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An Evaluation of the BGSU Herpetarium as an Educational Tool

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HONORS PROJECT

Submitted to the Honors College  
at Bowling Green State University in partial fulfillment  
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## I. Abstract

The goal of this research was to evaluate the impact of the BGSU Herpetarium on students, both as a means of academic success and preparation for the workforce. The Herpetarium offers undergraduate students the chance to volunteer, serve in leadership positions, conduct research, and develop a network of like-minded peers and faculty. Because of the great opportunities for student involvement, we hypothesized that the Herpetarium would prove successful in positively impacting students' college experiences and leave them better prepared to graduate and take their next steps. To assess these impacts, a variety of qualitative and quantitative data was collected. Six BGSU alumni/Herpetarium volunteers were interviewed over the phone about their time as undergraduates and their responses were analyzed for trends in attitudes about the Herpetarium. Also, historical survey data gathered by Drs. Eileen Underwood and Matthew Partin were studied as a means of gauging the impact of working in the lab on students' attitudes toward biology, reason for working in the lab, and the impact of the experience on retention at BGSU. These two data sets support the claims that the Herpetarium aids in student retention, creates a sense of community among students, and leaves them well-prepared for life after graduation. To obtain quantitative data, the group of Herpetarium volunteers from the exit survey was matched to a control group of former BGSU students who did not volunteer, but had similar incoming ACT scores, GPAs, and majors. It was shown that significantly more students in the volunteer group graduated from BGSU as opposed to those in the non-volunteer group. However, the years to graduation were not shown to be significantly different between the two groups. Overall, the Herpetarium has a positive impact on students across numerous majors and programs.

## II. Introduction

Science can be a difficult and intimidating field. Its reputation often precedes it and studies have shown that non-science majors experience anxious thoughts about learning scientific material at the collegiate level (Gogolin & Swartz, 1992). This can be problematic when science is part of our everyday functioning. Attitudes toward a subject can dramatically impact a student's understanding of the course material, especially if the course is not related to their major interest(s). Partin, Underwood, and Worch (2013) compared how the nature of science was understood among science majors versus non-majors. Their results indicated that those with a foundation in natural selection and evolution fared better than those without that knowledge base. Additionally, attitude was linked to understanding the nature of science, especially among non-majors whose interests and experiences were so varied. Another study found that belief in their own ability to succeed was a major predictor of a students' biology course performance, regardless of whether or not they had a special interest in the subject material (Partin et. al. 2011). This study also suggested that the integration of innovative learning techniques improved students' attitudes about science.

One technique that has been shown to create a positive change in student attitudes is interaction with live animals (Sherwood et. al. 1989). The interactive and overwhelmingly positive nature of play behavior has also been shown to increase learning (Worch & Haney, 2011). Many studies such as these focus on elementary school aged children as the subjects and

beneficiaries of pioneering research in effective education practices. However, if these innovative new discoveries could be emulated on a more sophisticated level, they may also be able to benefit students in the more advanced stages of their education. The Herpetarium on the main campus of Bowling Green State University (BGSU) offers a unique opportunity for undergraduate students to work closely with reptiles and amphibians in a professional capacity.

In addition to the way students are taught, the environment in which they learn is also crucial to their success. While exploring the effects of various factors on college students' attitudes and retention, Astin (1984) found that having positive interactions with faculty members gave students the greatest feeling of satisfaction with their overall college experience. As the founder and faculty member in charge of the Herpetarium, Dr. Eileen Underwood makes herself available as a valuable resource to her undergraduate volunteers. In an environment where so many diverse individuals converge, interactions occur every day. Beneficial connections are not only made between students and faculty, but also in peer to peer contact. In fact, peer engagement can increase campus involvement and academic success (Juvonen et. al. 2012). Similar results were found by Zhao and Kuh (2004) when they studied the impacts of learning community involvement. When students are in a community of like-minded and motivated individuals, they will also become more engaged in "educationally beneficial activities" and have a more satisfying college experience (Zhao & Kuh, 2004). Likewise, students who are more engaged in their campus will have a greater chance of meeting people who can form that beneficial network of support. This creates an elegant positive feedback loop. Student engagement can also increase academic performance and continuation past the first year of college (Kuh et. al. 2008). The BGSU Herpetarium connects like-minded individuals much in the style of a more traditional learning community. Therefore, it has the potential for students to reap the same rewards.

### III. Methods

#### **Qualitative: Interviews with former volunteers**

As much of this project focuses on the attitudes and personal feelings that students have about the BGSU Herpetarium, the collected data is heavily qualitative. Information regarding past students' experiences in the Herpetarium were gathered through a series of survey questions (See Appendix A). The questions also emphasized how their time in the Herpetarium affected their job prospects after graduation. Six randomly selected volunteers were interviewed. This group included four biology majors and two non-majors. Interviews were conducted over the phone and were audio recorded with the consent of the interviewees. All six interviews were then transcribed into digital word documents and examined to look for any trends in their responses. Assertions were obtained by scanning through the transcripts and finding common responses among interviewees. The questions that were asked guided them toward talking about specific aspects of the Herpetarium that I was investigating, such as social and post-undergraduate impacts. The digital documents were stored on a password-protected computer and pseudonyms were assigned to protect the privacy of the participants. Because this research involved human subjects, there was consultation with the Office of Research Compliance but because of the non-

invasive nature of the interview questions, and the fact that this was program evaluation, this project qualified for exemption.

### **Quantitative: Exit survey data**

Another assessment looked at historical data gathered by Dr. Eileen Underwood and Dr. Matthew Partin in 2012 and 2014. Exit surveys (Appendix B) were conducted of volunteers in both the marine and herp labs during this time frame in order to evaluate the impact of volunteering in the labs on students' attitudes toward biology and attendance/continuation at BGSU. Responses were translated into numerical values for analysis.

### **Quantitative: Matched control group**

A third data set was collected that examined volunteers' academic performance and overall success. This was compared to a control group of BGSU students who were alike with regards to incoming GPA, ACT scores and majors, but never volunteered in the Herpetarium. There were 101 students in each group. Students from a variety of majors and programs were surveyed. The groups were 83.2% biology majors. The other majors consisted of 2D studies, accounting, dietetics, creative writing, environmental science, geography, geology, individual business, intervention specialist, communication disorders, nursing, psychology, and undecided. The control group was matched and obtained through the Office of Institutional Research and any identities were kept anonymous. The sample of Herpetarium volunteers was selected from the exit survey participants mentioned in the previous section. Differences in graduation rate and time to graduation among the two groups was specifically analyzed.

## **IV. Results**

### **Qualitative: Interviews with former volunteers**

The six interviewees were asked a series of eight questions regarding their experiences as undergraduates at BGSU as well as their experiences in the herp lab specifically. Their phone interviews were audio recorded and transcribed into digital word documents. The documents were then scanned and color-coded to identify common themes among the alumni regarding their experiences in the herp lab. Three assertions were made with supporting warrants taken verbatim from the interviews. These are listed below.

Assertion 1: The Herpetarium has played a role in student retention.

Warrant 1: "I felt very isolated my first year. One of the ways that I wanted to alleviate that was to transfer schools. I submitted application to other universities. Before I got the responses back I decided to stay at BGSU because of my continual experiences with the Herp lab, honors scholar and the other laboratory I was involved in Dr. Middens lab." -Rachel

Warrant 2: "I almost transferred to UC but my mom mentioned that I have the herp lab here where I can get that experience, I have the marine lab where I can get that experience and we decided that I should stay there. I think that's as big of an impact as you can make." -Jen

Warrant 3: “These extracurricular activities allowed me to become more involved, a more active participant at school and that helped me to stick with it... But [the herp lab] did definitely impact my decision to stay. Like I mentioned before, it helped tremendously.” -John

Assertion 2: The Herpetarium creates a sense of community among like-minded students.

Warrant 1: “...it was definitely a sense of community. It was some place where I got along with other members of the herp lab became friends with them and it was just a place to go when things in school got overwhelming...by interacting with them, they pushed me to do better and to be better and to actually attend class which I was not doing.” -Lynn

Warrant 2: “So aside from any learning that went on, there was a lot of getting to know people and building relationships happening... We would all help each other academically and we would help each other pick classes and things like that so even on that level there was a really good impact happening.” -Kelly

Warrant 3: “The Herpetarium in particular because I tended to work more with people who had the same or very close to the same interests and goals as me. That helped out tremendously, having a bunch of like-minded people to associate with... I had these like-minded people who were going through the same as me that I could work with and it became a more cohesive thing... they were able to advise ‘try taking this while taking this to minimize your load,’ things like that. Or ‘take this class, it’s really interesting.’ ‘Avoid this class it’s not worth your trouble.’” -John

Warrant 4: “The Herp lab was definitely one of the best places I could meet people. It was a hub of supportive nerds... I was finding those friendships and support groups I needed.” -Rachel

Assertion 3: The Herpetarium leaves students well-prepared for career/academic pursuits after BGSU.

Warrant 1: “Eileen helped me and encouraged me to apply to different grad schools including coming to the interview here at the school that I’m at now... She also gave me letters of recommendation so she directly helped me get into these programs... The experiences with these animals also helped me get into this laboratory... So I continued with reptile and amphibian husbandry and then he actually asked me to be a teach assistant because he knew I had that kind of experience. So the herp lab directly helped me getting a well fitted teaching assistant job.” -Rachel

Warrant 2: “I got to work with so many different species. I think that really helped me in my career just to know different facts about species and what they need... it’s a huge reason that I was able to find a zookeeping job after college because I already had so much experience.” -Hannah

Warrant 3: “I can tell you right now I would not be where I am without that lab. Without a doubt... I got a job at the Columbus Zoo which is one of the biggest zoos in the nation, it’s one of the hardest zoos to get into so I asked my supervisor, ‘What set me apart? How did I get this?’

She literally said, ‘You’ve got all this experience in the herp lab. It shows your commitment to the animals and that you have experience in feeding, caring, and observing these animals so we thought you would be a good candidate.’” -Jen

Warrant 4: “It gave me kind of a background of working in a lab, working with different people on different projects. It gave me a chance to develop my own research projects. Small ones, but that’s still an advantage.” -Kelly

Warrant 5: “It taught me values, being responsible essentially, which I was not doing when I first started there. Keeping a schedule.” -Lynn

Disconfirming data:

Assertion 1: “No, [the Herpetarium did not impact my decision to attend/continue at BGSU.] I planned on getting my biology degree.” -Lynn

Assertion 1: “It had just started up when I attended so it was not something that basically existed when I applied and I wasn’t at any point considering leaving.” -Kelly

Assertion 1: “I don’t think it was the main factor of me staying at that school. I was pretty comfortable and it was a cheaper school and I had Hunter there so I think it definitely made it more pleasant and it was my favorite part of going to BG but I don’t think that it necessarily kept me there.” -Hannah

There were no disconfirming data found for assertions 2 and 3. The interviewee responses are summarized in the following table.

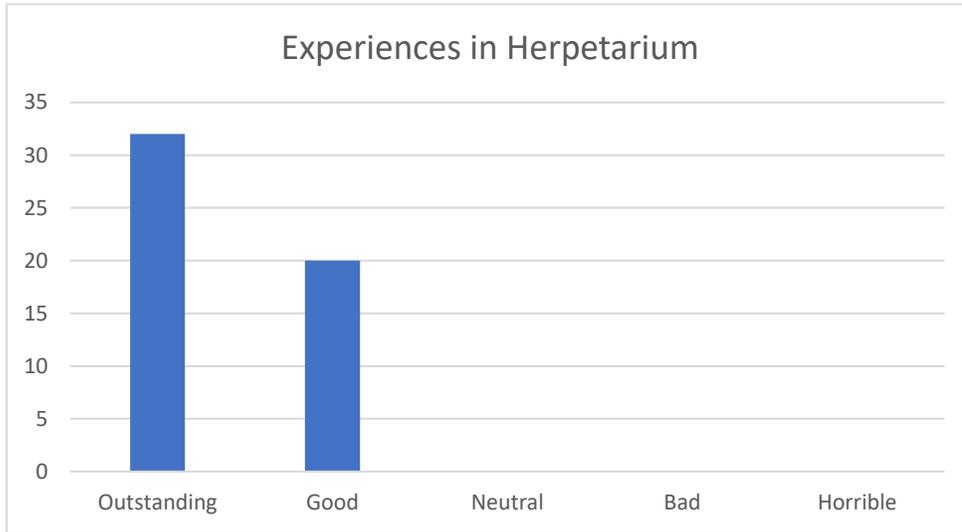
	Rachel	Hannah	Jen	John	Kelly	Lynn
Retention	Agree	Disagree	Agree	Agree	Disagree	Disagree
Sense of community	Agree	N/A	N/A	Agree	Agree	Agree
Career prep	Agree	Agree	Agree	N/A	Agree	Agree

Those that disagreed with the first assertion verbally stated that the Herpetarium was not responsible for their continuation at BGSU. Those whose responses are marked “N/A” did not state an opinion related to the assertion one way or another.

**Quantitative: Exit survey data**

According to the exit survey results, 34/52 students (65.4%) said they joined the lab for a sense of community, 21/52 students (40.4%) said the lab was a factor in their decision to attend BGSU, and 27/52 students (51.9%) said the lab was a reason that they continued at BGSU. Every single participant indicated that they would recommend the lab to others. All participants rated their experiences in the lab(s) as “good” or “outstanding.” No participants reported a

negative experience. Student experiences are shown in the graph below. We looked only at the responses of students who had spent at least one semester in the Herpetarium.



### Quantitative: Matched control group

SPSS 23 was used to compare the sample of Herpetarium volunteers to the matched control group using statistical analysis. Chi-Square tests were used on all nominal data and ANOVA tests were used with scaled data. Alpha was set at .05 across all tests. The Chi-Square test was used to determine if there was a difference in graduation rate between the two groups. Among the students that did not volunteer in the Herpetarium, 26.7% did not graduate while only 9.9% of Herpetarium volunteers did not graduate. This was found to be significant [ $X^2 = 7.811$ ,  $df = 1$ ,  $n = 37$ ,  $p = .005$ ]. A Chi-Square test was also used to determine if there was a difference in the year a student left BGSU between the volunteers and non-volunteers. It was found that 20 students from the control group left BGSU as an underclassman (freshman or sophomore). This was significantly more than expected. Meanwhile, only 9 students from the Herpetarium left BGSU as underclassmen [ $X^2 = 4.172$ ,  $df = 1$ ,  $n = 29$ ,  $p = .041$ ]. A Chi-Square test could not be used to analyze the upperclassman group (juniors and seniors) because only one student volunteer in the Herpetarium left as an upperclassman. However, there were 7 students from the control group who left as upperclassmen.

An ANOVA test was used to look for a difference in time to graduation between the two groups because this is a scaled variable. This was only looking at the students who did graduate from BGSU. The difference was not found to be significant [ $F = .577$ ,  $n = 165$ ,  $p = .449$ ].

In the past six years since the volunteer hour-logging system in the Herpetarium has been operational, 161 students have recorded 19,396.2 volunteer hours.

### V. Discussion

These results provide evidence that the Herpetarium has a positive impact on undergraduate students at Bowling Green State University. While there is no way to definitively prove that student participation in the lab is directly linked to student retention and/or future

success, there is a correlation presented here that should be investigated further. It was stated that in the past six years since the volunteer hour-logging system in the Herpetarium has been operational, 161 students have recorded 19,396.2 volunteer hours. This is a dramatic underestimation of the amount of time spent in the Herpetarium, as many students forget to log their hours and volunteers prior to December 2012 were not able to log hours because the system did not exist. In my personal experience with the Herpetarium, students spend time with the animals outside of their normal care responsibilities. Many students enjoy handling the animals recreationally in order to relax between classes.

### **Qualitative: Interviews with former volunteers**

One of the most notable aspects of the alumni interviews was the passion that those students had for the Herpetarium, even though some of them graduated as far back as 2001. These interviews provide support for the Herpetarium as an institution that aids in student retention, creates a sense of community among like-minded individuals, and leaves students well prepared for their post-undergraduate endeavors. The Herpetarium instills in its volunteers numerous transferrable skills, such as working in groups, time management, and organizational skills, that can be applied to their careers, regardless of whether or not they end up working with animals. Some of the alumni's careers include nursing and teaching at a university.

### **Quantitative: Exit survey data**

The exit survey data further supports the conclusions drawn by the alumni interviews. Students who participated in the survey reported positive experiences in the Herpetarium. Many also attributed the lab to their continuation at BGSU and to their interest in attending in the first place. Almost 2/3 of the respondents reported that they joined the lab for a sense of community. The data from this survey also included a "biology attitudes scale," which was not analyzed as part of this study. This provides a system for students to rank how they feel about biology concepts at the beginning and end of the semester. In the future, it would be interesting to evaluate how participation in the labs affects their responses.

### **Quantitative: Matched control group**

While the alumni interviews and exit survey responses were at least partially qualitative in nature, the data obtained from the matched control group comparison was strictly quantitative. It was found that a significantly larger portion of students who volunteered in the Herpetarium graduated, compared with students from the control group. This may be due to the fact students in the qualitative surveys reported a strong sense of comradery and community within the Herpetarium. It has been well documented in other literature that peer interactions can lead to greater on-campus involvement and academic success (Juvonen et. al. 2012). Likewise, on-campus involvement in something like the Herpetarium can lead to the creation of an academic peer support network, which will ultimately increase a student's likelihood to continue on past the first year of college (Kuh et. al. 2008). These statements are supported by the data gathered from this research.

## **VI. Acknowledgements**

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