

Emotions in Undergraduate Mathematics: A Distance Education Perspective

Sophia Pantelaki¹

¹Department of Mathematics & Applied Mathematics, University of Crete, Greece, pantelakisophia@gmail.com

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Little research has been done on the interpersonal aspects of the learning process and particularly on how several aspects of mathematics learning impact the academic-related emotions of students (Eligio, 2017). The emotions experienced in Linear Algebra courses are still underestimated (Stewart et. al, 2019); however, it seems that social factors, such as peer-perceived course difficulty, can impact students' emotions experienced in Linear Algebra (Martinez-Sierra & Garcia-Gonzalez, 2016). Thus, it is important to further study the factors that influence students' emotions in Linear Algebra, especially under the socio-educational context of Distance Education.

THEORETICAL FRAMEWORK

Thinking of education in a simplistic way, interaction underlies education. In a DE setting, due to the geographical and/or temporal distance between students and their teacher, how students interact can reflect the “*psychological and communications space (that has) to be crossed, a space of potential misunderstanding between the inputs of instructor and those of the learner*” (Moore, 1993, p.20) and is named 'Transactional Distance' (TD). According to the Theory of Transactional Distance, a student's perception of TD is measured by three types of interactions they have: *learner-content* (LC), *learner-instructor* (LI), and *learner-learner* (LL) *interaction* (also met as SC, ST, SS interaction correspondingly) (Moore, 1989).

METHODOLOGY

The survey was conducted online at a Greek university. A total of 97 (out of 832) undergraduates enrolled in an online Linear Algebra course participated voluntarily and anonymously. The course was based on video lectures for both the theory and the exercise-related hours. The online questionnaire was specially designed, consisting of two parts: in the first part student-perceived TD was measured by using the *Revised Scale of Transactional Distance* (Paul et al., 2015); in the second part students' positive and negative emotions experienced in the course were measured using a combination of the *Achievement Emotions Questionnaire* (Pekrun et al., 2011) and the *Positive and Negative Affect Schedule Scale* (Watson et al., 1988). Descriptive data analysis was conducted for identifying students' perceptions of TD and experienced emotions. Independent samples t-tests and correlation analyses were run in mean scores (ST_{mean} , SC_{mean} , SS_{mean} , $Positive_{mean}$, $Negative_{mean}$). Finally, two regression analyses were run to identify if ST_{mean} , SC_{mean} and SS_{mean} can be predictors of $Positive_{mean}$ and $Negative_{mean}$.

RESULTS

Overall, undergraduates in the sample felt TD at a fairly low level and experienced both positive and negative emotions at a moderate level. Also, all three types of interactions were positively correlated with positive emotions and negatively correlated with negative emotions. The most important predictor for both positive and negative emotions was identified to be the Student-Content interaction.

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