1st Place Contest Entry: Examining Students' Perception of & Experiences in STEM Course Office Hours

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The Leatherby Libraries has been a critical asset in supporting and furthering my research endeavors at Chapman University. As a biological science major, my interests lie within STEM (science, technology, engineering, and mathematics) education research. My enjoyment for teaching and mentorship began when I started tutoring undergraduate STEM students in molecular genetics and human physiology. I want their voices and concerns to feel heard, while in turn making STEM education feel supportive for everyone. Thus, I delved into qualitative research and began a project examining students' perception of and experiences in their STEM course office hours. Understanding student perspectives can provide insights for implementing new strategies to improve STEM education and offer support where students need it most. The resources provided by Leatherby Libraries have aided me throughout this venture and brought me closer to achieving this critical research goal.

I was first introduced to the "start your search" on the Chapman library website during class sessions in the Leatherby Libraries building my sophomore year. Two years later, I still use the invaluable techniques and library resources I learned. I implemented the knowledge I gained from these sessions when writing for my STEM office hour research project. My first step began with writing the introduction and methods. Thus, I needed a literature review and resources to support my qualitative research techniques. During the library class sessions, I was taught to use keyword searches and filters to target desired sources. I used quotation marks, symbols, and boolean operators (e.g., AND, OR, NOT) to search for exact phrases. For example, I searched "office hours AND STEM" or "office hours + STEM" to retrieve results that contained both terms. I was also taught how to refine my search by utilizing the filters option. This was incredibly helpful in making sure that the only results were peer-reviewed articles. Peer-reviewed articles are trustworthy sources, thus provided reliable data for my paper. I also took advantage of the relevance tab for the newest publications to appear first. I remember learning about the date range selection and chose 10 year articles to appear. However, due to the limited peer-reviewed studies on office hours, I deselected this option. Once a journal title piqued my interest, I selected the "view details" option and read the abstract. The abstract provides a clear overview of the sources' main points. This saved me time from having to click on the actual article and read the entire paper before deciding its relevance for my study. The Leatherby Libraries site also provides accessible citations. By clicking on the three, vertical dot icon to the right of a source, I was able to cite with a specific style. This was incredibly useful when creating my paper's reference list.

Although I found peer-reviewed articles or books necessary for my research project, there were often barriers such as subscription-based, subscriber-only, or paid access needed. I visited the front desk after running into this problem and gained assistance from a librarian. The librarian was extremely helpful and showed me how to access sources by requests through the interlibrary loan. He also explained that although a source might not be accessible online, the Leatherby Libraries could have the hard copy available. I have been able to access books such as *The*

Coding Manual for Qualitative Researchers and *Institutional Factors Affecting Student Retention* (Saldaña, 2009; Lau, 2003). The Leatherby Libraries database offered me access to books and resources that I otherwise would have needed to pay for somewhere else. The librarian also reminded me how to login to my library account online to easily renew items I checked out. Using this technique, I renewed books multiple times online for my project.

I learned valuable skills in navigating search engines for discovering credible sources. The Leatherby Libraries database provides critical sources for literature reviews. I was able to identify office hour benefits and highlight the gap in knowledge for student perspectives on STEM office hours. This supported my research topic and highlighted the need of furthering this knowledge in the STEM field. I plan to apply my skills to enhance the quality of future research, especially during graduate school. This includes keyword searches, filter options, date range, cite tools, and more. This journey has helped me become more resourceful and ambitious in my research endeavors.

My research is valuable to other scholars who are interested in advancing STEM education. By examining students' perceptions of STEM course office hours, my study offers critical insights for educators seeking to improve STEM education outcomes and foster a supportive learning environment. My study is supported due to studies demonstrating the benefits of office hours. Thus, it is important to further knowledge in this area and add another element, student perspectives, to pinpoint how we can further improve this already valuable resource called office hours.

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Three Page Sample

Office hours are meeting times outside the classroom where students interact with instructors and seek course help. They are a critical element of science, technology, engineering, and math (STEM) courses, with most instructors providing this resource for students. In fact, many institutions (including Chapman) require faculty to hold office hours and to include office hours details, such as time and location, in the syllabus (e.g., *Full-Time Faculty Handbook 2018 — 2019*; Chapman University, 2019). Office hours are a valuable resource for student-faculty interactions. These types of interactions are associated with overall college satisfaction, positively impact academic achievement (Lamport, 1993; Endo & Harpel, 1982), and positively correlate with GPA and retention among undergraduate students (Campbell & Campbell 1997; Lau 2003). This is especially important within the STEM field where retention rates are a huge concern, particularly for first-year undergraduates (Koenig et al., 2012). There is also a positive relationship between office hour visits and academic performance (Guerrero & Rod, 2013; Smith 2018). Office hours can also impact students' perception of learning. For instance, students find virtual office hours beneficial because it allows them to ask questions, get additional help, and gain a better understanding of the course material (Bakic et al., 2024). Some of these students also found a correlation between attendance and higher test or quiz scores (Bakic et al., 2024).

Small changes in how office hours are conducted can also cause differences in student affect (i.e., their feelings about office hours and the instructor), leading to decreases in equity gaps between minoritized and non-minoritized students. First-generation and minoritized students who were aware of a broad purpose of office hours from instructors earned higher course grades (Smith et al., 2022a). These communication tactics include informing students that office hours are a resource for conversations beyond course material and content-related questions (Smith et al., 2022a). Shifting students' perceptions about office hours led to increased performance, closing equity gaps between minoritized and non-minoritized students (Smith et al., 2022a). Another study revealed that some teaching practices can shift student perspectives from connecting academic performance with their self-worth to feeling both intellectually capable and valuable beyond academic success (Smith et al., 2022b). Instructors can implement positive messages to their students, particularly marginalized groups, such as communicating that they have confidence in students' academic abilities and view their worth beyond academic success (Smith et al., 2022b). Teachers have a direct impact on student identities and outcomes (Destin, 2020). Thus, it is critical to understand how student-instructor communication influences student motivation and affect (i.e., feelings, emotions, self-efficacy) towards office hours. Identifying these causes that threaten or support student engagement will allow us to create positive instructor strategies to implement during office hours.

Still, little is known about office hours despite their benefits and wide availability. They are also often underutilized by students. The research in examining student and instructor perceptions and experiences of STEM course office hours is limited. There is a lack of studies that examine

student emotions, attitudes, and feelings towards office hours, especially in the life sciences (Hsu et al., 2022). For example, past research has been restricted to one course subject, survey data methods only, and non-STEM subjects (Endo & Harpel, 1982; Guerrero & Rod, 2013, Griffin et al., 2014; Smith et al., 2017). Other office hour papers are also deficient in using interviews as a tool to gather data on student and instructor experiences on office hours. Therefore, we sought out to examine students' perception of and experiences in their STEM course office hours through semi-structured interviews.

We conducted semi-structured interviews with 20 undergraduate STEM majors to explore students' source of knowledge of office hours, students' motivation for attending office hours, and students' experiences in office hours. Semistructured interviews with interview questions were used to elicit participants' perceptions of and experiences in their STEM course office hours. This interview tactic is used to gain an understanding of a participant's unique perspective (Adeoye-Olatunde & Olenik, 2021). The interviewer uses a set list of questions while having the freedom to deviate from the script and further probe ideas revealed from a participant's answer. This provides a balance between a structured discussion and the flexibility to explore areas of interest that arise during the interview. This allowed for rich and in-depth student responses on office hours.

Specifically, we investigated: 1) What do students report as their first knowledge of office hours? 2) How do students perceive different instructor communications of office hours? 3) What motivates students to first attend and/or continue attending office hours? 4) What aspects or experiences during office hours promote or hinder student participation? 5) What makes students feel included and welcomed at office hours? 6) What makes students feel comfortable expressing uncertainties about a topic during office hours?

After the interviews, we used open coding to find emergent themes and develop a codebook from our qualitative data. Using the codebook, two coders (G.R.D. and J.L.H) independently coded the first interview transcript. Iterative discussions took place to compare and contrast how each coder applied codes to certain quotes. Revisions to code names and definitions were conducted based on these comparative discussions. The goal of these comparisons was to achieve high interrater reliability of the codebook, which was calculated using Cohen's kappa (κ) through the ReCal2 online software (Freelon, 2010). A high interrater reliability is achieved when two coders reach a substantial agreement between analyses, indicated by a kappa number between 0.61 - 0.80 (Gisev et al., 2013). After multiple refinements and comparative analyses of the codebook, high interrater reliability was achieved using 50 random utterances across the first five interviews ($\kappa = 0.701$). Thus, one coder (G.R.D.) analyzed the remaining interviews using the validated codebook

Our results reveal several themes. For instance, students report differing levels of knowledge of office hours upon starting college, demonstrating the importance of instructors in introductory

courses to highlight the meaning and benefits of office hours. Specific language in course syllabi also influences students' perceptions of office hours. For instance, students are more inclined to attend if office hour norms are described, such as not needing a question to attend. Similarly, students indicate higher engagement when instructors provide frequent reminders and outreach about office hours, and are less engaged when they perceive an instructor as unwelcoming or unwilling to help. The frequency of office hour communication during class impacts students' engagement with office hours. Thus, instructors should remind students about office hour details such as their times and locations. Students also report that the structure of office hours impacts their experiences. For example, students prefer when the door to the office hours is open because it feels more welcoming. Students enjoy when instructors utilize the whiteboard during office hours or hand out worksheets for additional practice. It was also reported that students and instructors' identities influences their attitude toward and engagement in office hours. The term "identity" was up to the interpretation of the student being interviewed. For instance, one student related her identity as a first-generation student and feeling very privileged and excited to go to office hours because it was an opportunity her parents did not have. Another student reports being one of the few Mexican girls in STEM, which gives her drive to work hard and graduate. However, sometimes she questions if she deserves to be in academia when no one else looks like her. Thus, instructors should be conscious of student identities and the possible consequences of how it impacts their office hour experiences.

There has been limited research in studying student perspectives towards STEM office hours. Our work provides critical insight into undergraduates' knowledge of office hours, their motivation for attending, and their experiences in office hours. Understanding these perspectives will enable future interventions to improve student engagement and experiences in office hours. We also provide implications for instructors to understand how they can best support student learning. Our analysis is aimed towards improving STEM education, allowing students to feel valued and heard, and identifying office hour strengths and weaknesses to make improvements to institutional performance.