

Using Longitudinal Video Reflection Methods to Understand Students' Experiences Abroad

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Abstract—In this Work-in-Progress Research paper we introduce longitudinal video reflection as a useful data collection approach for understanding students' real-time experiences of educational environments. We use data collected across three study abroad programs in engineering, comparing longitudinal video reflection data to written journals and post-program interviews, to understand the benefits and challenges of using each of these data collection approaches. Based on this, we make recommendations for when longitudinal video reflection could be used for data collection in future studies within engineering education.

Keywords—international programs, research methods, reflection

I. INTRODUCTION

Studying abroad is considered a form of experiential learning that can help students develop cultural skills and global competence desired by industry [1]. However, the existing research on this topic is usually conducted after students return home from their study abroad experience. This may be effective for analyzing long-term, quantitative outcomes [2] but does not capture student experiences in the moment. Post-experience data gathering can result in selective reporting as students may think differently about their experiences in retrospect. Collecting data that capture student learning in-the-moment could help educators and researchers better understand student learning processes and meaning-making [3]. This perspective on the student experience can inform the effective design of study abroad programs and help identify structures that support student learning during experiential programs like study abroad. The purpose of this study is to evaluate a mobile qualitative research phone application (Indeemo) as a method for collecting real-time data about undergraduate engineering student experiences while studying abroad. We compared this data collection method to two commonly used methods within the study abroad literature: student reflective journals kept while abroad and post-program interviews. Although this paper is situated in the context of study abroad programs, we believe that this method could prove useful in various contexts within engineering education.

II. BACKGROUND

Qualitative inquiry centers on creating “meaning in context” [4]. The researcher generates this meaning from qualitative data, which is collected and analyzed in numerous ways. One guide in selecting a qualitative methodology is the *information power* of the sample, which can be described by the quality of the

dialogue (richness and depth) and sample size [5]. Sampling in qualitative research can be viewed as a combination of both the number of participants and the amount of data collected from each participant. Researchers may collect a lot of rich data from a small number of participants or less data from a larger number of participants, the overall sample determined by the amount and richness of data collected rather than the number of individuals [6]. Interviews, a common data collection method for qualitative researchers, can provide a large amount of rich data at once. However, participants may struggle to recall details of events that happened weeks or months prior. In this study, we explore a new approach that achieves a similar *sample size* in terms of quantity and richness of data, but collected over an extended period of time.

In study abroad research, participants are often located at geographically dispersed sites, making many rich data collection methods difficult. Ethnography, for example, generates rich, thick qualitative findings over time while focusing primarily on social interactions between participants in the field [7]. The study abroad researcher cannot follow this approach when participants are spread across multiple continents, yet rich data may still be desired. The relative ubiquity of mobile devices and video applications allows for new methods of data collection using mobile applications. In study abroad programs, the use of mobile devices has been shown to enhance student reflection about and engagement with the host culture, particularly when programs intentionally incorporate these devices [8]. The purpose of this study is to introduce longitudinal video reflections through a mobile application as a new approach to collecting rich data in the context of study abroad programs and compare this method to traditional data collection methods. We will address the following research question: How do the richness and depth of data vary among three methods of data collection for engineering students who are studying abroad?

III. METHODS

For this paper, we draw on data collected across three studies of engineering students in study abroad programs to compare the methods. Each study collected students' reflections on their experiences abroad using a different data collection method: journal reflections written in-country (Study 1), post-program interviews (Study 2), and video reflections made in-country (Study 3). All of these studies used the Critical Incident Technique (CIT) as a guide for data collection and analysis. The CIT involves asking participants to describe an event of their choice in narrative form including what happened, their response, and the outcomes related to the event [9]. This

approach originated in studying the experiences of pilots in WWII [10], but it has since been adapted for use in social science research through incorporating an interpretivist perspective [11]. We have found that because CIT asks participants for concrete experiences to anchor the conversation, it helps students talk more coherently about their experiences and learning abroad and allows researchers to observe students' meaning-making processes [3].

A. Data Collection & Incident Selection

The following sections briefly describe the participants, data collection, and critical incident selection approaches for the three studies we drew data from for this paper. Because the focus of this paper is to compare the data resulting from these methods (as described in the next section), we have left out details about the data analysis techniques used in the original studies. All three studies were approved by the Purdue Institutional Review Board and all participants provided signed consent forms to participate.

a) *Study 1 – Journals*: In this study, participants were first-year engineering students participating in a two-week study abroad program. These students were asked to write journal entries at multiple points during their time abroad, and specific reflection prompts were provided. Based on students' responses to survey questions, 28 journals were selected for detailed analysis with the goal of achieving maximum variation in student experiences. More detail about the overall study can be found by reading [1]. In this study, CIT was used as a data analysis technique, where journal entries were analyzed to identify critical incidents based on how students described them. In the context of the journals, we defined critical incidents as stories where the student described an interaction with culture or engineering that resulted in speculations, questions, or interpretations, or where the student described an event in great detail and suggested that it held personal meaning for them. These incidents were then grouped into categories, following traditional CIT coding approaches [11].

b) *Study 2 – Interviews*: The participants in this study were recruited from across multiple types of engineering study abroad programs, including short-term study tours (24 participants), short-term classes abroad (9 participants), research/internships abroad (35 participants), and semester abroad (10 participants). We interviewed these 79 students and asked each of them to provide two critical incidents in response to the following prompt: Talk about two specific experiences that were significant to you during your time in [country name]. For these examples, I'd like you to think of a time where you felt that you learned something important (and this could be any kind of learning, about research, culture, travel, yourself, etc.). Based on suggestions and examples in other CIT studies [11] [12] [13], we prepared follow-up questions to encourage students to provide more detail as necessary. Using this method, we received 173 incidents (some students provided more than two), which were analyzed using multiple rounds of coding. More about this study can be found in [3].

c) *Study 3 – Videos*: This pilot study builds on the methods from the earlier two studies. The participants were 10 engineering students spending a semester abroad in different locations. We used an existing phone application (Indeemo) to

collect weekly video reflections from the students for 15 weeks. Participants received a weekly prompt on their phone to record their reflections. When they opened the application, they received a critical incident question similar to the question for Study 2 to answer. The students would hit "record" in the app and make a video with their response to the question. Participants were asked to make each video about 5-8 minutes in length, and most of them used up this time and occasionally recorded multiple videos in one week. Students in this study were paid \$5 for each weekly video and an additional \$25 at the end of the semester if they completed 80% of the videos.

B. Analysis for this paper

We identified two themes that were common across the three studies (language and international travel) and selected representative quotes for each theme from each study. Building on the idea of information power, we compared the quotes within each theme to identify differences in the content, richness, and quantity of the data across data collection approaches. The team of authors reviewed these quotes individually and then discussed as a group to come to a final consensus. Based on this comparison, we identified benefits and challenges related to each data collection approach, which can be used to determine the appropriateness of each method for future research studies.

IV. RESULTS

In this section, we present the comparison of the written journal reflections (Study 1), post-program interviews (Study 2), and video reflections (Study 3). For each of the two themes, we include the quotes we analyzed for each study in a table followed by our comparison of the quotes. At the end of the Results section, we summarize our findings in Table 3.

TABLE I. EXEMPLAR 1: LANGUAGE

Within-Program Journal
The part of this trip that made me the most uncomfortable was definitely the language barrier. I took Spanish in high school, but there were a lot of things I wish I could have communicated that I just didn't have the words for. Most importantly, I was uncomfortable ordering at restaurants. After my terrifying allergic reaction, I was basically terrified of all cultural food, and typically stuck to plain white rice at every restaurant. Whenever I ordered, I tried to communicate my allergies to the waiters, but it didn't seem to work some of the time which made me nervous. I could tell when they simply didn't understand what I was trying to say, which resulted in one or two instances of panicked tears in the restaurant bathroom. I had to have my friends or [friend] speak for me. I don't know what I would have done without [friend]. He was an amazing addition to the trip, and he was the only way I was able to survive group dinners. Every time it was my turn to order I would call over [friend] and he would talk to the waiter for me, so we could be sure they would understand. I'm looking forward to being back in the USA where I can confidently order and know people will understand and make sure I'm safe. I think I dealt with it pretty well considering how nervous I was, by using Google Translate and help from friends and [friend].
Post-Program Interview
I think one interesting thing that I learned is that language in Europe and probably other places too, is a lot more fluid than language in the United States. So I speak Spanish fluently and when I was there in Portugal, we, me and a couple of the other people took like a week and traveled through Spain. And it was neat to see that, well, first of all, Portuguese is really similar to Spanish, so I'm like, I could read everything that was written in Portuguese when I was there. But it was cool to see because we traveled north to a portion of Spain that was adjacent to Portugal. And when we were there, a lot of the signs were written in this, like, I don't remember

<p>what it was called. Guyego I think was the name of the language, but it was like a cross between Portugal or Portuguese and Spanish that didn't like, it wasn't fully either language, you know? And it was written in that language and all this stuff. And I was like, oh, like I can read this and I can see it's like not Portuguese and it's not Spanish, but that's how everyone communicated. And it was cool because I could speak Spanish to anybody no matter. If they were speaking, if they knew Portuguese or Guyego or whatever language, I could speak to them in Spanish and they could respond in whatever their language was and we would understand each other. And I don't think that's as common of a thing in the United States. I think here we typically see it more like, you know, you have discrete languages like English and Spanish and they're totally different. Right. But I think in Europe especially, they kind of pictured language as just however you communicate vocally with somebody. And it didn't matter what the words were you were using as long as people understood each other. I think that was a big takeaway that I had from that.</p>
<p>Video Reflections</p> <p>The other thing that I did while I was there was I went on a tour of some beer cellars and it was really, really interesting. But I thought that the tour was going to be in English and it actually ended up being in German, so I accidentally got to practice my German for like an hour. And it went a lot better than I thought it would. I was a little bit worried that I wasn't going to understand anything, but I ended up understanding a little bit more than I thought I would. So hopefully this kind of encourages me to in the future really push myself and push my German language because at the end of the day, at the end of this study abroad experience, I really do hope that my German has improved from what it is now. So that's something that I definitely want to keep in mind is just to kind of keep pushing it 'cause it's very easy, especially in, like, touristy areas, just to fall into that English, just to kind of pick English over German, 'cause German definitely is more challenging. But I think I have to find that balance between still being able to enjoy myself and still being able to learn something about the history about what I'm viewing, but also using that as a language learning experience. So I hope in the future I'm able to kind of find that balance a little bit easier.</p>

In Table I, the quote from the journal shows some reflection on how a language barrier is impacting the student's experience, but the description of the incident is high-level with few specific details provided. This lower level of richness is typical of written reflections, which take more effort than spoken responses in interviews or videos and therefore tend to be shorter. Compared to the journal quote, the responses are both longer and richer for the interview and video reflection data. A key difference between longitudinal video reflections and the post-program interviews is that this method allows for real-time reflection, enabling greater recall of details and focus on a specific moment in time. We see this in the video reflection example above, where the student discusses one small experience in a lot of detail, whereas the interview student is focusing on a larger takeaway from across their entire experience. In addition, the longitudinal aspect of the video reflection approach allows students to connect their experiences across their program. This results in more future-looking reflection, with students using the opportunity to process their experience over the course of several reflective videos. Although the interview quote shows a learning outcome, there is less richness in the reflection on how it will impact the student moving forward.

TABLE II. EXEMPLAR 2: INTERNATIONAL TRAVEL

<p>Within-Program Journal</p> <p>Possibly my biggest takeaway from today has to do with the challenges that arise when travelling in a group. I was the one who planned and set up the Pachacamac visit and lunch at the Peruvian restaurant, so I was a sort of leader of a little group today. It was very difficult because not everyone was satisfied with my plans and there were a lot of complaints from two</p>

<p>people in particular. I'm fine with criticism and complaints, but the part that bothered me was that no one was suggesting any alternatives or providing any ideas on how to improve my plans. The other thing that bothered me was that some people jumped in on my plans that I had previously made and got angry that my plans did not match up with their plans for later. It was stressful taking the blame for several issues even though no one would suggest improvements and alternatives. Luckily, everything turned out well today and I had some really good experiences. Previously, I had experienced group travel being difficult because it is hard to keep track of everyone and include everyone, but this today I learned quite a bit more about group travel.</p>
<p>Post-Program Interview</p> <p>Well I became a really good planner. That's just from keeping track of information and not having the cell phone access you have here. Just to have everything written down, places to go, if you're on spring break or on a weekend or something like that. So I definitely became a really good planner. I used to be not very, "Go with the flow." Because of that planning, I would always want to do that. But I actually became really, really good at just, "Oh, we missed the train, we'll get the next one." That kind of thing. Or I think the most interesting experience for me was, me and a friend were planning a trip to Barcelona for Easter, which was a long weekend. Then there was a family emergency in her life and she went home. So I had a plane ticket to Barcelona alone. So I went to Barcelona alone for three days. I didn't know anyone, hadn't traveled alone that before. I had gone to meet my buddy and traveled alone, but I'd never stayed alone, done tours alone, had to meet other people alone. It ended up being the best weekend I had had the entire time. Don't get me wrong, I wish my friend could have come. But the people I met, the experience that I had... I remember this one experience, I hadn't talked to someone in six hours. I had just been walking around. Like I said earlier, I love to just walk. So I went down, I haggled with street vendors for an hour or two. Me and this one guy... I got these shoes for \$15, and they're still in very good shape. So I was haggling with this guy for a long time, and we were doing it on our phone calculator. So he would take out his phone, put in a price. I would say no, I would type in a price. He would say no. Then finally we came down to some... So that was fun. It's a really cool experience.</p>
<p>Video Reflections</p> <p>So for this week I'm going to be talking about an event that I experienced and how I felt and how I responded to it. So one thing that happened this week was that on Tuesday it was the first time I was going to use the metro in Madrid by myself, so I needed to go to the Polytechnic University of Madrid, which is where I have my research and that's different from the university I am actually studying at, which is called UC3M and it's a bit South, kind of central Madrid where I'm living and it's pretty far, but I'll get into that later. So basically I was also moving out of my Airbnb at this time and going into my homestay, but first I had to go meet my research professors so I hop on the metro and I end up getting like confused about where I'm supposed to go and I get on the right train, but I get off on the wrong spot and I have to go back on the metro and like figure all of this out [...]</p> <p>So I get to like the second to last stop that I need to go to, and it turns out that's the last stop on the metro, so I have to get off and then I have to walk like 20 minutes to get to the actual campus of the school. Because I guess like Google didn't really understand how the metro system worked, so I ended up being there a couple minutes late and that kind of really frustrated me because I had used the metro before but I was always with friends so it wasn't just me trying to figure this whole thing out by myself. So that was pretty confusing and it was it kind of made me really anxious, but it was fine once I actually got to that place and I was talking to my professor that all went really well.</p>

In the examples in Table II, the within-program journal describes an event which happened on the same day (like video reflections), but the experience is generalized with few details provided. This "summary" approach is common in journals as it can take a long time to report details when writing. The post-program interview quote provides a few more details, such as a description of haggling, but also ends up being more of a synthesis across multiple experiences rather than focused on a

specific moment (despite starting with a specific critical incident). The post-program interview also reveals less of the student's immediate interpretation of the event. In the video example, we see a rich reflection, with the student recalling more details from the event than either the journal or post-program interview. All three of these quotes show a lesson the student learned while traveling abroad, yet the video reflection approach yields a greater level of detail and focus on a specific experience than either of the other two approaches.

Below is a summary table of the benefits and challenges that we identified for each data collection method. Written journals allow for real-time reflection, but typically result in less rich data because students do not write in as much detail as they speak. Post-program interviews provide richer reflection, but it tends to be at a higher, more synthesized level, since interviews are conducted weeks or months after the experience of interest. Although it can be more expensive to implement, we found that video reflection data captures a more "in the moment" description of an experience, which allows for greater richness in seeing both what happened and how the student interpreted the experience.

TABLE III. BENEFITS AND CHALLENGES OF EACH METHOD

	Within-Program Journals	Post-Program Interviews	Video Reflections
Benefits	-Real-time data	-Rich reflection -Captures biggest memories and learning	-Real-time data -Rich reflection -Captures smaller daily incidents
Challenges	-Students write in less detail than they speak -Reflection less rich	-Stories told in retrospect -Snapshot in time	-Cost of phone application

V. IMPLICATIONS AND FUTURE DIRECTIONS

The purpose of this paper was to compare video reflections with two other data collection approaches that are typically used to understand students' experiences in educational settings. Based on our analysis, we believe that video reflections provide several benefits for researchers not only in the study abroad space but in engineering education in general. The key benefits of video reflection that we identified in our data were that this method: 1) captures rich detail in terms of a students' description and meaning making of an experience, and 2) encourages students to consider a specific moment in the context of a larger educational experience (e.g., a study abroad program). This allows for rich, thick data with a relatively small number of participants, increasing the information power of the sample [5].

Our analysis provides insights into video reflections that can help future researchers determine if this method would be a good fit for a particular study. As argued by Creswell & Creswell [14], it is important to achieve alignment between research questions and research methodology. For example, our findings suggest that video reflections would be appropriate when the goal is to obtain real-time, deep, and detailed information about the phenomenon of study. In this study, we used CIT consistently in the three studies to have a point of comparison. We realized that with longitudinal video reflections we were able to understand

how students experienced the incident and how they processed it in greater detail than the alternative approaches. In contrast, the other approaches we considered may make sense in a study with different research questions. For example, if researchers were interested in how the incident had a long-term impact on the participant's perceptions or learning, an interview approach could be the best approach. If researchers do not have the time or resources to undertake a longitudinal video reflection or interview approach, a journal approach provides a good alternative because it is less time-intensive to both collect and analyze the data. Using video reflections can also help us understand how participants experience different constructs (e.g., emotions) that are not easy to capture with traditional methodologies. For example, we have been trying to understand how study abroad experiences vary according to the country visited, the length of the experience, and how some demographic variables can influence the experience [1]. Despite our initial findings with traditional methods, our new video reflection data may provide a richer perspective on these differences that cannot be fully captured with surveys, journals, or interviews.

Longitudinal video reflections have a lot of potential in engineering education research beyond study abroad. As mobile devices have become more prevalent, videos can expand the field of qualitative research. Students now own and use mobile devices almost ubiquitously, allowing researchers to analyze students' behavior outside of school [15]. This was effective in our study abroad setting but also has other possible applications. Mobile phones expand the range of potential research sites, allowing the qualitative researcher to participate remotely in both time and space [16]. This can make previously "impossible" research feasible to undertake. In our study, we utilized a mobile application to collect video data from students in Europe, South America, North America, and Asia without having to physically travel to these sites. In addition, short-form videos provide an opportunity to collect longitudinal data which may be beneficial for engineering education research seeking to understand students' development over time. For example, we are considering using longitudinal video reflections in a project to understand how doctoral engineering students perceive the importance and scope of lifelong learning and its impact on their research advancement and academic and professional success. Research has been conducted around understanding the doctoral student development process [17] [18] [19], however, understanding the full picture of lifelong learning in doctoral students is complex because of the degree of independence and the individualized path to a doctoral degree which can be difficult things to capture with traditional methodologies. We plan to collect data from students across different stages in the PhD in the form of 'social media type entries.' These entries will be prompted in response to moments of their week where they engaged in individual learning. Hence, we consider that longitudinal video reflections may provide rich, thick data to describe this phenomenon.

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