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Research Article

Fostering Cognitive and Creative Thinking Styles Using Educational Tools Aimed at the "Creative Economy" Model in the Process of Vocational Education and Training

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Abstract

This study has experimentally tested how the use of educational tools aimed at the "creative economy" model in the process of vocational education and training improves cognitive and creative thinking styles of the students majoring in Art and Design. This research has shown that the use of the applied "semi-virtual" learning environment aimed at the "creative economy" model combined with regular brain and memory training is capable to foster cognitive and creative thinking styles when integrated into the process of vocational education and training of the students majoring in Art and Design.

Keywords: creative economy, creative thinking styles, cognitive activity, blended learning model.

Introduction

The "Creative economy" - in which tertiary education plays the driving role – emerged as a new paradigm of economic growth involving economic, cultural, social and technological activities to have been linked at macro and micro levels with the overall economy (Bakhshi et al., 2013; Ondieki & Akuno, 2016). The theorists of the creative economy concept claim that creative and cultural knowledge and skills accompanied by digital capability, promote innovation in the economy, going beyond the boundaries of creative industries (Hearn et al., 2014; Potts & Cunningham, 2008,). A challenge it has brought about is the stipulation of the workforce transformation, from labour intensive into making intensive use of creativity (Araya & Peters, 2010; Portnova, 2016b). This radical change accelerated development and implementation of new cross-sectoral strategies, policies and systems for modernisations in education to strive for students to be autonomous (self-paced and self-reliant in learning), responsible and creative (Comunian et al., 2015). Additionally, the individual is expected to acquire 21st century competencies "associated with growth in the cognitive, interpersonal, and intrapersonal domains" (Ontario Public Service, 2016) and characterised as being *transversal* (relevant to a broad range of occupations and sectors), *multi-dimensional* (combines knowledge, skills and attitudes and associated with individual's *readiness to meet a challenge* when solving complex problems (OECD, 2005).

Using to the maximum extent practicable of human capital in the settings of the creative knowledge-driven economy stipulates placing the human resources into social and cultural capital networks. To make it occur, an educational trident, integrating competencies in innovation (which are based on creativity education combined with entrepreneurship/business education), transdisciplinary approach to education and networks, must be developed. Additionally, it seems essential that all educational interventions were intended to build creativity capability for specific domains in the scientific-technical and creative-cultural areas (Hearn & Bridgstock, 2010; Portnova, 2016a; 2018).

Having accepted the significance of creative industries in the growth of their economies, many countries and regions are improving their education systems through various support programs to be more assistant for creative industries. As the study on implementation of the "Creative Europe" project suggests, demonstrative examples of those successfully implemented programmes may be found in the UK, Finland, the Netherlands, Spain or Austria (Lazzaro, 2016). The "Creative Europe" project seeks to address, among other things, participants' employability through offering them learning opportunities to acquire 21st century competencies related to cognitive, creative, interpersonal, and intrapersonal activity, "be it through formal learning at recognised institutions which participate in projects or through non-formal activities focused on artistic learning or on soft skills in the culture and art sector" (European Commission, 2018). Nevertheless, the above programme and most of others are still in the implementation stage with insufficient level of evaluation and with the use of duplicity strategy to apply them. Furthermore, this situation provides a reason to take a closer look at Ukraine and study how effective it could be to apply educational tools aimed at the "creative economy" model to foster cognitive and creative thinking styles of the students in the educational (institutional) settings of the country (Ukraine) where more traditional industries are dominant.

Therefore, the specific research questions were as follows:

1. To what extent does the learning model based on best practices of "Creative Europe" project foster cognitive and creative thinking styles and improves their academic performances?

2. How effective are the educational tools, which are aimed at creative economy, in fostering cognitive and creative thinking styles of the students?

Materials and Methods

This research relies on empirical and statistical methods used for conducting an experimental study of fostering cognitive and creative thinking styles using tailored learning environment. This study used a mixed-methods approach based on collection quantitative data to obtain the overall picture of a problem and qualitative data to reveal explanatory details. The use of blended learning model and traditional teaching resulted data were considered independent variables of the research while students' academic achievements were the dependent variable.

The study was a continuous flow of three stages: (1) *empirical* – to study of the current state of implementation of the "Creative Europe" project in Ukraine, educational support provided by institutions to the students as the future human capital for the creative industries; to develop the concept of learning environment for the students majoring in Art and Design meeting the objectives of the creative economy model; (2) *experimental* – to do cognitive online tests, face-to-face sessions, tutorials, project-driven learning; (3) *analytic* – to process the experimental data collected.

Empirical involved examination of the websites of Lviv National Academy of Arts, Kharkiv State Academy of Design and Arts, Kyiv State Academy of Decorative Arts and Design named after M. Boychuk, Kyiv National University of Technology and Design, Cherkasy State Technological University and "Creative Europe" YouTube Channel to obtain the latest news about project realisation. More than 150 surveys took place within the project among the teachers/tutors and students majoring in Art and Design and representatives companies from various creative industries (advertising, architecture, fashion, design, performing arts and information technologies) in Ukraine in order to evaluate their instructive needs and define how they are addressed by existing support. For the reason that the surveys were more broadly oriented, in this article only education related issues will be addressed.

The concept of learning environment for the students majoring in Art and Design aimed at creative economy was developed during 2016 and 2017.

Prior to the experiment, Yuliia Fediv, the CEO for the Ukrainian Cultural Foundation and Director of the National Office of EU Program "Creative Europe" for Ukraine, was twice invited to provide an expertise for this project and evaluate its outcomes at the wrap-up stage. Elena Vyshniakova, Founder of Ukrainian Global School, was involved as an expert of the system of instruction. Sergii Markov, PhD holder in Psychology, Head of GeniusRevive Group, was an expert consultant, supervisor and advisor on system of fostering and testing the cognitive thinking style of the students involved.

Following this, the University Board of Academics acting as ethics committee gave their unanimous approval to make slight changes to the curriculum to run the experiment as they contemplated it worthwhile and the one which might bring benefits to the students. Additionally, the (randomly) selected students were provided with sufficient information about the project purpose, its objectives and expected outcomes so that they could make an informed decision as to whether to get involved in the research or to withdraw from it at freely.

Applied "semi-virtual" learning environment combining regular classes in Arts and Design, brain games such as CogniFit, Lumosity, BrainHQ, NeuroNation, Brain Metrix, Eidetic, Fit Brains, BrainExer 2.0 and intense training in entrepreneurship, management, SMM and digital marketing, self-branding was used.

The flow of the project was as it follows.

First stage – "Fine Tune Your Skills" 21-day Marathon

The event lasted 21 days and each day the participants were assigned to do some task like to set 100 goal, create a pen portrait of their target customer, write posts that sell, market your Instagram account, make videos that sell, prepare a presentation of some art product, develop a business plan etc. Additionally, the experimental group students used the *software* - brain and memory training programmes, brain games such as CogniFit, Lumosity, BrainHQ, NeuroNation, Brain Metrix, Eidetic, Fit Brains, BrainExer 2.0 – to increase their brain capacity throughout the fulfillment pf the project.

Second Stage – Tailored Follow-up Training Sessions to Catch up with skills

Students had been mentored and tutored for the following 2 months until they had a well-designed business plan.

Key Stage – Team Game (Battle) – "Set up Your Own Online Art & Craft Shop"

The students formed five teams (clusters) representing some trend in the decorative and fine arts to compete among themselves. While competing, they received a step-by-step training in selling techniques, designing a website, a tutoring in SEO for beginners, establishing, promoting and strengthening their own brand (reputation) etc. They used free website builders like Mobirise4, Tilds and Wix to design their online shops and virtual showrooms.

Wrap-up Stage – Evaluation the results of a game by the Board of Experts nomination for "Best Implemented Project".

Mock Auction of Projects – three best projects were presented by the students to the "potential investors" and they made bids for them.

Sample

At the empirical stage, surveys were conducted among 344 teachers/tutors and students of Lviv National Academy of Arts, Kharkiv State Academy of Design and Arts, Kyiv State Academy of Decorative and Applied Art and Design named after M. Boychuk, Kyiv National University of Technology and Design, Cherkasy State Technological University to evaluate the instructive needs and discover how the existing support addresses them. Due to application of exclusion criteria list such as: student age, major, English learning purpose, teacher/tutor willingness to participate in this experiment, location of the institution, the population was reduced by 138 people and it was obtained the population size of 96 people. In order to determine the sample size to ensure the quality and reliability representativeness, the Sample Size Calculator (Google Apps) was used. It was established that N (population size) = 206, confidence interval = 8.25, and e=.05 at 95% confidence level. Therefore, the required sample size obtained was **84** people and this number was used to form the experimental and control groups for this study.

The control and experimental groups of students were formed at Kyiv State Academy of Decorative and Applied Art and Design named after M. Boychuk and were generally homogeneous in terms of demographic and performance indicators. The experimental group numbered 43 people, of which 24 were females aged 19-21 and 18 males aged 20-22. Of 41 individuals in the control group, 22 were women aged 19-21 and 19 were men aged 20-22. All participants were students in their 3rd and 4th year full-time, Specialties 022-"Design", 023-"Fine Art, Decorative Art, Restoration".

The *t-test* was administered to identify whether there were any statistically significant differences between the pre-test scores of the two groups. Both groups can participate in the experimental process as there were no statistically significant inconsistences between the mean scores of the students ($t(56)=0.72$, $p<0.05$).

Instruments

Multiple data collection tools were used in this study. An achievement test was used to respond the first research question. Focus group surveys, on the other hand, were used to answer the second research question.

Cognitive Function Test (Food for the Brain, n./d.)

The test consists of four parts and it takes 15 minutes to complete. It estimates the applicants' potential to use mental processes to solve work-related problems or to acquire new job knowledge. The test was administered twice: before and after the experiment. The answers were processed electronically.

Achievement Test

Given the time allocated to each topic, the 24 multiple-choice-item test was designed and then evaluated by five knowledge field experts and the expert in the field of measurement and evaluation. The test items were aimed to distinguished between students who are masters and non-masters. To validate the test internal reliability, it was run the Kuder-Richardson Formula 20, resulted in a reliability coefficient, which was 0.74 and indicates internal reliability.

Focus-Group Survey

To increase the validity of the results, a detailed literature review in the relevant field was performed before the survey questions were developed. A ***Textalyser App*** was used in the analysis procedure. A total of 11 students (5 males and 6 females) were involved in the focus group surveys. The questionnaire consisted of 6 questions:

1. How much study time per week did you dedicate to the project-related activities?
2. How much time per week did you spend on your brain and memory training?
3. What kind of activities did you specifically do? 4) What are the benefits of taking part in this project for you?
4. What are the problems you faced when taking part in the project?
5. What do you suggest doing to solve the problems you experienced?

Data Analysis

In order to analyze the quantitative data, a 2X2 split-plot design was used. There was used two-way ANOVA for Mixed Measures to designate the main effects for column and row factors and their interaction effect related to the efficacy of the experiment (Büyüköztürk, 2016). The data obtained through the survey were organized according to the themes and were analyzed though descriptive analysis. When analyzing, to ensure validity, a coding list was formed, and these codings were peer reviewed. Upon finishing analyses, another expert coded and interpreted some parts of the interview data by means the same coding list. The results of the two analyses were compared, and the differences were discussed and negotiated.

To deal with the data from the Focus group survey, we used a *Textalyser* (n./d.) web-based tool to process the students' responses to questions for the most commonly used positive words in the texts, which helped us identify broad categories of responses. Here, the most commonly used words we set were "involvement", "improvement", "motivation", "speed", "concentration", "memory", "current studies", "future job". Then we distributed the answers by the frequency of those words to have been set. The responses, which fell under no category, were analyzed manually.

The method of studying the motivation of professional activity (Dobre, 2013; Psychology, 2012), the method of identifying value orientations of personality of "Square of Values" (Murzina, 2014), card for the level of development of communicative skills by V. Hordienko (Trotskyi, 2018), orientation questionnaire "Personality Orientation" of B. Buss (Psychology of Happy Life, n./d.); V. Henning's "Structure of Interests" method; modified diagnostic techniques of "Motives of Studying at a Higher Educational Institution" by Semychenko (2004), emotional state self-assessment methods of A. Wessman and D. Rick (Kokun et al., 2011, p. 94), Cognitive Function Test (Food for the Brain, n./d.) were applied to assess the dynamics of the influence of the applied "semi-virtual" learning environment supported by regular brain and memory training on the development of value-motivational, cognitive and activity-reflexive components of the educational activity of students of both groups.

Results

The experiment was fulfilled in the natural conditions of the educational process. And the suggested model contributed to the student's academic performance. The table below (see Table 1) exemplifies the standard deviation values and the means of the pre-and post-test scores of the students in both groups.

It is noteworthy that while the figures (mean scores) for pre- and post-test for the experimental group decreased (from 58.33 to 54.12), the figures (mean scores) for the control group increased (from 56.38 to 57.31).

Table 2 shows whether the changes in the students' scores show statistically significant differences and depend on the model used to teach them: the applied "semi-virtual" learning environment or traditional (lectures and seminars-based).

There cannot be identified the statistically substantial difference between the mean scores of the students learning through the applied "semi-virtual" learning environment and traditional mode. There was even a small decrease observed in the mean scores of the students taught through the applied "semi-virtual" learning environment as seen in Table 1.

To address the relationship between the the applied "semi-virtual" learning environment and improvement of students' learning activity, the descriptive statistics related to the variables of the research (cognitive and creative thinking styles, academic motivation, and perceived learning) and the correlations between them were examined (see the results in Table 3).

Table 3 illustrates there are positive and significant correlations between CCTS, AM and PL figures. It was found that there is a positive noteworthy relationship between CCTS and AM (r=.41, p>.05); a

Table 1. Achievement Test Scores of the Experimental and Control Groups

Group	*Pre-test*		*Post-Test*	
	M	*SD*	*M*	*SD*
Experimental	58.33	18.883	54.12	16.13
Control	56.38	18.369	57.31	12.84

Note. SD - standard deviations; M - arithmetic average.

Table 2. The Results of ANOVA for Mixed Measures on the Students' Pre- and Post-test Scores depending on the use of either the applied "semi-virtual" learning environment or traditional (lectures and seminars-based) models

Variance Source	*SS*	*df*	*MS*	*F-value*	*P*	η^2	*n*
Between-Groups *Group(Experimental/Control)* *Error*	*23201.27 32.44* *22859.47*	*84* *1* *56*	*33.34* *422.49*	*.081*	*.772*	*0.002*	*84*
Within-Groups *Measurement /Pre-test/Post-test)* *Group*Measurement* *Error* *Total*	*10841.72* *11.24* *187.31* *104789.02* *20693.06*	*84* *1* *1* *57* *117*	*11.18* *168.32* *186.155*	*.058* *.887*	*.797* ***.342***	*0.002* *0.015*	*84*

Note. *p*>.05; ANOVA, analysis of variance; *SS* – sum of squares; *df* – degrees of freedom; *MS* – mean square; η^2, measure of strength of relationship (eta squared); *n* – the number of students.

Table 3. Descriptive Statistics and Correlations Between Variables

Variables	*1*	*2*	*3*
1. Cognitive and creative thinking styles (CCTS)	1.00		
2. Academic Motivation (AM)	.41**	1.00	
3. Perceived Learning (PL)	.69**	.43**	1.00
Mean (Likert type mean score)	74.13 (4.11)	140.03 (5.00)	17.37 (3.47)
Standard Dev.	11.70	24.29	3.97

*p>.05. **p<.01.

positive substantial relationship between LR and PL is also observed (r = .69, p> .05); and there is a positive noteworthy relationship between AM and PL (r = .43, p>.05). All correlation values are positive which means that the the applied "semi-virtual" learning environment fosters cognitive and creative thinking styles in the students.

Results of processing student opinions obtained through a focus group survey

1) *How much study time per week did you dedicate to the project-related activities?* The participants were asked what amount of time they spent on performing project-related activities a week. **2** out of **11** stated they dedicated-two hours to do the above, **2** students reported spending three-four hours, while the other students spent four-five hours.

2) *How much time per week did you spend on your brain and memory training?* Replying to this question 9 stated they spent 15 – 40 min on this during the course of the day (usually in the first half of it). 3 out of 11 dedicated 1-1,5 hour every day. 1 person confessed she quitted after the 16th day.

3) *What kind of activities did you specifically do?* When asked the students what they specifically did and they primarily mentioned doing web-research to perform project work (4 out of 11 people), self-study (11 people), watched instructional video (10 students). They also collected information for presentations (9 out of 11 respondents), maintaining their web pages, dealing with marketing and sales.

4) *What are the benefits of taking part in the project for you?* To respond this question, the students stated that they were able to apply professionalism-related knowledge into practice (11 students), to become a quick thinker (all participants), to self-develop (10 people), to increase their academic performance (8 students), to experience the settings and specifics of their job (9 students), to raise their confidence and motivation (10 students).

5) *What are the problems you faced when taking part in the project?* When asked what problems the students encountered while learning through participating in this project, 2 out of 11 stated they sometimes experienced motivation problems, 9 students said they were challenged with the content, 2 students faced problems related to learning mode and 1 person blamed herself for procrastinating all the time.

6) *What do you suggest doing to solve the problems you experienced?* As for the students' suggestions to resolve the problems, 1 student responded they would give preference to lecture-seminar-based learning to better deal with the content, 4 suggested increasing the amount of face-to-face portion of instruction.

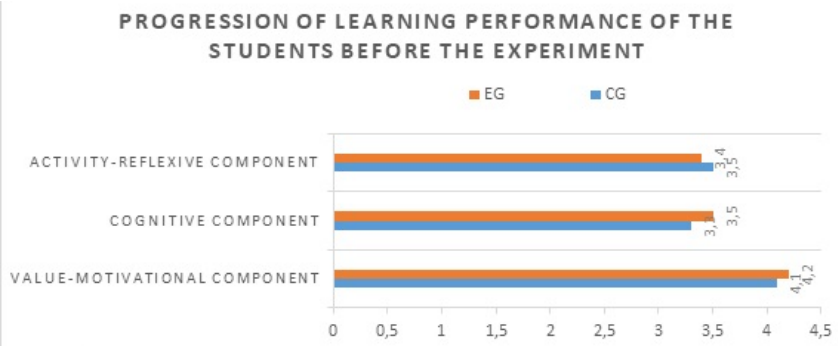
Additionally, the dynamics of the influence of the applied "semi-virtual" learning environment supported by regular brain and memory training on the development of value-motivational, cognitive and activity-reflexive components of the educational activity of students of control and experimental groups using a 5-point scale was evaluated (see Figures 1 and 2 below).

Having compared the visualized indicators of the degree improvement in value-motivational, cognitive and activity-reflexive components of the educational performance of the students of control and experimental groups before and after the experimental stages, it was noted the positive dynamics in above-mentioned components of educational activity in the students at the higher education institution. It was in contrast to the control group, where the growth of the indicators was relatively smooth and insignificant, in the experimental group the largest changes occurred in the activity-reflexive component and amounted to 1.2 points of growth, while the same increase occurred in the other two components with a difference of 0.7 in the cognitive component and 0.6 in value-motivational one.

Moreover, 87% focus group students interviewed after the treatment reported improvement of their academic achievements in those professionalism-related courses where internet research is required and Achievement Post-Test Scores showed a positive change of approximately 11,5%.

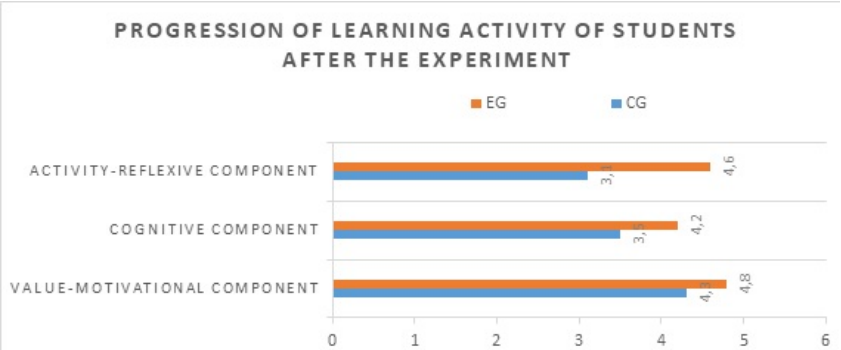
Restrictions of the study

The main restriction of this study is the participation of the students of only one higher educational institution in it. One more restriction can be considered the age category of students of control and experimental groups, because only bachelor qualification level students of the 3rd and 4th year were involved in the project. Prejudice of the members of the research group can also be considered a restriction, as some of them were involved in the development of the learning environment, organization and running the project.



	Value-motivational component	Cognitive component	Activity-reflexive component
EG	4,2	3,5	3,4
CG	4,1	3,3	3,5

Figure 1. Progression of development of value-motivational, cognitive and activity-reflexive components of educational activity of students of control and experimental groups at the beginning of the experiment



	Value-motivational component	Cognitive component	Activity-reflexive component
EG	4,8	4,2	4,6
CG	4,3	3,5	3,1

Figure 2. Progression of development of value-motivational, cognitive and activity-reflexive components of educational activity of students of control and experimental groups after the treatment

Discussion

It is worth drawing attention to the fact that a learning environment of this type is competentcy-oriented, and is aimed at engaging students to various activities to create a learning intrigue and maintaining concentration, interest and motivation of a student to study. Furthermore, it goes in line with Sun & Wu (2016), performing group work (project work) under the supervision of the instructor motivates the students. The projects simulating the students' future job provides the purpose and tailored settings and self-study and self-reaching goals help students gain the feeling of self-confidence (Blažič et al., 2012). Such a model is also aimed at developing self-education skills and skills, which are currently considered crucial and featured in the list of key life and career Skills of the 21st Century (Bellanca & Brandt, 2010; McGonigal, 2011).

Despite the benefits, Wawer et al., (2010) outlined some limitations in the use of game-like environment:

- Underperforming the reality;
- Player's decisions lack responsibility;
- Impossible without area and hardware resources;
- Education occurs in the limited to the scope of the game environment;
- Participants often treat games as entertainment but education;
- There is a significant difference in behavior patterns of participants when they are in game and when they are in real life.

It has been also found that despite the researchers' attempts, the methods used to measure student progress in developing cognitive and creative thinking styles as part of the project do not directly assess the performance of the educational activity resulting from the learning environment. Therefore, in this study, we have attempted to identify tangible (more or less measured) and intangible (difficultly measured) improvements. In addition to the results of the above tests or surveys, we have taken into account the results of professionally designed psychological tests and quizzes, projects, answers to questions in the questionnaire on student satisfaction with participation in such a project as indicators of improving the assessment of the final control test results in their professionalism-related disciplines. In our humble opinion, important indicators of progress in the study were the interest of students in participating in the project, their confidence in their abilities, responsible attitude, and motivation, although, from our perspective, those were intangible factors (improvements).

Overall, this research has shown that the use of the applied "semi-virtual" learning environment aimed at the "creative economy" model combined with regular brain and memory training is capable to foster cognitive and creative thinking styles when integrated into the process of vocational education and training of the students majoring in Art and Design. The above model has the potential to intensify the educational activities of students of higher educational institutions of Ukraine. Provision of the vocational training to the students with the use of this model increases the overall effectiveness of their learning activities, as they get the opportunity to study in their own pace, shifting the emphasis from creating an initial sedentary and knowledge-consumption-based environment in the classroom for autonomous learning of a student. This research contributes to the study of the problem of integration of applied blended mode-based environments in the vocational training process of students of higher educational institutions in Ukraine, the use of methods for evaluating the effectiveness of such a training model, extends scientific ideas about the use of "*blended learning*" model.

Conclusion

The use of educational tools aimed at the "creative economy" model in the process of vocational education and training improves cognitive and creative thinking styles of the students majoring in Art and Design, as well as the state of development of their value-motivational, cognitive and activity-reflexive components of educational activity.

In general, students expressed positive opinion about the format and content of the project. Most students of the experimental group reported improvement in their communicative skills, speed of thinking, flexibility in problem solving, and teamwork skills. In addition, learning environment organized in accordance to the algorithm tested in this study allows shifting the formation of competencies of self-education, which are a priori a secondary process in traditional teaching, to a dominant position, where the subjective "value" of professionally significant disciplines and, as a result, professional formation and personal development, increases. Participation in educational projects of this type provides students with the opportunity to integrate competencies in innovation and digital capabilities, foster their cognitive and creative thinking styles, develop readiness to meet a challenge, and establish networks in different creative industries and domains.

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