Investigating the effects of mobile navigation services and paper maps on the spatial knowledge acquisition of pedestrians in an indoor environment

by **JULIUS NYONYO**

Navigation, the act of moving from one place to another, is an everyday activity of human life. Navigation could occur on the sea, the land, and in the air. Presently, there are navigation aids which assist people to find their ways in the environment. Examples of these navigation aids are mobile navigation services (e.g. Google Maps) and paper maps. Research on the effects of these navigation aids (especially mobile navigation services and paper maps) on the spatial knowledge acquisition of pedestrians has been conducted by Ishikawa et al (2008) in the outdoor environment. Their findings were that paper maps are the better tools compared to mobile navigation services to help the pedestrian to acquire spatial knowledge of his or her environment. To the best knowledge of the researcher, there has not been a single study that considers researching the same theme in the indoor environment. Therefore, this study was conducted to investigate the effects of mobile navigation services and paper maps on the spatial knowledge acquisition of pedestrians in an indoor environment

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METHODOLOGY

The study area selected for this study was the Centrum Galerie in Dresden, Germany. Owing to the popularity of the study area, the researcher recruited study participants from outside of Dresden – in the neighbouring cities of Dresden (Freiberg and Leipzig). The reason of this was to make sure that participants for the experiment has no prior knowledge of the study area.

There was a total of 20 participants who were selected based on their responses from a survey questionnaire. There were 12 participants from Freiberg and 8 from Leipzig.

All the participants were divided into two groups: Paper Map (PM) group and Mobile Navigation Services (MNS) group. The PM group used paper map for the navigation exercise and the MNS group used Google Maps for the navigation exercise. Four points of interest in the study area, Centrum Galerie were selected for the navigation exercise. These points were shops location in the study area. They are; Eiscafe, SportScheck, L'OCCITANE and Marc O'Polo.

There was a two-way navigation exercise: first, each participant from their respective groups navigate with map from the starting point (Eiscafe) to the ending point (Marc O'Polo). Second, every participant make a reversed navigation immediately after completing the first navigation from the ending point (Marc O'Polo) to the starting point (Eiscafe) without a map. This method was used to test the fastness (with respect to time) of navigation with paper map or mobile navigation services). Subsequently, it also assisted in testing for spatial knowledge of ppedestrians.

After the navigation exercise, three methods were used to test for spatial knowledge acquisition of the participants. These methods are, the pointing task, landmark recognition exercise, and estimation of landmark locations.

The data collected from the experiment were analysed using the mixed method of data analysis. The selection of this data analsis method was because the data collected were both quantitative and qualitative.

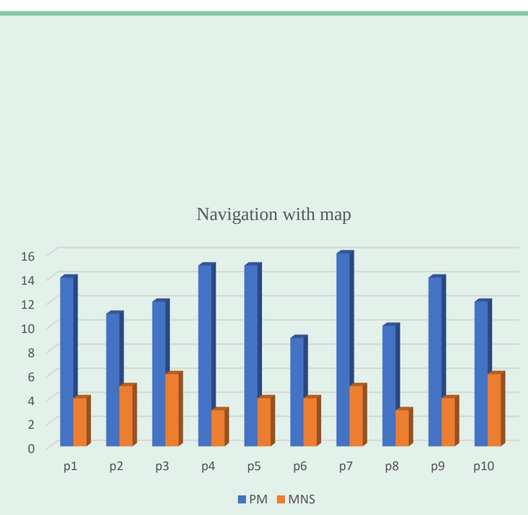

Figure 1: ***Time used for navigating with map by each group member***

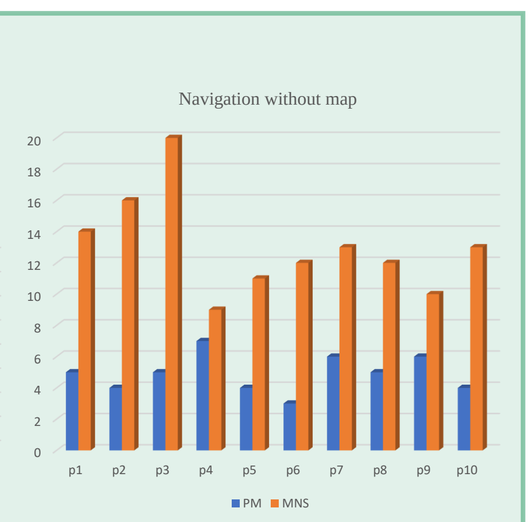

Figure 2: ***Time used for navigating without map by each group member***

RESULTS AND CONCLUSION

Based on the objectives of this study, the test results showed that, in the indoor environment, there is the tendency that using mobile navigation services to navigate help pedestrians to navigate faster in terms of time efficiency than using paper map (see fig. 1). On the other hand, result showed that there is the possibility of those who used paper map in the first round navigation navigated faster in the reverse navigation (navigation without a map) than those who used mobile navigation services (see fig. 2).

With respective to testing for the spatial knowledge acquisition, All the three methods used to test for this showed from the test statistics that their were no significant difference in spatial knowledge acquisition between the paper map group and the mobile navigation services group. However, there is the tendency that paper map group showed a better spatial knowledge acquisition skills than the mobile navigation service group (see fig. 3, 4 & 5).

From the results, the study cannot fully conclude that, in the indoor environment, paper maps are better in acquiring spatial knowledge than mobile navigation services. However, the results show that there is a tendency of paper maps impacting better on spatial knowledge acquisition than mobile navigation services.

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KEYWORDS

Mobile navigation service, paper maps, spatial knowledge

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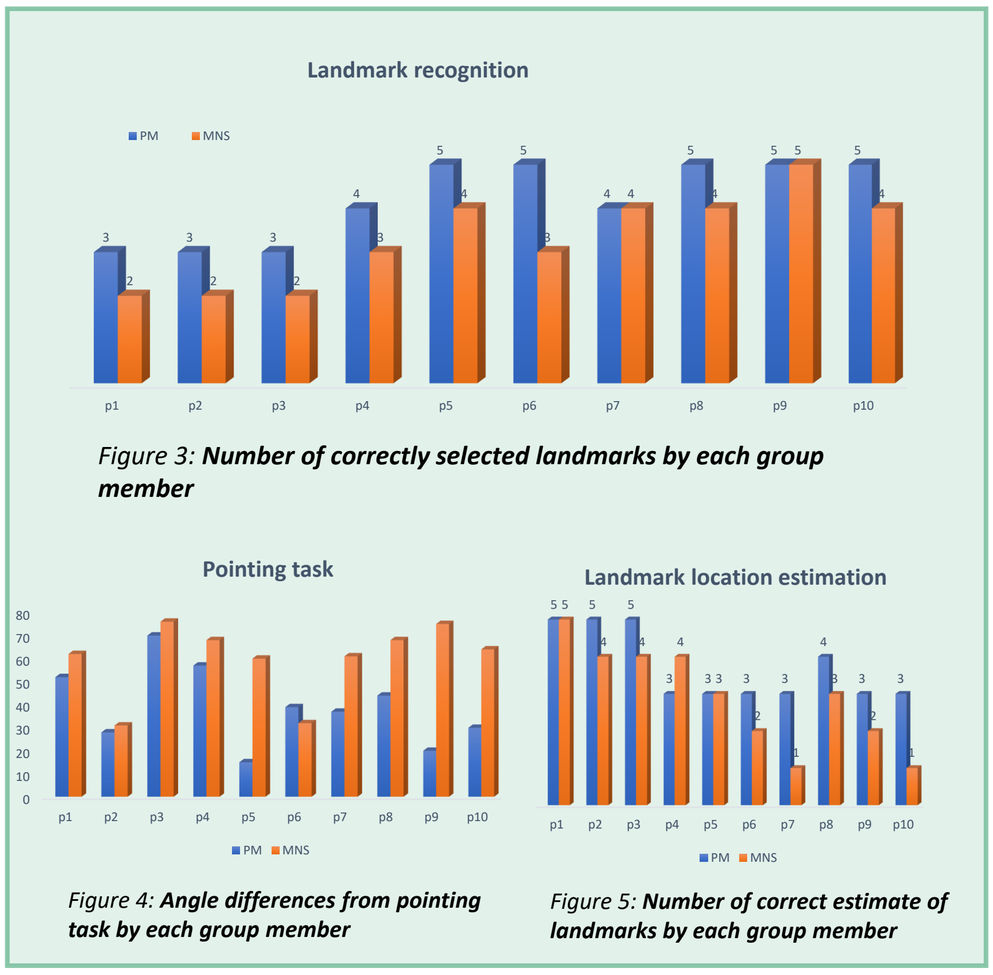

Figure 3: ***Number of correctly selected landmarks by each group member***

Figure 4: ***Angle differences from pointing task by each group member***

Figure 5: ***Number of correct estimate of landmarks by each group member***

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