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Game-based learning: addressing curriculum gaps in water management education in Ugandan schools

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Increased urbanisation and inadequate awareness have affected the availability and subsequent use of freshwater resources in Uganda. Education can play a crucial role in providing support to and training for students on sustainable water use, both at home and at school. Thus, this research assesses the current state of Ugandan education on this subject, by identifying the water-related topics currently featured in the curriculum at different class levels, using questionnaires distributed in four schools. An initial trip to Uganda was made in June-July 2022 (see. Figure 1) to visit schools, deliver questionnaires and gain a deeper understanding of the Uganda National Curriculum on water resources. Two of the schools are located in urban areas, and the other two in rural areas. The locations were specifically selected in an effort to ascertain how students in urban and rural areas behave towards and manage water usage and resources due to the differing context in location.

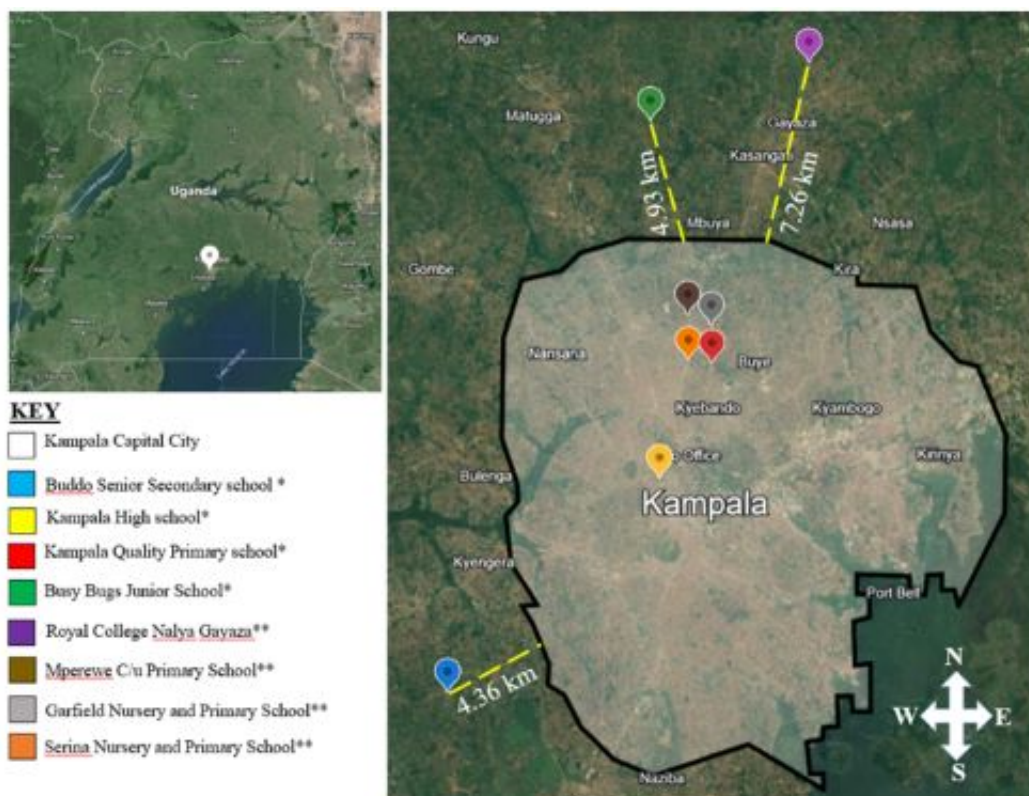


Figure 1. Map of the locations of the schools involved in the study. *Schools that were visited in June-July 2022; **Schools that were visited in July-August 2023.

Three separate questionnaires were designed for collecting responses from primary school pupils, secondary school students and teachers. Descriptive and thematic analysis were adopted to analyse the results. The results revealed that water sustainability topics are delivered in the science curriculum at primary level, as opposed to geography at secondary level, suggesting that there is discontinuity of water-related topics within different taught subjects. Furthermore a lack of integrated practical teaching was discovered within the courses currently taught in Ugandan schools. Therefore, in order to contribute to this knowledge-gap, three games, namely i) Water Conservation Snakes and Ladders (WCSL), ii) Water Awareness Quartet Cards (WAQC) and iii) Water Pollution Puzzle (WPP) were designed with the aim to create new material that can be utilised by schools to increase awareness of students on water resource management. A second trip was made to Uganda in July-August 2023 to four additional schools where students were introduced to and able to test the appropriateness of the games as and engaging tool for learning (Figure 2).



Figure 2. Activities conducted at the Royal College Nalya Gayaza, the Mperewe C/u Primary School, the Garfield Nursery and Primary School and the Serina Nursery and Primary School.

The impact of the games on student learning was measured by analysing pre-test and post-test questionnaire responses. The average score between a pre-test and a post-test of WAQC increased by 25% and it was the highest average score compared to 18% in WCSL and 14% in WPP. This indicates that the games significantly improved student learning on topics linked with the management and use of water resources. Furthermore, the results revealed that more water-related topics should be included in lower primary level Social studies lessons. An academic year in Uganda for example, runs from January to December and is divided into three (I, II and III) academic terms and it was found that in the academic term II, water-related topics are missing in primary three, four, five and six in the Science lessons. Finally, this study recommends that the Ugandan government integrate game-based learning as a teaching approach in Ugandan schools to increase student awareness of water resource management. Evidence shows that this teaching technique can positively shape knowledge and practice for school students.