CAN ARTIFICIAL INTELLIGENCE SUPPORT CREATIVE PROBLEM-SOLVING?

Jarosław Orzechowski[1], Daria Kamińska[2], & Paweł Jemioło[3]
[1]II Faculty of Psychology, SWPS University of Social Sciences and Humanities, Wroclaw (Poland)
[2]Faculty of Psychology, SWPS University of Social Sciences and Humanities, Warsaw (Poland)
[3]AGH University of Science and Technology, Krakow (Poland)

Abstract
The process of creative problem-solving and stimulating innovation in organizations is long, costly, and high-risked. While risk is by definition included in the creative process, ideation can cut down time and costs of fostering innovative solutions. Inventive systems such as TRIZ (*Теория решения изобретательских задач*), CPS (Creative Problem-Solving) or DT (Design Thinking), have paved the way in supporting creators, designers, inventors and scientists in innovative solutions seeking. However, only a few of these systems are scientifically proven to be effective. It seems that CPS, initiated by Osborn, is the best evidence-based inventive system, as well as it is still developed both in empirical research, and in real-life practice (Buijs, Smulders & van der Meer, 2009; Isaksen & Treffinger, 2004; Puccio, Murdock & Mance, 2005). The main assumption of CPS is that creating innovative ideas is a phase process, i.e. following a certain universal pattern. Baer and Kaufman (2005) argue that CPS involves various skills, especially domain-specific creativity (i.e. related to expert knowledge), which is embedded in general abilities such as intelligence and motivation. However, the use of CPS requires high-class experts who are not only specialists in a specific field but also trained in creative problem-solving. Regardless of the costs, it is a bottleneck for the application of such inventive techniques on a larger scale. Therefore, new approaches in development of AI-powered creative tools to assist creators and designers seem to be emerging. One of them is @CREATE – an expert inventive system based on CPS and supported by artificial intelligence. The idea of @CREATE will be presented by the authors.

Keywords: *Creativity, creative problem solving, innovations, antifiction intelligence.*

ADOLESCENTS´ SENSE OF BELONGING AT SCHOOL: THE ROLE OF EMPATHY AND INDIVIDUAL CHARACTERISTICS

Manja Veldin, & Ana Kozina
Educational Research Institute (Slovenia)

Abstract
There are many benefits of a high sense of school belonging (i.e., lower psychological distress), yet a lot of students do not feel like they belong to their schools. Many researchers have therefore tried to increase the sense of belonging in adolescents via different interventions. One of the recent review articles (Allen et al., 2021) discovered that successful interventions targeted students' strengths and promoted positive interactions. One way these strengths and positive interactions could be targeted is to build empathy capacities. Although personal characteristics have been widely recognized as predictors of school belonging (i.e., age, gender, academic achievement, etc.) this does not seem to be the case for empathy. Only a few studies explored empathy components when addressing school belonging (i.e., Batanova & Loukas, 2014) and none, to our knowledge, have looked into empathy as a possible mediator of the relationship between personal characteristics and school belonging. The present study investigated the relationship between personal characteristics and the sense of belonging at school while investigating the mediating role of empathy on the relationship. A randomized sample of 1990 students from Slovenia (M = 15.35 years, SD = 1.23; 58.3% female) was used in a structural equation modelling to determine the relationships between the individual characteristics (gender, age, grades) and the Sense of belonging at school (OECD, 2018), while looking into the mediating role of both empathy components, namely, Empathic concern and Perspective taking (IRI; Davis, 1980). Results showed that all personal characteristics (gender, age, grades) are positively connected to both empathy components. Also, both empathy components (Perspective taking, Empathic concern) have a positive connection with the Sense of belonging at school. Furthermore, grades have a direct positive and gender a direct negative connection with the Sense of belonging at school. Lastly, both empathy components mediate all the indirect paths from the personal characteristics to the Sense of belonging at school, thus providing 6 positive indirect paths in-between. The model provides an insight into the important role that empathy has when

addressing the sense of school belonging. Not only is it connected to it, but it also mediates the paths from the personal characteristics, which is especially important for the direct negative path from gender. Addressing empathy (especially empathic concern, which has the highest connection to school belonging) is advisable when trying to influence the sense of belonging at school.

Keywords: *School belonging, empathy, adolescents, individual characteristics, positive youth development.*

USING VIRTUAL REALITY TO ASSESS READING FLUENCY IN CHILDREN

Jonathan Mirault[1,2], Jean-Patrice Albrand[2], Julie Lassault[1], Jonathan Grainger[1], & Johannes C. Ziegler[1]
[1]Aix-Marseille Université (AMU) and Centre National de la Recherche Scientifique (CNRS), Laboratoire de Psychologie Cognitive, (LPC), UMR 7290, Marseille (France)
[2]Aix-Marseille Université (AMU), Institut National Supérieur du Professorat et de l'Éducation (INSPÉ), Marseille (France)

Abstract
Here we provide a proof-of-concept for the use of virtual reality (VR) goggles to assess reading behavior in beginning readers. Children performed a VR version of a lexical decision task that allowed us to record eye-movements. External validity was assessed by comparing the VR measures (lexical decision RT and accuracy, gaze durations and refixation probabilities) to a gold standard reading fluency test – the One-Minute Reading test. We found that the VR measures correlated strongly with the classic fluency measure. We argue that VR-based techniques provide a valid and child friendly way to study reading behavior in a school environment. Importantly, they enable not only the collection of a richer dataset than standard behavioral assessments but also the possibility to tightly control the environment.

Keywords: *Reading fluency, virtual reality, lexical decision task, eye-tracking, beginning readers.*

LEARNING HABITS: DOES THE DIGITAL GENERATION HAVE DIGITAL STRESS AND HOW DOES IT AFFECT THE LEARNING OF MATHEMATICS?

Aija Cunska
Socio-technical Systems Engineering Institute, Vidzeme University of Applied Science (Latvia)

Abstract
Mathematics is one of the most important subjects that students learn at all levels of education. Understanding and competence in mathematics allows to integrate better into the labour market, perform complex calculations and model significant processes. It is mathematics that has been proven to be the most sensitive to compulsory distance learning as a result of the Covid-19 pandemic. Due to the state of emergency in Latvia, all schools were periodically closed for a total of 9 months, when the learning process could only take place in the e-environment. In this context, the study was motivated by the question "Does digital stress exist for the digital generation and how does it affect the learning of mathematics?" The aim of the study is to determine the initiators of digital stress by using the Stressor-strain-outcome framework and the consequences that students face when learning math remotely. Using the Partial Least Squares Structural Equation Modelling with SmartPLS, a survey data of 185 students were analyzed. Anxiety, lack of instantaneous feedback, risks of self-directed learning and social isolation were found to contribute to digital stress, which in turn has a negative impact on interest and performance in learning mathematics. The study helped to delve into students' feelings and needs, as well as to develop recommendations to reduce the effects of the pandemic, to manage learning processes more effectively, to gain students' respect and to promote better learning in mathematics.

Keywords: *Digital generation, digital stress, math learning, learning habits, AI4Math.*
