

CONNECTING THE DOTS: LINKING CREATIVITY, SYNTHESIS SKILLS, AND THE STUDENTS' ANXIETY ABOUT THE FUTURE

Ioan Susnea, Emilia Pecheanu, Luminita Dumitriu and Adina Cocu
*University "Dunarea de Jos" of Galati, Department of Computer and Information Technology
Galati, Romania*

ABSTRACT

In the past few years we have participated in several EU funded projects, aimed to create the educational content and auxiliary ICT tools to support the development of some essential soft skills of the students: the creativity, and the ability to write syntheses of the ideas extracted from various sources. In this context, we produced an easy to use web application for the assessment of creativity based on a new scale, and we also proposed a methodology to evaluate the quality of text summaries written by our students starting from a given source. Through a serendipitous coincidence, this research occurred while we were in search of a means to assess the risk in education, and noticed that the students' anxiety about the future (AAF) might be a good measure of this risk. This paper is an attempt to make sense of the data collected using the newly created tools, by exploring the possible correlations between creativity, summarization skills, and AAF from the perspective of the students' ability to cope with the uncertainties of the future

KEYWORDS

Creativity, Synthesis skills, Anxiety about the future, Risk in education

1. INTRODUCTION

School is, certainly, a future oriented business. As educators, we claim that we "provide the students with the knowledge and skills they need to enjoy fruitful and meaningful lives" (Perna, 2013) in 10 - 20 years or more from now. But, since the future remains shrouded in uncertainty even for much shorter time horizons, this claim looks more like an example of "epistemic arrogance" (Taleb, 2007) than like a serious strategic objective. Thus, if we agree that risk is the result of the "uncertainty regarding the outcome of certain actions or events" (see Aven & Renn, 2009), it appears "that any activity expected to last, or to produce effects over a long period of time, is highly affected by risk." (Susnea et al., 2016b).

Education is a typical example of this kind of activity.

We discussed these topics from an ethical perspective in (Susnea et al., 2014), and from the perspective of the risk in education in (Susnea et al., 2016b). In both cases, we suggested that a systematic effort to develop the students' creativity could provide the students with the ability to better cope with the uncertainties of the future, and thus to mitigate the overall risk of schooling.

But we did more than just discussing these issues. In the project "Tecrino – Teaching Creativity in Engineering" (<http://www.tecrino-project.eu>), we developed educational content for an e-learning platform dedicated to teaching creativity (Susnea et al. 2015a, 2015b), and also a software application (Susnea & Vasiliu, 2016) for fast and easy assessment of the individual creativity (available online at <http://dev.ugal.ro/creativity/>). In the project iLab2 – Innovation Laboratories for the Quality of Vocational Education (www.ilab2.eu – see also Cocu et al, 2015) we focused on creating an "extraordinary environment" aimed to stimulate the group creativity, and – finally - in the project "Explain – How to Tell What You Know Well" (www.explainwell.org) we created educational content for other useful soft skills: the ability to synthesize the ideas from various sources in a text summary, the ability to create and handle mind maps and concept maps, and to improve the oral performances for public presentations. In the same project,

we also proposed a methodology to measure the value of a text summary in the educational context (Susnea & Pecheanu, 2017).

In the course of the development of the above mentioned tools, we collected a wealth of experimental data. Though we don't have yet a thorough statistical analysis of this information, in the following sections we outline some preliminary results of this work

2. A WORD ABOUT THE METHODOLOGY

Basically, what we tried to do was to measure the individual creativity, the AAF scores and the summarization skills of a group of students, and look for possible correlations between these variables.

We measured the individual creativity quotient CQ using our own scale and a dedicated software application described in (Susnea & Vasiliu, 2016). For the AAF, we initially used the Bolanowski AAF scale (Bolanowski, 2005), and later we added one item to the questionnaire: "I worry that I will not be able to complete my studies". In what concerns the synthesis skill, we used the methods described in (Garner, 1982) and (Susnea & Pecheanu, 2017) to compute a "summary efficiency quotient SEQ", as follows:

$$SEQ = \frac{AR}{CF} * K \quad (1)$$

Where:

AR - is the "accuracy rate", defined as the ratio between the number of ideas correctly identified N_i , and the total number of ideas in the source text N_t .

$$AR = \frac{N_i}{N_t} \quad (2)$$

CF is a "compression factor", defined as the ratio between the number of words in the output summary text, NW_o , and the number of words in the initial text NW_i .

$$CF = \frac{NW_o}{NW_i} \quad (3)$$

Finally, K is a scaling factor used to normalize the results in the interval [0-100].

In the early stage of the experiments, we simply applied the creativity test (Susnea & Vasiliu, 2016) and the unmodified Bolanowski test for AAF (Bolanowski, 2005) on a group of 30 students in the 5'th semester at the Department of Computer Science of our University, and we noticed a pretty clear negative correlation between the creativity quotient (CQ) and the AAF score. In parallel, we measured the CQ and SEQ quotients for a group of N=27 students, and again we noticed a correlation between the two variables (Susnea & Pecheanu, 2017).

However, the students who participated in these preliminary experiments were volunteers having overall exam results above the average, thus the sample was not really representative for the population considered. Therefore, we decided to repeat the experiment with a larger (N=62), and more diverse group of students. This time we added an item to the Bolanowski scale, and we eliminated the "manual" adjustment of the SEQ scores (aiming to a greater objectivity of the evaluation, but losing information about the ability of the students to formulate the ideas with their own words). The results are presented in the following section.

3. EXPERIMENTAL RESULTS

The charts indicating the values of the variables Cq, AAF, and SEQ for the group with size N=62 are shown in figure 1. We found that the Pearson correlation factor for the pair CQ-AAF was $r=-0.27$, indicating a weak negative linear correlation. This results supports the findings of our initial experiment, but the correlation is weaker.

For the second pair of variables CQ-SEQ, the Pearson correlation factor for this pair was $r=-0.14$ – indicating that there is no linear correlation between the students' creativity and their synthesis ability. This contradicts the results of our initial experiment with a smaller group of students, but it is unclear whether this is due to the change in the methodology of evaluating the SEQ, or to some other factor related to the structure and the size of the sample group.

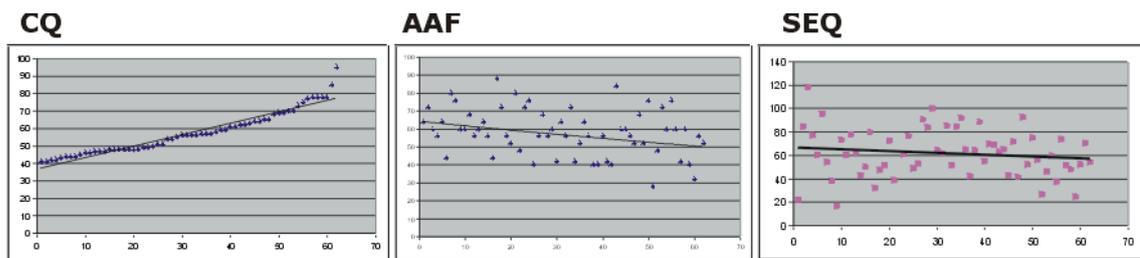


Figure 1. CQ vs AAF and SEQ comparison charts

4. DISCUSSION AND CONCLUSIONS

It appears that there is indeed a weak negative linear correlation between the students' creativity and their level of anxiety about the future.

The reason for this may be that more creative students feel better prepared to face the future, or maybe they simply care less about the future. According to Zimbardo and Boyd (2008), people having a "present hedonistic" type of personality, as determined by means of the Zimbardo Time Perspective Inventory (ZTPI see Zimbardo & Boyd, 2015) are more creative, probably because they perceive the future as distant i.e. having a higher "psychological distance" from the present (see also Chiu, 2012 and Trope, Y., & Liberman, 2010).

Further research by applying the ZTPI test to the same group of students might clarify this aspect.

It should be noted that the Bolanowki scale – designed and tested on medical students only - may not be the best instrument to measure the AAF of other young adults.

Our experimental data show that there is no correlation between the creativity quotient and the summary writing skills. However, it is possible that the correlation between CQ and SEQ is in fact nonlinear (we tried a polynomial regression and it seems to fit better on the CQ-SEQ data sets).

This may be explained by the fact that we have evaluated the SEQ based only of the verbal processing of the information, which is a typical left brain (non-creative) activity. It is likely that a methodology of evaluating the synthesis abilities starting from visual representations of the information (e.g. mind maps) may lead to different results.

Since the general topic of the risk in education seems to be only marginally studied, further research is also needed to investigate the interdependence between the AAF and the overall risk in education.

ACKNOWLEDGEMENT

This research is partly supported from the project ERASMUS+ KA2 Strategic Partnerships Italy 2014 -1-IT01- KA200 – 002650 "EXPLAIN – How to tell what you know well" (<http://explainwell.org/>)

This project has been funded with support from the European Commission.

This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

REFERENCES

- Aven, T., & Renn, O. 2009 On risk defined as an event where the outcome is uncertain. *Journal of risk research*, 121, 1-11.
- Bolanowski, W. 2005. Anxiety about professional future among young doctors. *International journal of occupational medicine and environmental health*, 184, 367-374.
- Chiu, F. C. 2012. Fit between future thinking and future orientation on creative imagination. *Thinking Skills and Creativity*, 73, 234-244
- Cocu, A., Pecheanu, E., & Susnea, I. 2015. Stimulating Creativity through Collaboration in an Innovation Laboratory. *Procedia-Social and Behavioral Sciences*, 182, 173-178.
- Garner, R. 1982. Efficient text summarization: Cost and benefit. *Journal of Educational Research*, Vol 75, pp:275–279.
- Perna, L. W. 2013. Preparing today's students for tomorrow's jobs in metropolitan America. University of Pennsylvania Press.
- Susnea, I., Pecheanu, E., Tudorie, C., & Cocu, A. 2014. The education for creativity—the only student's tool for coping with the uncertainties of the future. In *MAC ETEL 2014—International Conference on Education, Teaching and e-Learning, Prague*.
- Susnea, I. Pecheanu E., Tudorie, C. 2015a. Initiatives towards an education for creativity. *Procedia-Social and Behavioral Sciences*, 180, 1520-1526..
- Susnea, I., Pecheanu, E., & Costache, S. 2015b. Challenges of an e-Learning Platform for Teaching Creativity. In *The International Scientific Conference eLearning and Software for Education* Vol. 1, p. 376. "Carol I" National Defence University, Bucharest, Romania.
- Susnea, I. Pecheanu, E. Dumitriu, L. 2016a. The Education for Creativity May Lower the Students' Anxiety About the Future, Proceedings of the 7th Edu-World International Conference
- Susnea, I. Pecheanu, E. Dumitriu, L. 2016b. The School in Extremistan – How the Research on Creativity May Lower the Risk in Education , Proceedings of the 2nd MIC Conference, The Marconi Institute for Creativity, Bologna, Italy
- Susnea, I., & Vasiliu, G. 2016. A Fuzzy Logic Software Instrument and a New Scale for the Assessment of Creativity. *International Journal of Computers Communications & Control*, 113, 441-449
- Susnea, I. Pecheanu, E. 2017. Exploring the Connection Between the Students' Creativity and Summary Writing Skills, Proceedings of EDUCON 2017, Athens, Greece
- Taleb, N. N. 2007. *The black swan: The impact of the highly improbable* Random House
- Trope, Y., & Liberman, N. 2010. Construal-level theory of psychological distance. *Psychological review*, 1172, 440
- Zimbardo, P., & Boyd, J. 2008. *The time paradox: The new psychology of time that will change your life*. Simon and Schuster.
- Zimbardo, P. G., & Boyd, J. N. 2015. Putting time in perspective: A valid, reliable individual-differences metric. In *Time Perspective Theory; Review, Research and Application* pp. 17-55. Springer International Publishing