based practices in reading: A 3-year follow-up", *Remedial and Special Education*, Vol. 20, No. 5, pp. 263–287.

Konstantinidou E., Michalopoulou M., Agelousis N. and Kourtesis T. (2013). "Primary physical education perspective on creativity: The characteristics of the creative student and their creative outcomes", *International Journal of Humanities and Social Science*, Vol. 3, No. 3, pp. 234–247.

Lassig C. J. (2013). "Approaches to creativity: How adolescents engage in the creative process", *Thinking Skills and Creativity*, Vol. 10, pp. 3–12.

Layng T. V. J., Stikeleather G. and Twyman J. S. (2006). "Scientific formative evaluation: The role of individual learners in generating and predicting successful educational outcomes", in: R. F. Subotnik & H. J. Walberg (Eds.), *The Scientific Basis of Educational Productivity*, Charlotte, NC: Information Age Publishing, pp. 29–44.

Lincoln Y. S. and Guba E. G. (1985). *Naturalistic Inquiry*, California: Sage.

Locke L. (1992). "Changing secondary school physical education", *Quest*, Vol. 44, No. 3, pp. 361–372.

Mahdi R., Sukarman S. S. and Yok M. C. K. (2015). "Fostering creativity through innovation engagement in science and technology education: Case study of Universiti Teknologi MARA students", *Science Direct Procedia – Social and Behavioral Sciences*, Vol. 167, pp. 256–260.

Manzi J. (2012). *Uncontrolled: The Surprising Payoff of Trial-And-Error for Business, Politics, and Society*, New York, NY: Basic Books.

Martens B. K., Peterson R. L., Witt J. C. and Cirone S. (1986). "Teacher perceptions of school-based interventions", *Exceptional Children*, Vol. 53, No. 3, pp. 213–223.

Mobbs C. W. (December 2010). "Why is innovation important?", North Bicester, Oxfordshire, UK: Innovation for Growth, available online at: http://www.innovationforgrowth.co.uk/whyisinnovationimportant.pdf.

Mumford M. D., Waples E. P., Antes A. L., Brown R. P., Connelly S., Murphy S. T. and Devenport L. D. (2010). "Creativity and ethics: The relationship of creative and ethical problem-solving", *Creativity Research Journal*, Vol. 22, No. 1, pp. 74–89.

Newton D. P. (2013). "Moods, emotions, and creative thinking: A framework for teaching", *Thinking Skills and Creativity*, Vol. 8, pp. 34–44.

Newton L. D. (2012). *Creativity for A New Curriculum: 5–11*, London, Routledge.

Newton L. and Beverton S. (2012). "Pre-service teachers' conceptions of creativity in elementary school English", *Thinking Skills and Creativity*, Vol. 7, pp. 165–176.

Penney D. and Chandler T. (2000). "Physical education: What futures?", *Sport, Education and Society*, Vol. 5, No. 5, pp. 71–88.

Pickard A. and Maude P. (2014). *Teaching Physical Education Creatively*, London: Routledge.

Piffer D. (2012). "Can creativity be measured? An attempt to clarify the notion of creativity and general directions for future research", *Thinking Skills and Creativity*, Vol. 7, pp. 258–264.

Quay J. and Peters J. (2012). *Creative Physical Education: Integrating Curriculum through Innovative PE Projects*, Champaign, IL: Human Kinetics.

Reilly R., Lilly F., Bramwell G. and Kronish N. (2011). "A synthesis research concerning creative teachers in a Canadian context", *Teaching and Teacher Education*, Vol. 27, No. 3, pp. 533–542.

Rhodes M. (1961). "An analysis of creativity", *Phi Delta Kappan*, Vol. 42, pp. 305–310.

Richards R. (1999). "Four P's of creativity", in: M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of Creativity*, Vol. 1, pp. 733–742. San Diego, CA: Academic Press.

Rogers E. and Shoemaker F. (1971). *Communication of Innovations*, New York, NY: Macmillan.

Rogers E. (1995*). Diffusion of Innovations*, New York, NY: Free Press.

Rogers E. M. (1983). *Diffusion of Innovations* (3rd ed.), New York, NY: Free Press.

Rogers E. M. (2003). *Diffusion of Innovations* (5th ed.), New York, NY: Free Press.

Runco M. A. (2003). "Education for creative potential", *Scandinavian Journal of Educational Research*, Vol. 47, No. 3, pp. 317–324.

Runco M. A. (2007). *Creativity Theories and Themes: Research, Development, and Practice*. Amsterdam, The Netherland: Elselvier.

Saracho O. (2012). "Creativity theories and related teachers beliefs", *Early Child Development and Care*, Vol. 182, No. 1, pp. 35–44.

Sawyer R. K. (2006). "Educating for innovation", *Thinking Skills and Creativity*, Vol. 1, No. 2, pp. 84–94.

Schultz C., Zipple-Schultz B. and Salomo S. (2012). "Hospital innovation portfolios: Key determinants of size and innovativeness", *Health Care Management Review*, Vol. 37, No. 2, pp. 132–143.

Simonton D. K. (1995). "Exceptional personal influence: An integrative paradigm", *Creativity Research Journal*, Vol. 8, No. 4, pp. 371–376.

Sloane P. (2016). *Lateral Thinking Puzzlers*, New York: Sterling Publishing Company.

Stables K. (2009). "Education for environmental sustainability and educating for creativity: Actively compatible or missed opportunities?", *International Journal of Technology and Design Education*, Vol. 19, pp. 199–219.

Tin T. B., Manara C. and Ragawanti D. T. (2010). "Views on creativity from an Indonesian perspective", *ELT Journal*, Vol. 64, No. 1, pp. 75–84.

UNESCO (2008). *ICT Competency Standards for Teachers*, Paris: UNESCO.

Vygotsy L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*, M. Cole, V. John-Steiner, S. Sribner, & E. Souberman (Eds.), Cambridge, MA: Harvard University Press.

Webster A. and Campbell C. (2006). "Enhancing the creative process for learning in primary technology education", *International Journal of Technology and Design Education*, Vol. 16, No. 3, pp. 221–235.

West M. A. and Farr J. L. (1990). "Innovation at work", in: M. A. West & J. L. Farr (Eds), *Innovation and Creativity at Work: Psychological and Organizational Strategies*, Chichester, England: Wiley, pp. 3–13.

Witt J. C. and Martens B. K. (1983). "Assessing the acceptability of behavioral interventions used in classrooms", *Psychology in the Schools*, Vol. 20, pp. 510–517.

Wright S., McNeill M., Fry J., Tan S., Tan C. and Schempp P. (2006). "Implications of student teachers' implementation of a curriculum innovation", *Journal of Teaching in Physical Education*, Vol. 25, pp. 310–328.

Wu H. Y., Wu H. S., Chen I. S. and Chen H. C. (2014). "Exploring the critical influential factors of creativity for college students: A multiple criteria decision-making approach", *Thinking Skills and Creativity*, Vol. 11, pp. 1–21.