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Digital (Urban) Geography: Student-Led Research Methodology Training using Smartphone Apps

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New opportunities to deploy research methods such as surveys and questionnaires are shifting into the digital environment. There is increasing evidence that people who have grown up with technology have acquired distinctive new ways of learning, and that traditional methodologies fail to maximise student engagement (Lafuente 2018), yet many research techniques are still taught using traditional 'pen-and-paper' methodologies. Thompson (2013) suggests that these 'new learners' are constantly using technology, multi-tasking in interactive environments, and collaborating online, yet research shows that many students are unaware of the potential of their smartphone to support learning (Woodcock et al, 2012), despite a widespread interest in mobile devices facilitating teaching and learning in third-level education geography departments (Welsh et al. 2013).

The ESRI Collector for ArcGIS is a mobile application (app) that can be used with iOS, Android, and Windows smartphones. Collector for ArcGIS is beginning to emerge as a technology to support spatial thinking in geography at second-level education and third-level education (Panek and Glass 2018). Here we report on our strategy of integrating mobile technology in GG1015 Applied Geography, a large (250+) class introducing first year BA Arts Geography programme students to a number of techniques that we use in Geography. This module sits between GG1013 Environmental Geography and GG1014 Society and Space in the first-year programme. Both of these modules are a block of 24 1-hour lectures, with multiple choice quizzes (MCQs) and essay-based exams. Subsequently, GG1015 was developed to compliment these modules and introduce different teaching styles that facilitate learning across a range of diversities. Throughout this module, students engage directly in fieldwork, photographic activities, essay writing, presentations, and small group work. As such, this module offers an excellent case study to explore new techniques to engage students in learning, particularly in geographic research.

In 2017, we identified a need to revise and re-design the research training delivered in the second semester (that accounts for 35% of the module). This project consisted of an urban land use survey throughout Cork City, Ireland, using smartphones as the research medium and WebGIS to perform spatial analysis on the data. Our strategy was based upon four pillars:

1. Firstly, we decided to base our new pedagogy on research-based training and establish a new research project in the department focused on an urban land use survey of Cork City to be researched primarily by students.
2. Secondly, we decided to move our research training into a digital framework by deploying the ESRI Collector App, a mapping and data collection software that can be used on smartphones in the field.
3. Thirdly, we decided to instil a stronger research ethos into the cohort by directing students to take ownership of their project and underscore its relevance to their personal development as researchers.
4. Fourthly, we decided to reformat the pedagogy deployed in the module and flip the classroom by encouraging students to be self-directed and engage in peer-to-peer learning in a structured but largely independent fieldwork context using the opportunities of the new technology.

Three orientation sessions were offered to students in a large group context, that outline key teaching for understanding (TfU) goals. Figure 1 is a graphic organizer of this research project.

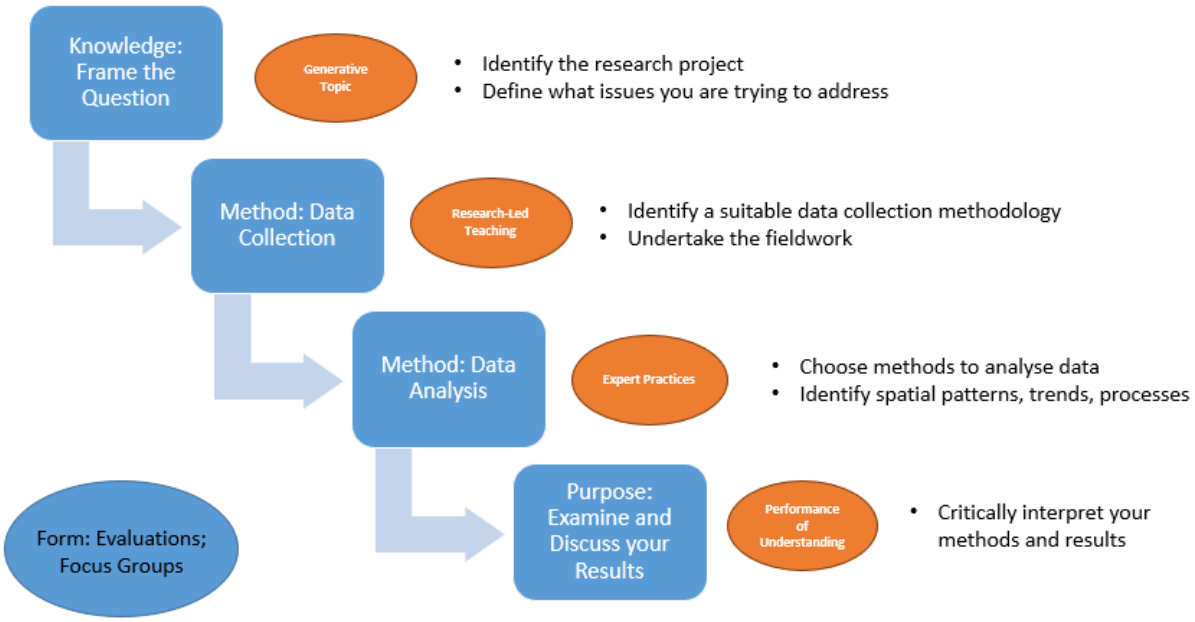

Figure 1. A graphic organiser of the research project, outlining the key teaching for understanding (TfU) goals, as well as the specific objectives for the research project from a student perspective.

Response to the student survey in 2019 was 34%, which given that online surveys are generally lower than in-class surveys (Anderson et al. 2006), is a good return. We then held focus groups that provided much more detailed discussion on topics with 5% of the students enrolled in the course that spanned 25% of the groups. Thematic analysis of the survey results (Table 1) and the focus groups identified three common themes; active learning through research led teaching, a dichotomy in response to technology, and peer-to-peer learning through group work.

Table 1. Results from student end of project survey. Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D) and Strongly Disagree (SD).

	SA	A	N	D	SD
The project objectives were clear	27.17%	56.52%	15.22%	1.09%	0.00%
The urban geography briefing introduced the topic well	26.09%	52.17%	18.48%	4.25%	1.09%
The Collector App briefing provided sufficient explanation on data collection	44.57%	39.13%	10.87%	5.43%	0.00%
The WebGIS briefing provided sufficient explanation on data analysis	43.48%	38.04%	15.22%	3.26%	0.00%
The Collector App videos were useful	53.26%	31.52%	11.96%	3.26%	2.17%
The WebGIS videos were useful	47.83%	35.87%	13.04%	3.26%	1.09%
I enjoyed undertaking research as part of this assignment	43.48%	44.57%	7.61%	5.43%	0.00%
I learnt a lot about geographic research from this project	30.43%	48.91%	16.30%	5.43%	0.00%
I preferred undertaking fieldwork compared to a lecture-practical series	47.83%	36.96%	6.52%	8.70%	0.00%
I would like to undertake more research-led modules	43.48%	44.57%	7.61%	3.26%	2.17%
I would like to use this technology again in some of my modules	32.61%	48.91%	13.04%	2.17%	3.26%

As evidenced by Table 1, 88% of the students surveyed enjoyed the research element within the module, 79% agreed they learnt a lot about geographic research from the practical components, and 88% want more research within geography modules. Positive student comments identified the benefit to geographic fieldwork, which is sometimes neglected in large classes, and the advantage to student learning over traditional 'essay-based assessments':

- *"I think what makes this project stand out as opposed to any other essay, where we just kind of go online and look for information and write about it, we actually go out and do it, this feels like new, it feels like something we actually did ourselves"*

- *"I think by doing it ourselves we are able to learn a lot more, we can actually go out and physically experience it instead of just researching it online, … but doing this kind of assignment, we are able to go out and collect our own information and then look back over it and analyse it and just think, oh yes, that's where that came from and then be able to relate it back to ourselves"*

Group work was identified by every student in the focus groups as a *challenge* to this project. Contacting group members and no-shows were frequent complaints:

- *"I emailed them and some people responded straight away and another person responded nearly a week later, so there was that… We had to wait for the fourth person to make contact."*

Due to new European Union General Data Protection Regulations (GDPR), we could not provide both student names and emails when placing the students in groups, which led to a large logistical challenge by course coordinators and administrative staff. Focus groups led us to consider introducing the students to their group members during the previous semester, which would resolve this issue. Group work was therefore generally perceived as a hindrance by students; however, when asked as to whether they would prefer to undertake this exercise on their own, students voiced their preferences at being in groups, and indicated that peer-to-peer learning was in effect:

- *"There was a bit of discourse in my group, sometimes we weren't all agreeing on what the status of a building was... Since this was the first one [research project] I like it in a group. If I was on my own I would be doubting if I was doing this correctly. Even with the 3 lectures beforehand. Was I doing this right? If all within the group do it the same way, it kind of reassures that it's the right way to do it."*

Finally the students responded in a divergent manner when discussing their digital literacy. Students felt they were technically able to undertake the fieldwork with little to no support. The consensus from the focus groups was that instructional videos on using the app were watched only once or not at all, and that students opted to just go into the field and improvise with their smartphones. Similarly, when discussing group contact, students listed a range of communication mediums that they used, including WhatsApp, email, Facebook, and Snapchat. Conversely, the students indicated that the WebGIS videos were not just useful but a necessity, as they could not undertake the required map-making and spatial analysis without them.

- *"none of us checked out the [Collector] videos online because it's all there so we could just kind of figure it out on the day."*
- *"I used a lot of the [WebGIS] videos just on how to do the different maps and found them very helpful. But the first time I tried I was a little bit lost in how to do the different maps and print them off, or format them into the actual write-up afterwards."*

The dichotomous views on technology held by the students indicate that these 'new learners' do not consider smartphone apps to be a barrier to learning (or perhaps even a technology). Moreover, students reported that access to smartphones was not an issue, with 98% of survey responses indicated that they had easy access to a smartphone (Table 1).

This undergraduate research project highlights the beneficial outcomes to be achieved by migrating to the digital space that students are both comfortable exploring and which has a key role in their professional development. As student feedback illustrates, this project positively influenced learning for first year students who took ownership of the entire process. Feedback also incorporated suggestions that provide this team the opportunity to reflectively refine the Geography curriculum to this project and other modules. By being innovative and using technologies and digital platforms that are freely available, this team developed an assignment that has captured the imagination of the students and engendered an enthusiasm for undertaking research within Geography. For the Team, this new intervention has opened up the potential to reinvent other aspects of the teaching programme, embed more research practices in student's work, and generate more pedagogical innovation using other digital platforms in the future.