

Journal of Trainee Teacher Education Research

**Using 'ORBIS' software to explore ancient geography:
an action research project with a Year 8 class
in an independent school**

Anya Morrice

(PGCE Latin with Classics, 2019-2020)

email: a_morrice@outlook.com

Abstract

This study considers the use of 'ORBIS' software, a navigational GIS looking at connectivity in the Roman empire, to explore geography in Roman times with students in a coeducational independent school. This research was partially undertaken during school closures (because of COVID-19), which had a significant impact on this study. The findings showed that the students developed an understanding of at least some of the concepts explored in these lessons. The findings also indicated a high level of student engagement with 'ORBIS' and potential activities, which the students wanted to do, which could develop students' understanding of ancient geography while familiarising them with ORBIS.

Using 'ORBIS' software to explore ancient geography: an action research project with a Year 8 class in an independent school

Anya Morrice

Introduction

In his *Fasti*, Ovid states that "the space of the City Rome and the world is the same" (2.683-84), my own translation, using Goold and Frazer (1931) as my resource. The Romans did not experience geography and space in the same manner as people today. White (2010) explains that "[s]patial relations shift and change. Space itself is historical" (p.2). A skim through the various exam syllabi would not suggest that ancient geography is a significant area in the secondary Classics curriculum. However, ancient geography is often important as context to many literary and historical topics. My interest in student perceptions of ancient geography stems from my experiences of observing and teaching topics involving ancient geography and the difficulties some students had in trying to understand spatial relations in the ancient world.

By spatial relations, I do not just mean where places are in relation to one another but the broader factors that influence how people move and experience space, for example: topography, socio-cultural influences, politics, technology (and its limitations) and cost. Similarly students can find it difficult to consider the impact of ancient buildings or spaces, if they only look at an archaeological layout. They lack what Nicholls (2016) terms "the expert eye" (p.41): the knowledge which would enable them to imagine, reconstruct and contextualise this information. This is why reconstructions and analogies are particularly beneficial. Just as reconstructions can aid students' understanding of spatial relations on the smaller scale of buildings, this project considers the impact of using a navigational Geographic Information System (GIS) to explore ancient geography, focusing on travel in the Roman Empire.

This GIS is ORBIS, the Stanford Geospatial Network of the Roman World. Put simply, ORBIS can be described as a more complex version of Google Maps for the Roman Empire. While ORBIS is designed as a tool for researchers, Arcenas (2019) presents it as "a digital tool that provides teachers

with an opportunity to familiarize both themselves and their students with this key topic": how the "Romans conceptualized geography" (p.166). This project intends to research the impact of using ORBIS to explore ancient geography in the classroom. Pseudonyms are used for the school and student names throughout.

This research was undertaken as part of a project about journeys in the Roman Empire in Salamandastron School, an academically selective, fee-paying, co-educational school in East Anglia. Latin is compulsory for Years 7 and 8. Students can then choose whether to continue Latin in Year 9. They also have the choice to start other subjects including Ancient History. The Year 8 Latin classes are set by attainment into three sets. Very few students in the lower sets choose to study Latin in Year 9 as they find Latin language particularly challenging, have low motivation and often low levels of engagement. Consequently they are also taught ancient history projects over the course of the year as many of the students enjoy learning about myths and history and will later take Ancient History. While the students are at an academically selective school, they self-identify as a lower set group in Latin. This research was undertaken with one of the lower set Year 8 classes consisting of twenty students: sixteen boys and four girls.

This research project was also taught during the Covid-19 pandemic and, as a result, was adversely impacted since the teaching sequence spanned before and during school closures in the UK. I will first survey the literature relevant to this research. In the subsequent sections I will set out my research questions, teaching sequence, ethics, research methodologies and methods before presenting my data and findings. Throughout these sections I will also consider the impact of the pandemic upon my research and any resulting limitations.

Literature Review

There is little research concerning the teaching of ancient geography in Classics or the use of ORBIS in education. Most of what exists concerns tertiary level education. Consequently, I broadened my search for relevant literature to include research on other humanities subjects as well as research concerning the use of Information Communication Technology (ICT) in education more broadly. This literature review will consider four areas: the teaching of ancient geography in Classics, teaching spatial relations using GIS, technology use within the classroom and the impact of technology on student engagement and motivation.

Geography and the Classics classroom

Ancient geography is not a discrete topic in any of the main specifications for Classical subjects. However, ancient geography is frequently important as context to these topics. For example, in the Oxford, Cambridge and RSA (OCR) Ancient History General Certificate of Secondary Education (GCSE), geography is explicitly referenced in the Teacher's Guides for both period studies and four of the six possible depth study options. Understanding the geographical context of historical topics and literary works can facilitate and strengthen students' understanding of the primary topic.

Maps are extremely useful in this regard and it is not unreasonable to assume that physical or digital maps are the primary resource used to teach these geographical contexts. Robson and Graham's (2018) evaluation of interactive resources in a Classics Open University course found that their interactive maps, which allowed students to search locations and click on these to access more information, as text and images, were frequently described by students as "particularly helpful to their learning" (p.222). Student feedback explained that the maps were useful because they provided "a geographical perspective" and located places "in relation to each other" (ibid., p.222). Maps are an invaluable resource in teaching about the ancient world.

However, traditional maps have limitations for teaching about ancient geography. While maps are useful for representing space, White (2010) states that maps cannot entirely represent spatial relations because "maps and texts are ultimately static, while movement is dynamic" (p.3). These maps are also based on modern cartographic conventions; the Romans did not perceive geography and travel in the same way as people today. Arcenas (2019) argues that "[f]amiliarizing students with the geography of the ancient world" is "difficult" because physical and digital maps "misrepresent the ways in which historical actors experienced and conceptualized those spaces" (p.166). These misrepresentations can lead students to "often develop anachronistic understandings of life" in the Greco-Roman Mediterranean (ibid., p.166). Further information regarding ancient connectivity is needed to conceptualise maps.

Arcenas (2019) identifies four key factors which influence Roman connectivity: the Romans used a limited number of clearly defined routes; cost in terms of time and money was of crucial importance; routes over water were more efficient than those over land; costs varied depending on factors such as seasons (p.166). The Romans did measure spatial relations in terms of physical distance through the means of *Itineraria* but these list distance as the distances of routes between particular places.

Surviving Roman maps, like The Peutinger Table (a medieval reproduction of an ancient Roman map) look very different to modern maps. Malamud (2016) likens them to "subway map[s]" because while the sequence of "stations" and stated distance between places is reasonably accurate, these maps do not use "representational scale or even geographical accuracy" (p.35). I have also observed Key Stage 3 students unable to recognise The Peutinger Table as a map because it looks so different to modern maps.

It is also harder for students to think critically about factors affecting spatial relations. Gersmehl and Gersmehl's (2007) study of spatial thinking in children aged 3 - 13 years old in the U.S. concludes "the brain areas developed to different kinds of spatial thinking seem to develop in very early childhood" (p.188). However, they found that this development is "cumulative" and is developed throughout childhood and adolescence (ibid., p.185). Several recent studies, both UK and international, have identified a need for secondary schools and universities to improve students' spatial thinking in geography. In particular, Bednarz and Kemp (2011) argue that spatial literacy is "as important as mathematical literacy" (p.18) and that education systems need to invest in developing the population's spatial literacy (p.20). Trimm's (2018) small-scale study on using a game to help his students understand the geography of ancient Israel in a university Theology course was in response to his observations that students found it hard to learn the geography of ancient Israel and understand the impact of geography on political and military affairs (p.306). While ORBIS utilises the familiarity of modern maps, its features allow users to explore how the Romans travelled around the empire. Like Trimm's game, Arcenas (2019) explains that ORBIS is intended to be used alongside traditional maps as an aid to enhance students' understanding of ancient geography (p.176). ORBIS' advantages lie in its similarity to modern navigation apps, with which students are likely to be at least somewhat familiar. ORBIS uses this familiarity to introduce the students to other perspectives on ancient travel, which are difficult to understand from a traditional map alone.

Teaching spatial relations with GIS

The questions of teaching about spatial relations and the effectiveness of using GIS for this purpose are among the significant debates in geography education. The National Curriculum for Geography in England (Department for Education (DfE), 2013) states that students should be able to "interpret a range of sources of geographical information, including [...] using GIS to view, analyse and interpret places and data" (p.2-3). The use of GIS is also mentioned in the current GCSE and A-Level

specifications. Although there is still considerable debate over the effectiveness of using GIS to teach about geography, Walshe (2017) notes that there is "general agreement that GIS has a significant place within the geography classroom" (p.609). Depending on the types of GIS utilised in the context of a particular school's geography classrooms, it may be possible to draw on students' existing spatial thinking skills and knowledge of how to interpret cartographic data in order to consider geography in the ancient world as well as offering another opportunity for students to practice these skills.

However, studies investigating the impact of using GIS to develop thinking about geography and spatial thinking skills in students have produced mixed results. Bearman, Jones, André, Cachinho and DeMers (2016) state that "[g]eobrowsers (such as Google Earth) have developed a new type of GIS, making spatial data available to a much wider range of people than before" (p.395). One of the strongest arguments in favour of using GIS in education is its ability to develop spatial skills as suggested by the findings of Lee and Bednarz's (2009) study of 80 students at a large university in the USA (p.194). Bearman et al. (2016) recognise that GIS enables students to "access and make sense of geographical spatial information, thereby supporting their understanding" (p.394). Kim and Bednarz's (2013) study on GIS use in university courses found that the development of critically spatial thinking regarding data and problem solving seemed to be particular advantages gained through GIS use (p.363). Xiang and Liu's (2019) study of using GIS to develop spatial thinking among university students found that while students with different learning styles improved their understanding of spatial thinking to some extent through using GIS (p.1875), the impact differed depending on their learning styles. Auditory learners experienced a more significant improvement than visual or kinaesthetic learners (*ibid.*, p.1876). If GIS is to be part of effective teaching on spatial skills, it needs to be part of a range of activities and methods of teaching and learning to effectively support all learning styles.

However, Bearman et al. (2016) recognise the risk that relying on geobrowsers "has reduced the level of spatial literacy" because people can now rely on digital systems to perform a significant portion of the analysis for them (p.395). Marsh, Golledge and Battersby (2007) findings, from a study of 124 students in American elementary schools, secondary schools, and colleges also support this analysis. Marsh et al. (2007) found that the most effective approach seemed to be teaching spatial thinking using minimal GIS, and using GIS as a tool to facilitate learning about spatial thinking, rather than as a teaching tool, in the same way that "calculators" are used to facilitate learning maths but are not used to teach the students (p.711). Similarly Bednarz (2004) argues that GIS is most effective when

students have already learned the fundamental concepts of spatial thinking and then use GIS to expand their existing knowledge or "transfer" it to a new context (p.197). GIS is not a panacea to difficulties in teaching spatial thinking; rather, it is a resource that can be used as part of a teacher's broader pedagogy to support their students' learning.

Evaluating Technology use in the classroom

In an early study on the use (and misuse) of computers in education, Ellis (1974) stated that "[t]hinking about the computer's role in education, does not mean thinking about computers, it means thinking about education" (p.42). *How* technology is used for education, matters far more than *what* is used.

Rapid developments in technology have led to concerns that technology is sometimes used for the sake of using technology and its usage is not evaluated. Natoli and Hunt (2019) remarked in their introduction to a volume on technology in Classics teaching that there is a problem with "*technologia gratia technologiae*" (technology for its own sake) in education and this "runs the risk of becoming completely unrooted in pedagogical theory and unevaluated for its effectiveness" (p.2). Similarly Chadwick (2013) titled his experiences of embedding ICT into the classroom as "New does not equal Good", arguing that "[t]echnology should not be seen as a goal in itself but is present in our educational institutions to assist the learning of the students and to enhance the pedagogy of the instructor" (p.8-9). Such sentiments are not peculiar to using technology in the classroom, but good teaching practice. Gibson's (2001) consideration of teaching and learning concludes "on-line technologies will not necessarily improve or cause changes in learning by themselves. What improves learning are well-designed instructional experiences" (p.56). In this regard, using technology as part of teaching is no more unusual than utilising a new resource or different style of teaching.

However, as seen, educators have particular concern when it comes to the effectiveness of technology. Condie and Munro's (2007) landscape literature review on ICT use in UK schools found that much of the research, particularly the research concerning attainment, motivation and engagement, consists of small-scale case studies, often conducted soon after the introduction of a new technology which has led to an "unsystematic evidence base from which to evaluate the impact of ICT" (p. 4). The aim of Hunt and Natoli's (2019) volume on using technology in Classics education aims to consider the "duelling issues of methodological shifts and the successful incorporation of technology into the classroom" (p.13). This volume aimed to consider the many different uses of

technology in Classics teaching and "to provide fodder for inspiration and debate [...] and ultimately - for teaching and learning" (ibid., 3). As Chadwick (2013) concluded, it is only through teachers "continuing to share ideas and good practice that we can begin to make sense of these new technologies and deploy them effectively" (p.9). It is crucial that teachers understand how best to utilise the opportunities that these new technologies facilitate and share these ideas with others.

Teaching with technology also involves some particular considerations when planning and evaluating its usage. Gibson (2001), drawing on the earlier work of Knapp and Glen (1996), states that teachers must consider the reaction of the students, classroom management issues resulting from the use of the technology, the new skills the students need to learn and the time needed to prepare to use the technology (p.39). It is crucial that teachers consider the practicalities of using this technology in the context of the available resources as well as the skills that both students and teachers need to utilise the technology effectively.

Even though usage of digital technology is widespread, this does not necessarily mean that all students are easily able to use a digital resource. Gibson (2001) states that a common misconception about using technology is that "[a]ll learners are excited and comfortable about the use of technology" because "not all learners will find the same type of experience with technology rewarding" and "differences in technological experience still exist" (p.38). For example, Craft (2016), in his study on using the computer game Minecraft to teach students about Roman daily life, found that some students had never played Minecraft or did not like video games, and even those students who had played Minecraft, were not necessarily familiar with how to recreate a building from research (p.350). The use of a new technology has to be accessible and interesting to all students.

Consequently, the teacher's own knowledge and confidence in using technology is especially crucial when teaching with a technology that is new to their students. Chadwick (2013) observes that "[t]here is a lack of confidence on the part of many of my colleagues to use technologies" (p.9). His reflections are echoed in the wider studies looking at teachers' attitudes towards the use of ICT or web-based in resources in the classroom. Condie and Munro (2007) summarise that while teachers' confidence with the technology is "more in using the applications themselves than in using them effectively in learning and teaching" (p.19). They further advocate for purposeful training and examples of good practice with technology in the classroom being modelled or explained (ibid., 19-20). Knowing how to use a technology does not necessarily equate to knowing how to effectively use it in teaching.

Indeed Walshe's (2017) small scale action research project on developing geography teacher trainees' practice with GIS was a response to the fact that although teachers agreed that GIS has "a significant place" in geography education, many teachers do not use GIS because "it can be seen as too technically complex, too difficult to integrate into an already busy curriculum, too time-consuming to produce resources for" (p.609). Walshe (2017) found that the trainees who participated in the study preferred simpler interfaces that "allow[ed] them to devote their time to teaching and learning, rather than grappling with the technical functionality of the software" (p.618). Carver, Evans and Kingston (2004) earlier research into designing a more user friendly Web-GIS noted that the practical issues of learning to use and using GIS often impeded students' learning (p.428).

However, Walshe (2017) found that the teacher's issues may not be specific to the particular software but related to their confidence in using ICT more generally (p.618). One interviewee responded that she "was not very confident in letting the pupils use it themselves, because any technical problems they would come across I would probably struggle to fix" (ibid., p.618). These findings echo Lee and Lee's (2014) larger scale study of 136 teacher trainees in Korea (p.126). Condie and Munro's (2007) literature review of the impact of ICT in UK schools emphasised that "[t]eachers have to be confident in their own ICT capacity and understand the potential benefits of using ICT in a planned and sound way" in order to be able to effectively "embed ICT into the learning experience" (p.63). If teachers perceive a technology as too complex or have low self-efficacy in their own ability to use the technology, they are far less likely to use it effectively in their teaching.

The impact of ICT usage on student engagement and motivation

Although many of the studies on this topic are small-scale, there is much evidence to suggest that effectively used technology can improve student attainment, engagement and motivation. One of Condie and Munro's (2017) most frequent findings, from the 350 pieces of literature reviewed, was that students experienced "increased motivation and improved engagement" when using ICT (p.25). Passey, Rogers, Machell and McHugh (2004) study, commissioned by the Department for Education, aimed to investigate student motivation and conducted a mixed methods study of 17 schools, which were identified as "good practice" schools (p.10). The study involved: interviews with head teachers, teachers, learning assistants, pupils, parents and other professionals such as social workers involved in school liaisons; documentary evidence (of attendance, behaviour and attainment); student questionnaires; lesson observations (ibid., p.10). Passey et al.'s (2004) research found that students

perceived behaviour in lessons as better "most of the time" when lessons involved ICT (p.6). Student respondents also felt that ICT enabled them to have greater control over their own learning (ibid., 6). Depending on how ICT is used, students may have greater freedom to work at a pace suited to their abilities and use the opportunities afforded by ICT to support their own learning needs.

Technology, like ORBIS, also allows students to engage in the process of active learning. In active learning, also known as 'experiential learning', students 'construct' their own understanding by doing. To an extent using ORBIS can be considered active learning, because the students use the technology to reconstruct journeys in the ancient world and examine the impact of different factors affecting connectivity. Condie and Munro (2007) found "greater and more persuasive" evidence for the impact of ICT on improving engagement (p.4). In particular, they found that computer based learning involving "problem-solving" and "investigative" activities gave the students greater agency over their own learning and developed independent learning skills, which led to increased motivation and engagement with the project. (ibid., 21). There is a comparative lack of evidence specifically considering active learning. Legg's (2019) small-scale action research project examining the impact of making models of temples on Year 10 students' understanding of Greek temples found that active learning "seemed to increase student engagement" (p.328). However, further research is needed in this area.

Research Questions

RQ1. What are the practicalities of using ORBIS as a teacher and with students and what do both parties learn?

RQ2. What is the impact of using ORBIS on students' perception of ancient geography?

RQ3. What is the impact of using ORBIS on student engagement?

Teaching Sequence

In this section, I will set out both the original plan for my teaching sequence and the changes that occurred as a result of the COVID-19 pandemic. My research was initially planned over four lessons in March. The class had two 40 minute lessons each week. I had taught the class regularly since the end of January in conjunction with the class' regular teacher. Throughout the teaching sequence, my

lesson plans and research plans changed in response to the evolving COVID-19 situation. The class' regular teacher taught the third lesson after trainee placements were suspended and the final lesson(s) occurred after the school closures. This teaching sequence was intended as a project exploring travel in the ancient world and how Romans experienced journeys.

The project began mid-lesson after the students finished their essays from the previous lesson. First, the class compared ancient and modern perceptions of travel and geography through considering the Peutinger Table and types of transport in ancient and modern times. I then compared how far Alexandria and London were from Rome today (using Google Maps) and in Roman times (through a demonstration of ORBIS). The students then worked through a series of tasks to explore ORBIS' features but due to unanticipated delays earlier in the lesson, the students did not spend much time on this activity.

Consequently, the next lesson began by the students exploring two open-ended questions to scaffold their exploration of ORBIS and to familiarise themselves with ORBIS' key features. These questions were presented as a challenge to find the best route for a general or merchant, leading the students' to consider what a general's/merchant's travel priorities might be.

I then introduced the late antique poet Rutilius Claudius Namatianus, who described his journey from Rome to Gaul in his poem *Going Home*, a poem rarely studied at secondary level. I chose to look at Rutilius' poem because it describes how the Romans conceptualised journeys and extensively details factors affecting journeys. The students then answered questions on some short and modified (for readability) extracts of Rutilius' poem before using ORBIS to reconstruct Rutilius' journey. I had intended to have a class discussion about Rutilius' conceptualisation of his journey and the factors affecting his journey but because of the unusual level of focus and engagement in this lesson, I regrettably decided to delay this discussion entirely to the third lesson.

Due to the suspension of trainee placements, I did not teach the third lesson. My plan involved discussing Rutilius and finishing the activities of the second lesson. The students were then to choose a character and journey in the ancient world and begin planning a diary style account loosely in the style of Rutilius. The students would then finish their planning and write their accounts in the fourth lesson. The class' regular teacher also gave them the option to produce a storyboard instead of a written account and because of the switch to remote learning, added a fifth lesson.

Methodology

This section concerns the methodological approach of my research - the use of an action research approach and qualitative data - as well as the limitations of my research.

There are many different interpretations of action research. Wilson (2009) describes action research as the process whereby the teacher "tries a new approach, studies what happens, shares findings with others [...] and repeats the process again" (p.190). McNiff (2017) describes this process as highly reflective: teachers question their own practice, considering what needs improvement and how to improve this (p.19). For McNiff (2017), action research is "cyclical", practitioners "observe - reflect - act - evaluate - modify - move in new directions" (p.22). I chose this approach because I wanted to explore the impact of using ORBIS on students' perspectives of ancient geography as well as the practical implications of using ORBIS for the students and myself. I was following Wilson's (2009) approach of trying and studying a "new approach" with my class (p.190). I also engaged in what Koshy (2010) terms a "constructive enquiry", in which the researcher "constructs" their knowledge of a particular issue through the process of engaging in action research (p.19). My research is also a limited form of action research. I can only reflect on how the knowledge, which I have gained through this project, will shape my future practice, rather than how I have repeated the process.

As my research concerned perceptions and experiences, I chose to use qualitative data. As Koshy (2010) notes, this approach is "likely" for action research projects because the "data may be more in the form of transcripts, descriptions and documents for analysis" rather than data that can be readily quantified (p.80). I could have gathered quantifiable data. However, as my sample was so small, I did not believe that quantitative data would produce useful findings. I was further concerned that the methods of data collection most suited to quantifiable data which could facilitate answering my research questions, such as structured observations, would impair and be impaired by the demands of providing support to the students managing behaviour in this class. My presentation of the data involves a limited quantification of student responses to the questionnaire to show that multiple students shared particular responses. However, as my sample is small, my primary analysis of such data is qualitative rather than quantitative.

My research also has significant limitations. This research was conducted with a single class that may not be typical and in exceptional circumstances that have probably impacted the validity of my results. The shape of my teaching sequence and the data produced would likely have been very different if

my teaching sequence occurred a fortnight earlier, especially in regard to my research methods and the data collected. My findings are tentative and only apply to part of this class as my main sources of data (student work and a questionnaire) do not reflect the experiences of the whole class.

Ethics

This research followed the guidelines for educational research recommended by the British Educational Research Association (BERA) (2011) as well as the Faculty of Education's ethics guidelines. I also completed the Faculty Ethics Form with my subject lecturer. All the research activities took place within regular lesson time and were allowed by and discussed with the class' regular teacher and my school mentor. As all the activities occurred within regular lesson time and were mostly observational, the students were not informed that I was undertaking formal research in these lessons. I made this decision in conjunction with the class' regular teacher because I did not want the knowledge that these lessons were part of a research project to have an impact on the class' behaviour, their classwork and their responses to a focus group in the final lesson. Due to school closures, this focus group was replaced by a questionnaire and hopefully explained as a way for the project and my teaching using ORBIS to be improved in the future. Completing and submitting the questionnaire was optional. Student names are anonymised in this report.

Research Methods

This section describes and evaluates the methods used to gather data in this research. My choice of research methods was informed by the data that would facilitate answering my research questions and the constraints imposed by school closures. These circumstances reduced the amount of data, which I was able to gather. I planned to use five methods of data collection: my research journal; my unstructured lesson observations and evaluations; observations of my teaching made by the class' regular teacher; documentary evidence of student work; informal focus group. Due to school closures, I had to replace the focus group with a questionnaire, and only had observations and evaluations from the first two lessons. I have no evidence for the students' experience of the remaining lessons and I could only access work which students submitted.

Student Work and Lesson Observations

This evidence was the most straightforward to gather since this data was generated in each lesson and not specific to the research project. The class' regular teacher observed my lessons and I evaluated my own practice each lesson as part of the Postgraduate Certificate in Education (PGCE). These were unstructured observations rather than following a structured observation schedule. I also examined my own research journal, which contained my reflections and thoughts throughout the research process, in order to examine the practicalities of using ORBIS as a teacher.

I examined students' work generated as part of the project to assess their understanding and insights. In addition, to the students' creative writing, I wanted to examine their planning sheets and compare the work that the students produced about Rutilius with my own observations. However, I could not gather this data.

Focus Groups and Questionnaires

I intended to conduct an informal focus group to gain qualitative feedback from the students as a complement to their written work. I was aware that many of the students communicated their understanding of a topic better verbally. Cohen, Manion and Morrison (2017) explain that focus groups produce a greater degree of insight into the "collective" views as the data is generated from the group's "*interaction*" (p.532). Gibbs (1997) highlights that conducting a focus group enables the research to "draw upon attitudes, feelings, beliefs, experiences and reactions" in a manner that would not be possible with one on one interviews because such expressions are "more likely to be revealed via the social gathering and the interaction" of a group. I hoped that the use of an informal focus group would reduce any anxiety, which students might have about answering. There were potential risks to conducting a focus group. Cohen et al. (2017) warn "group dynamics may lead to non-participation by some members and dominance by others" (p.533). However, I had to quickly adapt my focus group questions to a questionnaire. Consequently, these questions were perhaps less effective than they could have otherwise been.

My questions were constructed along Foddy's (1993) principles of "brevity, simplicity and concreteness" (p.50). I discussed the wording of these questions with the class' regular teacher. I used open-ended questions to give the respondents freedom to express their own views and avoid the risks of closed questions, described by Cohen et al. (2017): "the categories might not be exhaustive and

there might be bias in them" influencing the respondents' answers (p.476). The most significant limitation of the questionnaire was that the resulting answers were very brief and unlike in a focus group, I could not ask further questions to clarify the meanings of respondents' answers.

Data and Findings

This section analyses the data, which I was able to collect as part of my research project. First I will explain some of the limitations of my data as a result of the pandemic. Then I will analyse the data and my findings in the three key areas of my research questions: using ORBIS; students' perceptions of ancient geography; student engagement. Due to school closures, I was unable to gather as much data as I had intended and the students' work was completed in the extraordinary circumstances following the lockdown in the UK. Students and teachers were adapting to these changes and many were not yet familiar with Salamandastron School's digital learning platforms. Fourteen of the twenty students submitted work: twelve as journal entries and two as storyboards. Eleven students chose to complete the questionnaire, but only nine of these respondents had also submitted work.

Using ORBIS

When I first considered investigating the impact of ORBIS in teaching ancient geography, I was not familiar with using ORBIS. The process of becoming confident with using ORBIS was straightforward and fast (about thirty minutes), by watching the tutorial videos and exploring the different capabilities of the software. The process of considering how best to use ORBIS in my lessons as well as creating resources rapidly developed my own confidence and ability to reflect on the pedagogical uses of ORBIS. It also expanded my subject knowledge and perceptions of ancient geography.

In the first lesson, I introduced the students to ORBIS by demonstrating ORBIS and the functions which we would be using during the project (the route planner tools and how to access the information on duration and cost). Due to time constraints, this demonstration was fairly short. The students then worked through a series of activities for the remainder of the first lesson and the beginning of the second lesson. I gave the students a sheet that explained how to use the different functions with pictures. In retrospect, this would have been more effective if it had been combined with the activities' worksheet since I did not notice many students using this resource.

Twelve of the fourteen pieces of creative work showed evidence that the students had used ORBIS to some degree. Most of the questionnaire respondents found ORBIS at least "quite easy" to use, although two students noted that they had had some issues and one - Willoway did not find ORBIS easy to use at all. Four students including the three, who had issues, responded that extra teaching on how to use ORBIS would have helped them to use ORBIS more easily (although one student recognised that they had missed a lesson).

However, three of these respondents, including Willoway, sit beside each other. While Merriscut is keen to contribute to class, Willoway and the other student rarely directly contribute in class unless they are called on (even with the class' regular teacher). They are usually well behaved, focused and do not ask for help as frequently as other students in the class. This raises the possibility that I may not have checked on these students' progress as often or offered as much support as I did to other students who were more prone to losing focus. Alternatively, they might have had lower confidence in their perceived ability to use ORBIS, because both Merriscut's and Willoway's work displayed considerable understanding.

The students also found some of the features of ORBIS harder to use than others. All the respondents, except Willoway, described the route planner, or aspects of this function, as easy to use. The few problems in class usually resulted from a student forgetting to click on the calculate route button or trying to calculate a route impossible under the chosen conditions, when they decided to explore ORBIS through alternative activities to the task set.

Three aspects of ORBIS caused particular difficulties: cost, duration and looking at the stages of journeys. Of the functions used in this project, these least resembled Google Maps and also required a greater degree of analysis to extract and understand the relevant data. Cost is listed as the price per kilogram of wheat or passenger in different modes of transport or by clicking on three tabs ("Donkey", "Wagon", or "Carriage") depending on the mode of land transport, which you want to look at. Looking at the different stages of the journey requires analysing these on the duration, cost or latitude graphs and selecting the dots to see the different stages. Four respondents wrote that aspects related to duration were difficult, and another five mentioned cost. One student commented that ORBIS would have been easier to use if this information was "displayed in a less confusing way" and another suggested that I give them more structure in the questions related to looking at cost by setting "budgets". Familiarising students with these features was more complex than I had initially expected.

In retrospect, this activity required more time than I had allocated as some of the fantastic insights these features can provide into ancient geography were missed because the students found them harder to use. I would modify these initial activities were I to teach with ORBIS again.

The most successful activities were the open-ended questions challenging the students to find the best possible route. While I had intended this as a competitive activity between the students, with the possibility of looking at a few well reasoned journeys at the start of the next lesson, reconstructing a journey on ORBIS requires writing down all of one's options and very few students wrote all of these details. During the lessons, several students also explored ORBIS rather than the task at hand by attempting to make a route to China, finding the longest journey or seeing how far they could zoom in or out (this causes the page to glitch and freeze but can be solved by refreshing). Through deviating from the task, the students made some interesting discoveries such as the fact that it was not possible to travel to certain places in winter or travel to China on defined routes. I would have liked to discuss why there was no route to China and the issues associated with travelling beyond the empire but this was not possible under the circumstances.

If I were to teach with ORBIS again, I would redesign my activities to familiarise the students' with ORBIS to channel this curiosity and desire for competitive challenges based on my observations and the responses to the questionnaires. Many of the activities suggested by questionnaire respondents in response to the question of what activities they would have liked to do with the ORBIS followed on from this curiosity. Suggestions included "class competitions" to find the "longest, shortest, most expensive or cheapest journeys" or finding places. Multiple respondents also wanted to do more activities comparing ancient and modern journeys on ORBIS. (A caveat to this activity is that ORBIS uses Latin names and the students would have to find these first).

In the future I would spend at least a full lesson familiarising students with ORBIS. I would use activities that channelled the students' curiosity and desire for challenges to first explore the route planning functions before spending more time on the features concerning cost and duration. A significant caveat of this process is that it is time-intensive in terms of resource production and lesson time.

Some students also developed their data analysis skills through using ORBIS, but as I was not able to observe the final lessons my evidence and findings are very tentative. The students had to consider how a person's status and situation would impact on the available choices for travel by extracting

relevant information from a source or briefing and analysing what this information would mean in regard to the different travel options. The students also had to extract relevant data from the data generated by ORBIS. However, the limitations of the evidence, which I was able to collect, prevent me from determining the extent to which all the students realised and developed these skills.

Student perceptions of ancient Geography

I will briefly survey the questionnaire responses regarding what students felt they had learned from this project before considering three case studies of students' work: Ffring, Merriscut and Barshaw. Of the eleven questionnaire respondents, four identified that that they had learned about the different modes of travel, six had identified the lengths of journeys, two identified cost and six responses mentioned how the Romans would have experienced journeys and potential dangers. While this quantification does not reveal much, as the answers were very brief, all but one respondent (who said that they learnt how to use ORBIS) identified at least one aspect of ancient geography, which I had been teaching them about during the project.

Student work produces provides far greater insight although there are also considerable limitations in using this as evidence for student understanding. Many of these students express their understanding better verbally and this work was also produced under extraordinary conditions. With the exception of one student who just listed the options and results of an ORBIS search, every journey account displayed evidence of some perception regarding journeys in the Roman Empire. I wish to examine the work of three students, which represents the variation of understanding displayed across the submitted work.

Ffring

Ffring is among the lower attaining students in the class. Although Ffring wrote a dramatic and engaging account, his work did not fulfil the instructions set for the task. Ffring chose to describe the journey of a freedman who survived Pompeii and travelled from Naples to Athens with his former master. Although the character brief stated that the journey was from Naples to Pompeii, Ffring dedicates almost half of his account to describing his character's escape from the eruption of Vesuvius. This escape involved a short voyage to Naples in which "the gloomy mist", "blinded our vision meaning that there was no escape from the treacherous rocks That [sic] lay ahead". During this journey the freedman makes frantic prayers to the gods to save him.

Arriving in Naples, the freedman faces a "ghostly" and unsettling city in which "the streets were naked leaving only beggars and merchants". The freedman immediately decides to travel to Athens as a safer destination, "set[ting] sail at dusk". While the sailing conditions were initially "perfect", the ship accidentally sails into the "open sea" and becomes lost "with no land around" to navigate. The ship sees a "light" and sailed towards it, thinking it was a "lighthouse" but instead find that it is a pirate ship. The pirates armed with cutlasses, board the ship and demand "ya [sic] treasure", envisioning the pirates in the manner of modern popular culture. The work ends mid-sentence on a cliff-hanger just after the pirates leave.

Like Ffring, many of the lower attaining students produced very dramatic accounts, and there was also a strong focus on describing either the origin or destination point of the character and factors (such as weather or pirates) that affected the character's experience of the journey. Concepts related to ORBIS such as choice of mode of transport and the stages of the journey were often not explored in the students' account, even where there was evidence that the student had used ORBIS, as in Ffring's case. Ffring's work displays an awareness of other aspects of ancient travel such as navigation. However, other concepts such as the dangers of sailing at night are not understood or perhaps sailing at night simply made the story more exciting. While a valuable source of data, there are limitations to analysing student work in isolation, without comparing it to other sources of data. Unfortunately, I was unable to discuss' students verbal understanding of their perceptions of ancient geography.

Merriscut

Merriscut is very enthusiastic and keen to contribute in class. She tends to express a greater degree of understanding verbally than in writing. Merriscut's journal entry is fairly short and handwritten. The journal account begins by stating that her character, a freedman, would be making the same journey as his former master but the freedman's journey would be longer because his master had "access to quicker transport, were [sic] as I am only a poor man". Merriscut has identified that access to resources depended on one's status and this impacts on the available travel options. She then proceeds to describe the journey from Neapolis to Athens noting the impact of the weather on the quality of the journey: as it happened "in summer the weather is very good". However, the freedman is afraid of the risk of storms. Arriving in Athens, the freedman "plan[ned] to go to the Altar of the Twelve Gods, to pray to Mercurius, god of travelers [sic]". Merriscut recognises the dangers of travel

in the ancient world and that Romans would often pray to the gods for protection, drawing upon relevant knowledge from a previous project about Athens.

Barshaw

Barshaw is one of the higher attaining students in the class. His journal is one of the longest and is structured by the number of days. Like Rutilius, Barshaw's merchant views his journey in stages, focusing on the duration between the different stages rather than perceiving the journey as a single trip. This had been one of the discussion points in the first and second lessons. Barshaw's merchant chooses the "cheapest" option but this has left him concerned about the length of the voyage he faces, especially as he is undertaking his journey very early in the sailing season and conditions are not conducive to a pleasant journey. The merchant is relieved that "at least we got a good night [sic] sleep in Messina", recognising that journeys were sometimes only conducted during daylight because of the risks of travelling at night.

Barshaw displays a considerable degree of understanding throughout his entry. Although the character brief only mentioned that this character was a merchant, Barshaw considers the fate of the goods and how this affects the merchant's abilities to travel. The merchant worries that his merchandise may be damaged in the storm, and is later "robbed" of all his merchandise. This loss reduces the merchant's resources for the remaining stages of his journey. He may have to abandon the rest of his journey because "the seas are too dangerous to go on" but the merchant lacks the resources to pay for a land route.

Ultimately, the three case studies show a clear understanding of the impact of factors that affect the experience of journeys and the dangers of ancient travel. Not all the students displayed understanding of the concepts, which they had been exploring through ORBIS, in their work. Due to the limitations of my evidence, it is difficult to determine whether this was because of a lack of understanding of these particular concepts (which some of these students identified in the questionnaire) or because these students' written work does not accurately reflect their understanding either because they find it harder to express their ideas in writing or the influence of trying to adapt to extraordinary circumstances.

Student Engagement

My findings are consistent with the literature. Although the presence of Chromebooks caused excitement resulting in frequent low-level disruption in the first lesson, the students were very excited to use ORBIS and many asked if they would get to use it again. Student engagement was unusually high in the second lesson: their regular teacher observed that they were "exceptionally engaged". I was amazed at how quiet and focused the students were during this lesson. However, I recognise, as Condie and Munro (2007) caution, that ORBIS was still a novelty for the students and that using this software over a prolonged period of time may not have seen such effects continue (p.55). However, their level of motivation to explore ORBIS aided some of the students in developing some interesting insights into the ancient world although these findings are tentative due to impact of school closures on my ability to gather data.

The use of computers also had some benefits for student engagement and attainment. Condie and Munro's (2007) review concluded that the use of ICT "improved quality of work in terms of writing, appearance and presentation" (p.26). I noticed that the students' work was often longer than their previous extended writing in class and the quality of written communication was higher. One student even added an image to the document background to make their journal entry look like an unrolled scroll. Some students may have also researched places that their character passed on the journey, because they mentioned features that are prominent among the archaeological remains relatively obscure Mediterranean towns, although I cannot discount the possibility that these were guesses or that parents helped.

Conclusion

Although there is scant literature on the specific use of ORBIS in education, my findings are broadly in line with the conclusions of the literature, which I surveyed. The process of teaching with a technology that was new to the students was heavily reliant on my own understanding of how best to use this technology in a pedagogical context and the efficacy of my own practice in supporting my students. Changes to my practice could have considerably increased the impact of using ORBIS on my students' perceptions.

In spite of this using ORBIS led to the students developing interesting insights into travel in the ancient world and led to one of the most successful lessons, which I have taught with this class due

to the unusually high levels of engagement and motivation to explore ORBIS. This interest in the topic and the software led to many of the students developing increased understanding of ancient geography. It also allowed the students to utilise and display skills that they are not often able to use in the Latin classroom.

At the same time, I found that there are significant considerations for a teacher to take into account when debating whether to use ORBIS with students. Crucially I would ask if the benefits of ORBIS were worth the time it takes to normalise its use with students and to create resources for this purpose. I was teaching a Key Stage 3 class, which had greater flexibility of time and content. In many schools and classes, especially at Key Stages 4 and 5, time constraints and the pressures of getting through the required content make the question of value for time particularly pertinent. These are considerations for further study. Although some classes may benefit from the teacher merely using ORBIS as a demonstration tool, this approach would not have worked with my particular class.

However, the careful use of ORBIS has the potential to enable students' to gain a greater understanding of how the Romans conceptualised and experienced travel and space and the potential for students to better understand how geographical concerns affect the experiences and decisions of historical actors. This raises a number of questions for future consideration. It would not only be informative to investigate the impact of ORBIS on students' perceptions of ancient geography further not only due to the limitations of my research but to better understand the impact of ORBIS in contrast to traditional maps. Furthermore, it would be useful to explore if and how an improved understanding of ancient geographical concerns impacts on students' understanding of ancient history and historical thinking skills.

Looking forwards to my Newly qualified teacher (NQT) year and future teaching, I am interested to consider ways in which I can more effectively familiarise students with ORBIS and also talk to students about their understanding of ancient geography and the perspectives they have gained through ORBIS. I would also like to investigate the potential for cross-curricular opportunities with students' geography learning and using ORBIS to contribute to students' broader skills development.

Reference List

- Arcenas, S. L. (2019). Teaching Ancient Geography with Digital Tools. In Natoli, B. and Hunt, S (Eds.). *Teaching Classics with Technology*, (pp. 165-177). London & New York: Bloomsbury Academia.
- Bearman, N., Jones, N., André, I., Cachinho, H. A. & DeMers, M. (2016). The future role of GIS education in creating critical spatial thinkers. *Journal of Geography in Higher Education* 40(3), 394-408.
- Bednarz, S. (2004). Geographic information systems: A tool to support geography and environmental education? *Geojournal* 60, 191-99.
- Bednarz, S. & Kemp, K. (2011). Understanding and nurturing spatial literacy. *Procedia Social and Behavioural Sciences* 21, 18-23.
- British Educational Research Association [BERA] (2011) *Ethical Guidelines for Educational Research*. Retrieved from: <https://www.bera.ac.uk/publication/bera-ethical-guidelines-for-educational-research-2011>.
- Carver, S., Evans, A. & Kingston, R. (2004). Developing and Testing an Online Tool for Teaching GIS Concepts Applied to Spatial Decision-making. *Journal of Geography in Higher Education* 28(3), 425-38.
- Chadwick, A. (2013). New does not Equal Good. *Journal of Classics Teaching* 28, 8-9.
- Condie, R. & Munro, B. (2007). *The Impact of ICT in Schools - a Landscape Review*. (BECTA). Quality in Education Centre, University of Strathclyde.
- Craft, J. (2016). Rebuilding an Empire with Minecraft: Bringing the Classics into the Digital Space. *The Classical Journal*, 111(3), 347-364.
- Cohen, L., Manion, L. & Morrison, K. (2017) *Research methods in education*. London & New York: Routledge.
- Department for Education [DfE] (2013). *Geography programmes of study: Key Stage 3*. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/239087/SECONDARY_national_curriculum_-_Geography.pdf.

Morrice, A.

- Ellis, A. B. (1974). *The Use and Misuse of Computers in Education*. New York: McGraw-Hill.
- Foddy, W. (1993). *Constructing Questions for Interviews and Questionnaires Theory and Practice in Social Research*. Cambridge: Cambridge University Press.
- Gersmehl, P. J. & Gersmehl, C. A. (2007). Spatial Thinking by Young Children: Neurologic Evidence for Early Development and "Educability". *Journal of Geography*, 106(5), 181-191.
- Gibbs, A. (1997). Focus Groups. *Social Research Update*, Issue 19, Winter 1997. Retrieved from <http://sru.soc.surrey.ac.uk/SRU19.html>.
- Gibson, I. W. (2001). At the Intersection of Teaching and Pedagogy: Considering Styles of Learning and Teaching. *Journal of Information Technology for Teacher Education*, 10(1-2), 37-61.
- Goold, G. P. & Frazer, J. G. (1931) *Ovid: Fasti (2nd Ed.)*. Cambridge, MA: Harvard University Press.
- Kim, M. & Bednarz, R. (2013). Development of critical spatial thinking through GIS learning. *Journal of Geography in Higher Education* 37(3), 350-66.
- Knapp, L. R. & Glenn, A. D. (1996). *Restructuring Schools with Technology*. Boston: Allyn & Bacon.
- Koshy, V. (2010). *Action research for improving educational practice: a step-by-step guide*. London: Sage.
- Lee, J. & Bednarz, R. (2009). Effect of GIS Learning on Spatial Thinking. *Journal of Geography in Higher Education*, 33(2), 183-198.
- Lee, Y. & Lee, J. (2014). Enhancing pre-service teachers' self-efficacy beliefs for technology integration through lesson planning practice. *Computers & Education* 73. 121-28.
- Legg, M. (2019). Changing dimensions: the impact of making models on Year 10 students' understanding of Greek temples when studying Classical Civilisation. *Journal of Trainee Teacher Education Research*, 10, 307-330.
- Malamud, M. (2016). *Rutilius Namatianus' Going Home: De Reditu Suo*. London & New York: Routledge.

- Marsh, M., Golledge, R. & Battersby, S. E. (2007). Geospatial Concept Understanding and Recognition in G6-College Students: A Preliminary Argument for Minimal GIS. *Annals of the Association of American Geographers*, 97(4), 696-712.
- McNiff, J. (2017). *Action Research. All You Need to Know*. London: Sage Publications.
- Natoli, B. & Hunt S. (Eds). (2019) *Teaching Classics with Technology*. London & New York: Bloomsbury Academia.
- Nicholls, M. (2016). Digital Visualisation: Ancient Rome and Beyond, *British Academy Review*, 27, 41-44.
- Passey, D., Rogers, C., Machell, J. & McHugh, G. (2004). *The Motivational effect of ICT on pupils*. England: DfES/ University of Lancaster. Retrieved from: https://www.researchgate.net/publication/239924105_The_Motivational_Effects_of_IC T_on_Pupils.
- Robson, J. & Graham, E. (2018). Classics Online at the Open University: Teaching and Learning with Interactive Resources. (pp. 217-229) In Holmes-Henderson, A., Hunt, S. & Music, M. (Eds.). *Forward with Classics*. London: Bloomsbury.
- Trimm, C. (2018). War and Peace in Canaan: Connecting geography with political and military affairs in ancient Israel through a classroom game. *Teaching Theology and Religion*, 21(4), 306-320.
- Xiang, X. & Liu, Y. (2019). Exploring and enhancing spatial thinking skills: Learning differences of university students within a web-based GIS mapping environment. *British Journal of Educational Technology*, 50(4), 1865-1881.
- Walshe, N. (2017). Developing Trainee Teacher Practice with Geographical Information Systems (GIS). *Journal of Geography in Higher Education* 41(7), 608-28.
- White, R. (2010), "What is Spatial History?", Spatial History Lab Working Papers. Retrieved from <https://web.stanford.edu/group/spatialhistory/media/images/publication/what%20is%20spatial%20history%20pub%20020110.pdf?>
- Wilson, E. (2009). *School-based Research A guide for education students*. London: Sage Publications.

