Demande de Publicité Internationale
Recrutements prévus dans les Projets ISITE-BFC
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Job title	**PhD Grant : Influence of manual activities on the development of cognitive functions and the appetence to microtechniques.**
Ref	Complété par UBFC
Date de mise en ligne souhaitée	**09.04.2021**
Job type (PhD, Post-doc, Engineer)	**PhD grant**
Contract duration (months)	36
Qualifications (Master degree, PhD…)	Master degree
Job hours (full time/ part time)	Full Time
Employer	UBFC – Université de Bourgogne - Franche-Comté
Host Laboratory	ELLIADD
URL Host Laboratory	http://elliadd.univ-fcomte.fr/
Address Host Laboratory	ELLIADD Lab 30-32 rue Mégevand CS 81807 25030 Besançon Cedex
Job description	**Scientific context and state of the art.** For the past few years, schooling institution has assigned a primary role to the learning through digital media and simulated world. In Western countries, students are spending more and more time in front of their screens, ranging from 4 h 45 for 8-12 years old up to 6 h 45 for 13-18 years old (Desmurget, 2018). Regardless of the purpose of this consumption, game or study, students allocate a significant volume of their daily time to stay in front of a screen and use several digital artefacts (computers, smartphones, etc.). For millions of years, humans has always used manipulation to know and explore the environment; manipulation has significantly contributed to the expansion of the brain. Today we are observing a turnaround of which we don't know where it will lead the future generations. Nowadays it becomes increasingly rare to see children "touching" and playing with objects, it becomes, on the other hand, increasingly

	frequent to see children "swiping" their index finger on a flat screen. The use of the electroencephalogram to measure the cortical potential in response to the mechanical movements of the index and middle finger, has shown how a pervasive use of the smartphone through the repetitive movement of these fingers on the screen, could introduce modifications of somatosensory cortex, as it happens for professional violinists. The results showed that the cortical potentials of the thumb and index finger of those who use a smartphone are directly proportional to the intensity of its use. These data raise some questions: if schoolchildren are no longer used to touching objects, manipulating them and exploring their nature through the five senses, how do they acquire any knowledge and show an appetite for manual activities requiring any spatial reasoning? And later, how will students be able to exploit their mental potential and to develop the expected manual skills to build any tangible artefacts? These questions are echoed in the industrial report published by BPI France (2019), which shows the difficulties encountered by several high-tech companies in recruiting young graduates. Most of these companies (82%) state that young candidates do not own all required cognitive skills (e.g., knowing how to represent physical objects in space, producing inferences). All recent pedagogical reforms in French school education have reduced students' chances to act with technical objects and instruments, to develop their appropriate skills and to increase their interest in technology and, by extension, in scientific and technical training. This observation is related to many scientific works at the crossroads of cognitive and educational sciences. Through Piaget's founding work on manipulation (1945), we know that children implicitly construct each mathematical concept that determine the physical characteristics of objects (e.g. size, length, weight, volume). Then, in a second phase, children elaborate these implicit forms and rationalize the mathematical knowledge, according to the process of "mathematization" (Sarama and Clements, 2009). Moreover, several scientific works have shown that through construction games (with bricks) young people are in an active status which significantly influences their cognitive development and skills (Pickett, 1998; Stroud, 1995). Construction plays are examples of complex situations (Zacks & Tversky, 2003) that stimulate and reinforce forms of intelligence, mathematical and spatial, such as visual search, mental imagery, rotation (Casey, Pezaris, & Bassi, 2012; Oostermeijer, 2014; Nath, 2014). **Objectives and expected results.** We assume that it could be possible to reinforce the forms of reasoning required to solve complex activities through manipulation and construction games, which have always been a necessary form of activity for the cognitive, emotional and social development of human beings.

	We plan to conduct a longitudinal experiment (2 years) to compare the learning performance of two groups of students: one group using a set of digital tools, according to the French pedagogical program, and one other group playing some construction games. Previous works have measured the impact of construction games on the development of mathematical skills in 7-year-old pupils (Pirrone & al., 2010; 2015). The general objective of this project is to design a set of construction games that develop, through the manipulation and use of mental images cognitive functions related to the competences expected in the microtechnology sector and to measure the students' appetence towards this sector. The expected results concern theoretical, methodological and application levels, including: 1. corroborate studies that show a strong relationship between construction games and the development of mathematical and spatial skills (e.g. rotation, calculation, spatial visualization, mental imagery) (Pirrone & al., 2014); 2. identify and validate pedagogical activities based on "construction games" fitting these skills; 3. demonstrate the influence of concrete activities on the cognitive development of young students (4th and 3rd grade); 5. to identify levers to improve students' appetence for technology and microtechnology; 6. to operationalize the theoretical construct of appetence and validate a psychometric measurement tool.
Supervisors	Dr. Federico Tajariol, ELLIADD Lab, University Bourgogne Franche-Comté (federico.tajariol@univ-fcomte.fr) Dr. Concetta Pirrone, Department of Educational Sciences, University of Catane (Italie) (**concetta.pirrone@unict.it)**
Candidate profile	Applicants must have a university degree in psychology or educational sciences. They must demonstrate high skills in experimental methods and statistical data analysis, be proficient in English (expected level B2) and having a sufficient level in French. A French training class will be mandatory for students whose level of French is insufficient.
Keywords	Learning, Construction Games, mental imagery, appetence,
Application deadline	**04.06.2021**
Starting Job	**01.10.2021**

Application *Depending on the type of position*	**PhD Position** Please send the following documents (all in one PDF file) by e-mail to "indicate contact email" : 1) For EU candidates: Copy of your national ID card or of your passport page where your photo is printed. For non-EU candidates: Copy of your passport page where your photo is printed. 2) Curriculum Vitae (1 page). 3) Letter of motivation relatively to the position (1 page). 4) Copy of your Master degree and/or Engineer degree if already available. 5) Copy of your final marks and ranks. 6) Coordinates of reference persons (maximum 3, at least your master thesis supervisor): Title, Name, organization, e-mail. If you have questions regarding the application, please contact the supervisors. **OR** **Post-doc position** Please send the following documents (all in one PDF file) by e-mail to "indicate contact email" : 1) For EU candidates: Copy of your national ID card or of your passport page where your photo is printed. For non-EU candidates: Copy of your passport page where your photo is printed. 2) Curriculum Vitae (may include hyperlinks to your ResearchID, Research Gate Google Scholar accounts). 3) Detailed list of publications (may include hyperlinks to DOI of publications). 4) Letter of motivation relatively to the position (Cover Letter) in which applicants describe themselves and their contributions to previous research projects (maximum 2 pages) 5) Copy of your PhD degree if already available. 6) Coordinates of reference persons (maximum 3, at least your master thesis supervisor): Title, Name, organization, e-mail. If you have questions regarding the application, please contact the supervisors.