MATHEMATICAL MEMES: FROM INTERNET PHENOMENON TO DIGITAL EDUCATIONAL RESOURCE

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This thesis aims at providing insights into the process of transforming the Internet phenomenon of mathematical memes into a digital educational resource, with the purpose of contributing to bridging the discontinuity between out-of-school and in-school learning environments. Mathematical Internet memes are a nearly unexplored research topic in the field of Mathematics Education. This condition requested to sample theoretical foundations and develop appropriate methodologies, guided by the main research question asking how can we conceptualize mathematical Internet memes and what could their educational potentialities be. The investigation process progressed according to two research approaches: one experimental and the other ethnographic. The experimental approach grounds on data collected during school experiments (university and secondary school) and analysed through some relevant theoretical lenses in Mathematics Education (e.g. Boundary Objects, as in [4]) to maximize the understanding of an unknown phenomenon by observing it from different standpoints. The ethnographic approach grounds on a three-year-long fieldwork conducted observing the Internet phenomenon in its natural habitat following an innovative methodology developed for this purpose. A data set of nearly 2000 memes has been collected and analysed through the theoretical framework used to investigate the Web 2.0 culture [3]. In the process of the research, the two approaches overlapped and intertwined, producing theoretical, methodological and empirical results that contribute in building a body of knowledge about exploring Internet phenomena with an educational purpose. Theoretically, mathematical memes are conceptualized as representations of mathematical statements with an epistemic power that nurtures mathematical discussions [2], and interpreted through a new semiotic tool that distinguishes levels of meanings. Methodically, an innovative use of ethnography framing multi-case focus studies is developed, that now can be used to explore Internet phenomena from the point of view of mathematics education. Empirically, the educational potentialities of mathematical memes are sampled. To sum up, the research shows that the contamination between mathematics and memes empowers both cultural realms: it upgrades the use of memes beyond their original subculture, and it expands the range of disciplinary signs traditionally pertaining to the domain of mathematics. These resources may contribute to fostering the cultural change aimed at bridging the discontinuity between out-of-school and in-school learning environments, as embraced by the recent literature about the future themes of mathematics education research [1].

References

[1] Bakker, A., Cai, J., & Zenger, L., *Future themes of mathematics education research: an international survey before and during the pandemic*, Educational Studies in Mathematics, pp. 1–24, 2021
[2] Bini, G., Robutti, O. & Bikner-Ahsbahs, A. , *Maths in the time of social media: Conceptualizing the Internet phenomenon of mathematical memes*, International Journal of Mathematical Education in Science and Technology, pp. 1–41, 2021
[3] Jenkins, H., *Confronting the challenges of participatory culture. media education for the 21st century*, MIT Press, 2009
[4] Robutti, O., Aldon, G., Cusi, A., Olsher, S., Panero, M., Cooper, J., & Prodromou, T., *Boundary objects in mathematics education and their role across communities of teachers and researchers in interaction*, Brill Sense, pp. 211–240, 2019

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