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Detecting differences between the map reading strategies of novice and expert students of geography: A pilot study

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Abstract:

Being able to find our way in a city, to follow a path while hiking, or to drive along the route the GPS presents us are all connected to spatial ability. Spatial ability is a skill that develops within people almost since birth, and is one of the skills that are essential in everyday life. Teaching and learning proper map reading during formal education helps us to expand this skill (Dong et al., 2018; Grieves and Jeffrey, 2017; Jacobs and Schenk, 2003); however, there is little information available on how map reading is implemented, especially in geography classes, what individual characteristics determine its successful learning (Havelková and Gołębiowska, 2019), and how it can be effectively taught and expanded during formal education.

Eye-tracking tools offer a good opportunity to investigate a growing range of activities. Employing eye-tracking to explore the gaze path of the individual wearing the instrument in order to infer the way and strategies of information acquisition offer a great opportunity to reveal how map reading is done when students are presented with exercises related to maps in the geography class.

The steps that make up a map user's solution to a task related to a certain map can be revealed effectively by employing eye-tracking. This method allows us to compare the strategies of map readers, and the results can be further analysed by applying the variables gained from a background questionnaire focusing on the attitude and interests of students. During our pilot study (N=22), which was aimed at adapting a diagnostic tool to reveal map reading strategies, we selected two students from the 2022 data collection of the MTA-SZTE Research Group on Geography Teaching and Learning. We deliberately chose two students whose performance differed significantly from each other. One of them had a very high performance (92%), the other one had a low performance (21%). For the teaching of geography, it is of particular importance to know how the high and low performers (or expert and novice map readers) solve map-reading-related tasks.

In the present pilot study, we aimed at detecting the problem-solving strategies of the two students both qualitatively and quantitatively to see whether the diagnostic tool works as it was originally designed. Though the results are not representative, they imply that novice and expert map readers do not have significantly different strategies in this particular case. However, the time spent on understanding the task and finding the answer is substantially longer in the case of the novice student, which subtly hints at having problems not only with the visual decoding of map symbols but also reading comprehension in general. Therefore, our further research is dedicated to delving into the in-depth qualitative and quantitative analysis of map reading strategies in order to be able to develop effective teaching strategies for teachers of geography.

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References

Dong, W., Zheng, L., Liu, B., Meng, L. 2018. Using Eye Tracking to Explore Differences in Map-Based Spatial Ability between Geographers and Non-Geographers. International Journal of Geo-Information 7:9. pp. 337. DOI: 10.3390/ijgi7090337

Grieves, R.M, Jeffery, K.J. 2017. The representation of space in the brain. Behavioural Processes 135. pp. 113–131. DOI: 10.1016/j.beproc.2016.12.012.

Havelková, L., Gołębiowska, I. M. 2019. What went wrong for bad solvers during thematic map analysis? Lessons learned from an eye-tracking study. International Journal of Geo-Information 9:1. pp. 9. DOI: /10.3390/ijgi9010009

Jacobs L.F., Schenk F. 2003. Unpacking the cognitive map: The parallel map theory of hippocampal function. Psychological Review 110:2. pp 285–315. DOI: 10.1037/0033-295x.110.2.285.

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