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Pre-service Teachers Reflection on their Undergraduate Educational Research Experience through Online Instructional Delivery

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Abstract. Undergraduate research as a high-impact educational practice aims to develop the personal and professional growth of preservice teachers and prepares them to be effective practitioners in the field. With the sudden shift in instructional delivery, a dearth of studies focusing on students' experiences in conducting research in the online learning environment is observed. This study examined the experiences of 80 preservice teachers from a teacher education institution implementing a pure online instructional delivery in conducting educational research through descriptive phenomenology. Their narrative accounts were obtained through their post-assessment reflective journal with seven guide questions and were analyzed using thematic analysis. Their nuances articulated that students' prior knowledge and experiences in research, presence of support groups, availability of learning resources, and perceived benefits were the enabling factors for their learning success. However, there were also challenges along the way such as communication barriers, lack of resources, overlapping responsibilities, and the quality of their output and performance. The presence of a supportive virtual learning environment and online learning community is critical to learning outcomes and the quality of learning experiences.

Keywords: educational research; online instruction; phenomenology; preservice teachers

1. Introduction

Research and inquiry are essential tools for preservice teachers to be informed decision-makers and effective practitioners in the field. Several studies have underscored the benefits of conducting research for the professional and personal growth and development of preservice teachers (Hong & Lawrence, 2011; Miller & Shinas, 2019; Ulvik, 2014). First, the duration of undergraduate research experience positively contributes to graduate school performance in their research

skills (Gilmore et al., 2015). Second, participation in research undertaking has been associated with enhanced ability in doing science along with other scientific values and skills such as oral communication, professional writing, research skills, and academic skills (Thiry et al., 2011; Sanchez & Rosaroso, 2019). Thirdly, it enables them to understand and visualize the role of teachers with those opportunities and problems that may confront them as professional teachers as research-derived knowledge is instrumental for effective learning processes and whole school improvement (Mincu, 2015). Lastly, educational research results provide an empirical basis for implementation in the teaching-learning process and implications in the educational system (Eğmir, Erdem & Koçyiğit, 2017). Teacher candidates who develop an inquiry-based stance to learning are positioned to become change agents in their classrooms (Ortlieb & Lu, 2011; Hermoso et al., 2022). Therefore, incorporating educational research in teacher preparation programs creates opportunities for candidates to develop the skills and competencies of effective teachers (Miller & Shinas, 2019).

Undergraduate research education has been incorporated across higher education institutions in various countries (Gilmore et al., 2015) including the Philippines (Ulla, 2018; Sanchez et al., 2021). Due to the COVID-19 lockdown protocols, schools in the country closed in March 2020 and partially reopened in January 2022 in some low-risk areas. However, with the recurrence of the surge of infections brought about by COVID-19 new variants, schools reverted to flexible learning options with these set up to be adopted as part of the new normal in the educational setting. The country adopted preventive measures for learning continuity in both basic and higher education levels through flexible learning modalities such as modular-based instruction, blended learning approach, and pure online instruction (Canlas & Karpudewan, 2021). Teachers and students were confronted with the need to adapt to online teaching in particular since it is a reality that web-based technology has noticeably influenced and transformed the learning and teaching environment. This transformation permeated across degree programs and course offerings such as educational research (Ni, 2013; Aghae & Keller, 2016). These unconventional approaches to learning are characterized by advantages and disadvantages to learners, teachers, and the learning process (Alqurashi, 2019; Boholano et al., 2022).

1.1 Purpose of the Study

Too many studies focused on mentors' perceptions and experiences in mentoring undergraduate research but less on student experiences, especially in the context of new learning modalities such as blended learning, distance learning, and pure online learning that necessitate further description. This study aimed to answer the following questions:

1. What are the enabling factors affecting preservice teachers' undergraduate research experience in the online learning environment?
2. What are the deterrent factors affecting their learning experience and outcome in undergraduate research through online instructional delivery?

2. Literature Review

2.1 Research in an online learning environment

Undergraduate research is changing in the face of the challenges and developments in the educational landscape and higher education. In a comparative study by Ni (2013) between online students and classroom students vis-à-vis, their performance measure in research methods courses in a graduate public administration, students' grade is independent of the mode of instruction. However, all classroom students considered their learning experience to be successful, whereas only 87% of online students do. With a higher failure rate (12%) for the online section compared to 4% in the face-to-face section, the author underscored the need to carefully direct research efforts exploring various aspects of learning effectiveness affecting the online instructional mode. Brown et al (2020) revealed that online students have lower completion rates than those studying on campus, amidst the flexibility and autonomy that the nature of online learning offers. This phenomenon could be affected by the lack if not the absence of interaction between students and mentors.

Online learning modality potentially eliminated physical barriers and increases convenience, flexibility, access to materials, and customized learning and feedback over the traditional face-to-face setup (Ni, 2013). Undeniably, concerns are also reported that online learning modality significantly reduced social and communicative interaction (Ni, 2013), reduced the level of motivation, and affected learning effectiveness. One essential element for a quality-learning outcome in doing research is interaction. Learners perceived peer interaction as useful to enhance the quality of the thesis outcomes (Aghaee & Keller, 2016). This contemporary educational setting raises a question about the effectiveness of online instructional modality as compared to traditional classroom learning in developing research skills and competence and achieving the learning outcome. Interestingly, in a time of decreased in-class interaction between students and faculty mentors due to the COVID-19 restrictions, efforts to examine students' reflections of their learning experience in the context of the pandemic are scarce to non-existent. In response, this study examined the dimensions of students learning experience in educational research courses in the context of unconventional online-based instructional delivery.

3. Methods

The succeeding sections detail the research approach and procedures employed to collect the textual data needed to explore the various factors affecting undergraduate students' research experiences with the online learning modality.

3.1 Research Design

This qualitative research utilized descriptive phenomenology (Sundler et al., 2019). This methodology involves thematizing meaning to illuminate the underlying meanings hidden in lived experiences (Ho et al., 2017) of preservice teachers in their undergraduate research through online instructional delivery – a phenomenon that is considered relatively unconventional in the context of the study. The written accounts of students' narration of their reflection on the phenomenon were subjected to thematic analysis based on descriptive

phenomenology (Sundler et al., 2019) wherein coding categories are derived directly from the textual data to illuminate the meaning.

3.2 Participants

The participants of the study are 80 preservice teachers and students who were selected purposively based on the quality of the reflection paper that they submitted. The authors attempted to recruit a diverse sample based on gender and specialization as reflected in table 1 showing the characteristics of the participants. These participants were third-year undergraduate students pursuing a degree in teaching at a public university recognized as a center of excellence in teacher education. All participants were granted informed consent before data collection; the study was approved by the institutional review board with the following certification number **562/2020-09 Picardal**.

Table 1. Participant Characteristics

Characteristic	Distribution
Sex	Male = 24 (30%) Female = 56 (70%)
Specialization	Science = 20 (25%) English = 20 (25%) Mathematics = 20 (25%) Elementary = 20 (25%)

3.3 Context and Research Locale

The most interesting aspect of this study involving these student participants is the fact that they will be the pioneer batch of the graduate of the K to 12 programs, an educational reform of the Philippines that was initiated in 2013 to address issues and concerns in the Philippine educational system vis-à-vis global competitiveness. Moreover, the participants were preservice teachers studying in a recognized teacher education institution in which the Commission on Higher Education (CHED) granted a Center of Excellence in Teacher Education status to this university in the region. For ethical considerations, the institution is named ABC University for anonymity and confidentiality principle. This university implemented flexible learning modalities because of the COVID-19 restrictions as well as the mandate to ensure learning continuity by enforcing health protocols.

3.4 Course Learning Program

In compliance with the outcomes-based education framework for the Philippine Higher Education reform that focuses on outcomes of learning, the learning program is used instead of a course syllabus. As Spady (1994, p.2) put it, OBE serves as *“a comprehensive approach to organizing and operating an educational system that is focused on and defined by the successful demonstrations of learning sought from each student”*. The nomenclature for this compulsory 3-unit course is Education 7: Educational Research. Based on the course outcome, after completion of the course, prospective teachers should be able to: a) demonstrate content knowledge of principles, ethics, rigors, and processes in the conduct of educational research; b) Conduct educational research in groups of 2-3 members/group under the

guidance of research professor or adviser or mentor; c) formulate research problems, justify its significance, gather related literature and studies, choose appropriate research methodology and research design, procedures of gathering data, research instrument construction, validation, data collection, organization of data, analysis and interpretation of results, conclusion, and recommendations, proper citations and referencing; and d) disseminate research findings through (1) oral presentation and (2) written research output in a journal article (IMRAD) format. Given that for this batch of K to 12 students who have undergone at least three curriculum-mandated research subjects (e.g., quantitative research, qualitative research, and inquiries, innovations, and immersion) in their Senior High School years, their prior research experience is considered a prerequisite. Usually, this course is offered to students in their third-year level during the first semester which is equivalent to 12% of a 25-unit full-time student semester load.

Teacher preparation in the Philippines requires a minimum of four-year of coursework including 2 semesters of practicum in their final year. Interestingly, all third-year students need to take and pass this subject and their research output should be aligned with their specialization. For instance, preservice science teachers should be working on issues and problems in science education. As to the learning design, the scope is divided into eight units for the whole semester with its content anchored on the standard content of Cohen et al. (2018), Creswell and Poth (2016), and Creswell (2013). These learning resources also served as the major reference materials that students were asked to download the eBook version in the Google Scholar database. Unit 1 begins with the introductory nature of this course along with contemporary issues and trends of educational research from the global scenario down to the contextual setting in the Philippine education system. The mechanism of student coursework follows that of an input-output pattern wherein the instructor gives explicit and sometimes inquiry-based instruction on the concepts afterward students apply those research knowledge and skills to their respective research problem. By mid-semester, they should be able to come up with and defend their research proposal to a panel of evaluators. After complying with the comments and suggestions of the panel, they proceed with the data collection until such time that they will be able to complete and present their work as the major output of the course at the end of the semester. Throughout the course, the instructor conducts regular consultations with students on the development and concerns of their research undertaking. Comparably, this is similar to an undergraduate thesis in another degree program as students in educational research courses are expected to contribute to the growing body of knowledge in the field of education by addressing emergent educational issues.

3.5 Data gathering procedure

The current paradigms in teacher education in the context of distance education and with the demands of 21st-century teaching and learning highlight reflective practices using self-reflection (Erdemir & Yeşilçınar, 2021) in improving practices in the classroom. This study utilized post-summative reflection of students as the source of data. After the screening of student reflection papers, they were identified, selected, and invited via email to participate in the study. Initially, there were 88 students but eight of them declined to participate in the study as

they were working students and they could not commit to the procedure. The writing of the reflection paper came towards the end of their educational research course in which students were given six guiding questions for them to share their experiences in the course and with the new learning platform, which is pure online instructional delivery.

3.6 Data analysis

The textual data from the reflection papers of students were analyzed thematically using the protocol of Sundler et al., 2019 achieve an understanding of patterns of meanings from data on lived experiences. Their thematic analysis for descriptive phenomenology involves three steps as follows: 1. Achieve familiarity with the data through open-minded reading; 2. Search for meanings and themes; and 3. Organizing themes into meaningful wholeness. To illustrate the data analysis, the following table depicts how each analytical step is carried out to generate themes that describe the phenomenon. For the step of thematic analysis, text data were read several times to be familiarized with the experiences of participants. The second step involved meaning-making and looking for patterns among the meanings to come up with themes. As shown in Table 2 is the thematic analysis to illustrate how a particular theme emerged. The third step involved an exhaustive description of the theme by describing the meaningful text and it is supported by the actual narration of the experiences by the participants through their vignettes.

Table 2. Sample thematic analysis of textual data from participants' reflection paper

Source	Statement	Meaning	Theme	Organizing Theme
P3; #61-64	full support and guidance of the teacher through regular meetings and sharing of resources made the experience easier and bearable	Availability of mentor	Presence of a support group	Enabling Factor
P7; #44-50	best and efficient people in the team built by trust, cooperation, and sharing of knowledge	Collaborative team members		
P9; #61-63	supportive people around helped to overcome challenges and anxieties	Supportive family members		

4. Results

Based on the responses from the participants, eight primary themes were identified by the authors of which four themes served as enabling factors such as 1) Prior knowledge and experience; 2) presence of a support group; 3) Availability of learning resources; 4) Perceived benefits. Meanwhile, four themes described the deterrent factors affecting undergraduate research experience which are 5) Communication barriers; 6) Lack of resources; 7) overlapping priorities, and 8) Quality of output and performance. Direct quotes from the student reflection paper were presented to support each theme. Codenames were used for the participants.

4.1 Enabling factors affecting undergraduate research experience in an online learning modality

Prior knowledge and experience

Participants have expressed that their prior experience and research orientation during their senior high school years were helpful to their undergraduate research experience. Some of them admitted that they had to unlearn and relearn research concepts from their previous exposure as they see it more relevant and extensive when they applied it to their educational research project. During the initial stage of topic conceptualization, several students admitted that they were used to the practice of the teacher-adviser providing them with a specific topic to work on and some were asked to come up with a research title right away, which is a common practice by most research teachers. Their experience in this learning modality considered unconventional was more student-driven as they had to source out potential research topics from the recommendations advanced in recently published journal articles in their field of specialization. Since the nature of this course was self-directed and with the limitless information available to students, they learned to be critical in examining information to identify a plausible topic. A kind of practice that to them is quite new but more appreciated because it is different from what they were trained during their high school days. This nuanced from participants supported Mosyjowski and Daly's (2020) findings that the previous experiences of students shape their research practices and perceptions, especially in the selection of a research problem.

"What comes to my mind is to search again that would be hard and timely. Hard because of embracing this new platform while conducting research in and timely because I need to spend most of my time in making research amidst the pandemic. I was also afraid and doubtful of its future outcomes because of this new mode of learning. Hardly, I am confused and worried as to how I will create my research and how it should be done when all the people are under quarantine. In addition, I am also doubtful about myself and my research skills because ever since when I was in grade school, research already put a milestone in education as well as in learning."
(P19)

Presence of a Support group

When students were asked how they were able to sustain their motivation to comply with the coursework and conduct research all the way through, they unanimously ascribed having a support group as their source of strength. Students underscored the essence of having a healthy relationship with their

mentors, classmates, family, and friends to overcome challenges brought about by the new mode of learning as well as the economic and socio-emotional impact of the pandemic. This adaptive mechanism is similar to the findings of Sespene et al. (2021) on students learning in a modular distance learning modality in the Philippines.

"During the making of our research study, whenever we are stressed out we usually reach out to one other to share our burdens and empathize with each other. This helped me a lot because it gives me a sense of security that I am not alone in my struggles. It encourages me to keep going because soon we will all graduate together. Upon making our research study, I constantly communicate with my group to work and plan our research. We never fail to talk and listen to each other's ideas, which made the flow of making our research way easier. We usually meet with each other in our group chat but sometimes we also meet through video call in messenger, zoom, or google meet. It's really fun to see and talk to them despite our distance because aside from talking about our project, we also get to have fun teasing and checking each other's situation at home." (P7)

Accessibility to learning resources

One of the contributing factors to the positive learning outcome of students in this new learning modality for undergraduate research is the availability of various learning resources readily available to them. Considering their level of maturity, they have managed to practice different self-regulated strategies with the aid of technology and open communication with their mentor for feedback. They maximized the comments and suggestions from their mentors on their progress and output as a learning opportunity at the same time enriching their knowledge and skills in research through self-initiated reading and video tutorials.

"Whenever some group would have confusion the other group would help and guide what to do in accomplishing the data needed I experience that because YouTube and google can answer my questions so I tried asking my major how to calculate and interpret the data and somehow it helps a lot." (P44)

Perceived benefits

Surprisingly, the majority of these preservice teachers demonstrated inherent motivations to pursue educational research not only because it is a major course output. They have a positive perception of undergraduate research, as they believe it contributes to their professional and personal development knowing that if they will become a practitioner teacher in the field, the conduct of research is also encouraged and a promotion ticket. They also cited the benefits that educational research provided to them through online learning, particularly on strategies and techniques for doing research efficiently such as using a research matrix in establishing a research gap.

"With the endless moving parts to a project, there is truly never a dull moment in research. I was able to develop new skills with every research experience, learn more about the kind of setting I want to be in, further explore my strengths and interests, and test my motivation to study more or pursue a career in a field or discipline. This chapter of my life is an equally important learning experience that I need to consider and use when deciding what kind of life waits ahead of me." (P38)

4.2 Deterrent factors affecting undergraduate research experience in an online learning modality

Cognizant of the enabling factors that facilitated the development of knowledge and skills in research, there were deterrent factors that served as challenges to the learning experience and learning outcome of students in research courses in this online learning modality.

Communication barriers

The sudden shift to flexible learning delivery in which a purely online platform was one of the options due to the COVID-19, communication barrier significantly affected the teaching and learning process in an educational research course. All student participants remarkably said that they encountered difficulty in communicating with their peers, their instructors, and even at their own pace of learning due to intermitted internet connection and other technical glitches. Since these students were at their respective homes while learning through online mode, they have no control over connectivity issues due to geographical location, and their groupmates with no communication devices for learning due to economic reasons.

“In online classes, it is hard for us to update each other because only a few of us have good internet connectivity. Even worse, we are clueless that some are being left behind in the activities and we are perplexed because we cannot help them. Our unity as a class is disrupted by the digital divide phenomenon.” (P70)

Lack of resources

Considering the economic situation of students, the majority of them do not have available learning devices to keep up with the demands of online learning. Some students were sharing one device with other siblings, while others had to endure using mobile phones in attending synchronous classes and in working with tasks and activities. One of the reasons why students were compelled to choose pure online learning modality over print-based modular learning or electronic-based modular learning is the aspect of timeliness and the sense of belongingness. They felt that they had to be with their other classmates and instructors in real-time so they had to be resourceful in meeting the demands brought about by all the other courses in this learning modality.

“I find it very difficult to communicate with my groupmates because I don't have a laptop at that time and my phone is already broken so there's one time our leader is upset with us and tell us what she felt about our cooperation and work but after that confrontation, we settled and said sorry for our mistakes.” (P14)

Overlapping responsibilities

Some participants complained that they could not focus on their academic work because they had to do some household chores or errands, which disrupt their participation and learning process. It is a reality in this distance-learning set-up that there is no boundary between school and family responsibilities because they often overlap. Some students were confused about what to prioritize as they were sometimes overwhelmed with much coursework in their other subjects along with the major output (e.g., research), and their urge to help at home with chores or to look for additional income. With these overlapping responsibilities, it becomes a

deterrent factor to students' success in this course and this learning platform if they could not manage their time and responsibilities.

"Other small issues relating to communication problem points to the fact that not all of us are free all the time. When we do planning and agreements about our assigned research parts, not all are present. Some were late responding due to their commitments at home. So, as the leader, the thing that I did was to leave a detailed message for my groupmates to easily and comprehensively absorb the things that I asked them to do."
(P39)

Quality of output and performance

Cognizant of the challenges of the learning platform and the public health crisis, students had to work in-group for their educational research project. With the heterogeneous nature of the group in terms of previous learning experiences in research, some participants expressed concern about the quality of their output and collective performance. This concern stems from their observation of their groupmates with limited background knowledge in research, apathetic members, and mediocre mentality, among others. Another issue cited by students that served as a deterrent factor to producing quality research output was the research process itself in terms of data collection. While others found it convenient to collect data through an online platform, some groups complained that reaching out to their target respondents was extremely difficult due to physical restrictions along with the availability of respondents when reached out online.

"One of the difficulties we faced was during the gathering of data. Because our sample size is quite big and we had to follow certain strata for our respondents, we were very challenged with finding such students who fit the criteria we set. We had to message every student individually from the list of names their bloc chairpersons gave us. It was very time-consuming since we were spammed a couple of times with Messenger and email. It did test our patience on data collection but it made us understand the value of connection among our peers and our determination to finish our research with full accuracy and rigor." P(46)

5. Discussion

The present study drew out the experiences of preservice teachers in terms of the enabling and deterrent factors affecting their undergraduate educational research undertaking using pure online instructional delivery. Among the factors that contributed to their learning outcome in this course were their prior knowledge, the presence of a support group, accessibility to learning resources, and the perceived gains they will develop in terms of personal and professional growth. Several studies in the literature focusing on preservice teachers' undergraduate research experiences during traditional in-class learning highlights the benefits that students gained from the process of doing research supported by various enabling factors (Ulvik, 2014; Linn et al., 2015; Stanford et al., 2015; van Ingen & Ariew, 2015; Gilmore et al., 2015; Miller et al., 2019; Ruth et al., 2021).

The first theme on prior knowledge and experience corroborated reports from the literature that early research experience benefits undergraduate students in terms of increased retention and learning gains (Standford et al., 2015) and positive

attitude as they were more intrinsically motivated to engage in research due to their research experience (Guilbert et al. (2016). These student researchers had their previous exposure and training in research during their junior and senior high school years because of the curricular reform in the country to produce globally competitive graduates which we believe contributes to the extent of engagement in research and the quality of their output and performance.

In the Philippine education system, students have already been exposed to several types of research as stipulated in the K to 12 curricula where students had more or less three research subjects with a graduated level of complexity in terms of content and outcome. As they progress through the university level, more intensive research-based coursework and discipline-based research subject (e.g., educational research, research in teaching science) are part of the teacher education program.

Preservice teachers' confusion about research diminishes as they engage more in research tasks particularly those with the real-world application (Toquero, 2021). In the context of online learning, the quality and extent of previous research training these students have had play a major role in their involvement in their group research project as students always tend to anchor their present perception of research to their experience. Few reported positive encounters with teachers and the content but several of them revealed worst experiences and inadequate training. Moreover, part of their coping mechanism to sustain their motivation in conducting research in this online learning setup is through cultivating a support group in the person of their parents, mentors, classmates, and friends. For instance, a student reported that having an approachable mentor helped them to continue what they were doing despite the many challenges they are facing (psychological, economic, physical, and emotional).

According to Song et al. (2016), students' emotional responses and instructors' self-disclosure enhances the student-teacher relationship, which as a result increases gain in perceived knowledge and learning satisfaction. Active mentoring practices showed to be a significant influence on students' perceived competence (Davis & Jones, 2017). Meanwhile, the observation that the support group enabled students' positive research and online learning experience contrast Alqurashi's (2019) claim that learner-to-learner interaction was not predictive of student satisfaction and perceived learning in an online learning environment. It is evident in the current study that these student-researchers relied on their groupmates and other peers to work collaboratively on their research project and even offered assistance to those who are struggling due to communication barriers. Information sharing and development predicted learning at the same time access and motivation leads to student satisfaction (Tratnik, et al., 2019). Supporting students in the online learning environment contribute to increased student success, satisfaction, and retention (Brown et al., 2020).

The theme of accessibility to learning resources supports the observation of van Ingen and Ariew (2015) that to prepare preservice teachers to engage in the complex research process, they had to foster collaboration with librarians and

other groups as a learning resource to develop information literacy skill thereby gaining higher achievement. This essential skill is viewed as the beginning step of the process of linking research to teaching practice. Students reported that through this online learning setup, they were able to maximize the accessibility and use of a wide array of these resources to their advantage and content enrichment. This finding further supports Alqurashi's (2019) report that learner-to-content interaction was the strongest and most significant predictor of student satisfaction in an online learning environment while online learning self-efficacy was the strongest and most significant predictor of perceived learning due to the availability of online learning materials. While it is recognized that these online learning materials served as enabling factors for positive learning outcomes, especially in research, Soffer and Cohen (2019) countered that access to these materials does not necessarily guarantee meaningful engagement however it is a factor to their achievement. The theme of perceived gains of knowledge, skills, and attitude among these undergraduate students relates to Ulla's (2018) findings on Filipino teachers' motivation to pursue research out of degree compliance and job promotion. While some participants nuanced that the manifested intrinsic motivation to conduct research because of the various skills they developed such as critical thinking, communication skill, and other competencies alongside the research process, it is undeniable that in the online learning modality, this perceived gain served as an enabling factor for undergraduate research. This study posits that undergraduate research in this online learning modality is successful in the aspect of perceived gains by students with the knowledge and skills which Ni (2013) attributed such development to the nature of online learning in which students must communicate both individually and collaboratively in the online environment by writing and posting their work or ideas. On top of this, the virtual space appears less intimidating which enhances the participation of most students belonging to the 'Net Generation' (Ni, 2013). Increasing opportunities for students to be involved in a research undertaking in the online learning modality lead to a perceived improvement in understanding the research process and ethics, self-confidence, perseverance, and collaboration (Ruth et al., 2021).

Consequently, several studies disclosed the common barriers and concerns encountered by undergraduate students in conducting research whether in the classroom learning set-up (Ulvik, 2014; van Ingen & Ariew, 2015; Miller et al., 2019; Sanchez et al., 2021; Batmang et al., 2021) or compared to the online learning environment (Ni, 2013). The findings of the present study revealed common issues encountered by these student researchers as they navigated the online learning environment in conducting research. Communication barriers, lack of resources that support their online learning, overlapping responsibilities, and concerns about quality output and performance served as deterrent factors that affected their research learning. Student researchers reported real struggle as they tried to huddle virtually as a team to discuss their research project and even during synchronous sessions, they could not meet or participate because of poor internet connection.

Another issue is the technical glitches because some students were not equipped with competent and proper online learning devices for economic reasons that they

endure using old laptops or mobile phones or staying at the internet café to keep up with the demands of online learning and the research course work. This issue with technology hinders effective communication critical for successful distance learning through online modality. These challenges may have caused some members of the team to be less participative leading to poor learning outcomes or low satisfaction in the learning process. This observation is similar to Imafuku et al. (2015) report that interpersonal communication, understanding of the research process, and social relationships with others widen the differences among students that contributed to a barrier to learning research in an online class setting. Unique to this kind of online research undertaking is the manner of data collection in which they are heavily dependent on different tools and mediums to reach out to their respondents for surveys or interviews. While web-based surveys were viewed as rapid and low-expense data collection procedures (Steele, 2008), the student researchers were apprehensive of its employment in their research project due to the credibility and validity of the data collected given that they are limited to self-reported responses only. This concern became a deterrent factor to students for their research project as they reported difficulty in reaching out to the target respondents due to survey fatigue (Steele, 2008) as most of the students conducting research focus on their locale within the institution or neighboring setting, thereby increasing occurrence of web-based surveys on campus. This phenomenon led other students to ignore or resent such surveys. Students also complained about a lack of feedback received on their output which could be attributed to overlapping responsibilities of the mentor, the bulk of research projects being supervised, and overloaded schedules, among others that diminish mentor-researcher dialogue and constructive Feedbacking. To avoid such a scenario, Ajjawi and Boud (2017) recommended that both students and teachers co-construct comments and interactive dialogue and engage actively in the process and meaning-making from the feedback.

Generally, students claimed to have gained personal and professional benefits from their research undertaking despite their unconventional learning setup. Although they encountered setbacks in their learning process due to some deterrent factors that mainly resulted from the nature of the online class, students found ways and means to overcome it through a positive mindset towards doing research in the online learning environment in the hope that it will improve their professional qualification and teacher competence. This study successfully elucidated students' experiences in conducting undergraduate research in the face of an unconventional learning setup. However, it also recognizes some methodological limitations employed in this study, particularly on the source of data, which only relied on the end-of-course reflection paper of select students. To trace the development of research skills and interaction of potential elements in undergraduate research done through online modality, a longitudinal and cross-case analysis of stakeholders can be conducted for future research direction.

6. Conclusion

Conducting undergraduate research is a critical aspect of teacher education preparation to capacitate prospective teachers to be an effective and reflective practitioners in the field with the personal and professional gains they developed. With the unconventional learning setup brought about by the global health crisis,

the complexity of this course is magnified. Two main conclusions were deduced from the research experience of these student researchers in the online learning modality. First, some factors promote successful learning outcomes and positive learning experiences among students when they are provided with a supportive learning environment, mentoring, and a built foundation of knowledge and skills. It is evident from students' narratives that they have had varied prior experiences in research affecting their knowledge, skills, and attitude toward to course and toward the learning process. Second, being new to this unconventional online learning platform and given the complexity and demands of the research course, students encountered challenges that made their learning experience meaningful. These deterrent factors come in the form of technical, financial, emotional, and psychological concerns. Despite all these challenges, they remain optimistic amidst the situation and develop a positive attitude towards research by looking forward to the benefits that it may provide to them as future teachers. Relevant to teacher preparation and development as key building blocks in developing effective teachers (Darling-Hammond, 2017), this study emphasized the need to strengthen undergraduate research through the provision of a supportive online learning environment and hands-on mentoring in the form of feedback and consultation. Higher education institutions and mentors need to be informed of the salient strategies to support online teaching and learning by considering the experiences of students. In light of the findings, future research may be conducted on mapping out the extent of involvement of the teacher/mentor and the extent of autonomy of students in the research process. This study is cognizant of the following limitations on the methodological aspect owing to the nature of the study which involved a smaller sample size. Furthermore, the data source through students' reflection papers may also have served as a limitation, which may have restricted students from further describing details of their experiences. Nevertheless, this study was able to shed light on enabling and deterrent factors influencing students learning experience and outcomes in research in an online learning setup.

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