

## **What do UNC Asheville Alumni Think About Their Undergraduate Research Experiences?**

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### **Abstract**

Many universities offer undergraduate research (UR) opportunities for students across disciplines. Nationwide, 33% of undergraduates complete research projects. UR experiences can be improved by understanding alumni perceptions of their undergraduate research. UNC Asheville is nationally recognized for opportunities in UR, yet alumni perceptions of research have not been previously studied. This study reports on a 2014 survey of UNC Asheville alumni that prompted them to describe their UR experiences and the overall perceptions of their undergraduate education. The data were analyzed in aggregate and by academic division (Natural Sciences, Social Sciences, and Humanities) in order to determine whether there are distinct differences in alumni perceptions across academic disciplines. Overall, alumni responses were positive amongst the divisional cohorts. Identifying how alumni view their research experiences could aid in distinguishing what the strengths and weaknesses of UR are at UNC Asheville. By determining the perceived benefits of UR at UNC Asheville, the university can improve how research is conducted to provide students with more beneficial research opportunities that encourage further engagement in educational activities during, and after, their undergraduate careers.

**Keywords: Undergraduate Research, University of North Carolina Asheville, Alumni**

### **1. Introduction**

Undergraduate research (UR) is a known way to involve students in the process of academic engagement and application.<sup>1</sup> UR serves to develop written communication skills, verbal communication skills, and independent working. The skills that are gained from completing undergraduate research benefit students during college as well as after graduation.<sup>2</sup> However, there has been no formal assessment of the perceptions University of North Carolina at Asheville alumni have towards their undergraduate research projects and how it has affected their careers, and lives, after graduation.

The purpose of this study is to understand the perceptions that UNC Asheville alumni have towards their undergraduate research experiences and how those experiences have affected their academic and personal lives before and after graduation. The study also provides a cross-disciplinary comparison of UNC Asheville alumni perceptions of UR (i.e. comparisons across the Social Sciences, Natural Sciences, and Humanities). Participating in undergraduate research is highly encouraged at UNC Asheville and by assessing the perceptions of alumni who have participated in undergraduate research, UNC Asheville can better determine what the strengths, weaknesses, and benefits are of research and how to ensure that students are receiving the best opportunities possible.

## 2. Literature Review

### 2.1 The Benefits of Undergraduate Research

A few of the benefits students recognized as a result of their UR were gaining “knowledge about the topic”, “improving my resume”, “learning how to do research”, and “preparation for graduate school”.<sup>3</sup> Similarly, what students’ value most from their undergraduate research includes “job experience” and “references”.<sup>4</sup> However, undergraduate research provides more than benefits based on external opportunities and achievements (such as graduate school, resumes, references, etc.). These experiences allow students to make experimental, creative, and academic progress that contributes to their personal growth and development.<sup>5</sup>

Alumni who complete undergraduate research projects not only report gaining more skills during college, but also have a more positive outlook on their education. In addition to the skill development and personal discovery that takes place, graduate school attendance rates are higher amongst students that participate in undergraduate research. In fact, in comparison to students that have no research experience, students with experience are two times more likely to pursue a Ph.D.<sup>6</sup> Students engage in in-depth and experiential learning while conducting UR. They are able to see the tangible implications of their classroom knowledge to the real world.<sup>7</sup> These experiences foster a greater understanding of their impact in the field and their career goals after completing their education.<sup>8</sup>

Student-faculty interactions are widely acknowledged as an important component of a successful education.<sup>9</sup> Collaborative research benefits both the student and faculty mentor in academic and professional ways. For example, faculty members often gain recognition as a mentor and thus have more research opportunities. Students are able to broaden their educational and career goals by working with professionals in their field of study.<sup>10</sup> Career choices, problem solving skills, and student satisfaction are positively influenced by working with a mentor.<sup>11</sup> In addition, collaborative research promotes student engagement.<sup>12</sup> Although mentor based research provides direction and support for the student, the most successful undergraduate research occurs when the student uses their faculty mentor as a resource, but takes most of the responsibility in the project.<sup>13</sup>

### 2.2 The Benefits of Undergraduate Research by Academic Division

There is evidence that the general perceived benefits of undergraduate research are similar across academic disciplines.<sup>14</sup> In the natural sciences, the researcher’s abilities to think scientifically are improved upon. They also have a better understanding of their post-graduation and career plans. These experiences have a stronger influence on career development and the continuation of research after undergraduate school.<sup>15</sup> UR experiences in science, technology, engineering, and mathematics (STEM) also assist students in understanding the process of conducting research. This process includes not only accomplishments, but also failures that can often occur in a lab. In addition, the interactions with faculty teach students how research is conducted and how the theoretical ideas learned in the classroom have real-world applications.<sup>16</sup>

Historically, research options for undergraduates are a more prevalent practice in the natural sciences. Although there is well-documented evidence for the benefits of undergraduate research, the humanities have been slow to offer extensive opportunities for students.<sup>17</sup> In History departments specifically, research is not considered a collaborative venture.<sup>18</sup> Through engaging in group research with undergraduates, it is evident that UR gives students the opportunity to choose from their own interests and develop their own questions. The collaborative process within the humanities also provides both students and faculty with a greater responsibility to their academic environment.<sup>19</sup> The benefits of participating in UR in the social sciences are similar to the benefits defined above from other disciplines. These include developing written communication skills, problem solving skills, and working independently. Critical thinking skills, written communication skills, and self-confidence are all enhanced through research.<sup>20</sup>

## 3. Research Setting

The University of North Carolina at Asheville is the designated liberal arts university in the University of North Carolina system. UNC Asheville is recognized for its intimate class sizes, Undergraduate Research Program, and focus on providing students with an education that explores beyond a single discipline.<sup>21</sup> The university emphasizes “critical thinking, clear and thoughtful expression, and honest open inquiry”.<sup>22</sup> Many of the opportunities to develop

these skills, which are essential to a liberal arts education, stem from the nationally recognized undergraduate research opportunities that UNC Asheville provides.<sup>23</sup>

The mission of the Undergraduate Research Program (URP) at UNC Asheville seeks to give students the opportunity to be a part of research endeavors that encourage creative thought and contribute to their undergraduate education. The Program enables students and faculty mentors to collaborate in the process of academic inquiry. Undergraduate research, for the purposes of the URP, is considered to be individual or group work that makes an effort at producing creative and scholarly work with the intention to be published and presented.<sup>24</sup> In 2013, 67.8% of UNC Asheville graduates completed some form of undergraduate research. Approximately 30% of departments require UR to be completed upon graduation.<sup>25</sup> Because of the long history of UR that is embedded in the UNC Asheville culture, the university provides an intriguing study to assess alumni perceptions in aggregate and by academic division.

## **4. Methodology**

UNC Asheville alumni were surveyed on how they view their undergraduate education in general as well the perceived effect that undergraduate research has on their career success, academic skills, and life skills. The survey included questions on verbal communication skills, written communication skills, working independently, and self-confidence. There were open-ended questions in which the respondents could provide qualitative information on their experiences.

The survey was sent to 8,315 alumni by email invitation on October 30, 2014 by the Alumni Office. A reminder email was sent out approximately three weeks later and the survey was open for responses until December 16, 2014. A total of 767 alumni responded to the survey yielding a response rate of 9.2%. Of these responses 642 specified their major; these respondents were divided into cohorts (Humanities, Social Sciences, and Natural Sciences) based on academic discipline.

Data was extracted from Survey Monkey and organized in Microsoft Excel. The data was copied to Minitab Statistical Software, which was used to analyze the responses in aggregate as well as for comparison across academic divisions. A two sample t-test and chi-squared test of association in Minitab Statistical Software was used to identify significant differences in perception between the Humanities, Social Sciences, and Natural Sciences. Questions focusing on overall undergraduate satisfaction and undergraduate research satisfaction were used for comparison. In addition, the perceived skills gained from conducting undergraduate research were compared across academic disciplines.

## **5. Data**

The typical respondent was female (54.7%), between the ages of 26 and 45 (62.3%), White (91.5%), employed full-time (71.7%), and had a cumulative GPA between 3.5-4.0 (47.2%).

### **5.1 Aggregate Results**

It was clear that alumni perceptions of their college education were very positive. When asked about their experiences, 49.5% of respondents answered 'Excellent' and 37.7% answered 'Very Good' (Table 1).

Table 1. Which of the following describes the perception of the education you received while you were in college?

	<b>Response Count</b>	<b>Response Percent</b>
Excellent	369	49.5%
Very Good	281	37.7%
Good	66	8.9%
Satisfactory	23	3.1%
Poor	5	0.7%
Very Poor	1	0.1%
Answered	745	
Skipped	59	

When asked if their college education contributed to their current success, a combined percent of 65%, alumni responded ‘Strongly Agree’ and ‘Agree’ was reported (Table 2). Furthermore, alumni indicated that they not only attribute their success today to their college education, but many also attribute their career success and progression to their senior project (Table 3).

Table 2. I attribute my success today to my college education.

	<b>Response Count</b>	<b>Response Percent</b>
Strongly Agree	227	30.6%
Agree	255	34.4%
Somewhat Agree	179	24.1%
Somewhat Disagree	38	5.1%
Disagree	28	3.8%
Strongly Disagree	15	2.0%
Answered	742	
Skipped	62	

As shown in Table 3, the majority of alumni (a combined percent of 61%) indicated that they either ‘Somewhat Agree’, ‘Agree’, or ‘Strongly Agree’ that they attribute their career success today to their senior project.

Table 3. I attribute my career progression/success today to my senior project.

	Response Count	Response Percent
Strongly Agree	76	11.3%
Agree	122	18.1%
Somewhat Agree	213	31.6%
Somewhat Disagree	89	13.2%
Disagree	128	19.0%
Strongly Disagree	46	6.8%
Answered	674	
Skipped	130	

After gauging the general perception of research experiences, alumni were next asked questions focusing on the specific benefits of undergraduate research and the skills gained from completing research. Critical thinking had 92.5% of respondents indicating that their senior project was Somewhat Beneficial, Beneficial, or Extremely Beneficial. Analytical Skills closely followed with 92.2% of respondents reporting improved skills from their senior project. There is strong evidence supporting the positive perception that alumni have of their college education as well as the benefits of their undergraduate research experiences.

Table 4. Please rate how beneficial your senior project was in improving each of the following skill sets.

	Extremely Beneficial	Beneficial	Somewhat Beneficial	Not Very Beneficial	Not at all Beneficial	Rating Count
Written Communication Skills	206 (32.4%)	248 (39.0%)	122 (19.2%)	42 (6.6%)	18 (2.8%)	636
Verbal Communication Skills	178 (28.0%)	244 (38.4%)	133 (20.9%)	58 (9.1%)	22 (3.5%)	635
Creativity Skills	129 (20.5%)	230 (36.6%)	174 (27.7%)	69 (11.0%)	26 (4.1%)	628
Persuasive Skills	96 (15.2%)	229 (36.2%)	193 (30.5%)	91 (14.4%)	23 (3.6%)	632
Critical Thinking	248 (39.2%)	241 (38.1%)	96 (15.2%)	31 (4.9%)	16 (2.5%)	632
Analytical Skills	259 (40.9%)	230 (36.3%)	95 (15.0%)	32 (5.1%)	17 (2.7%)	633
Data Collection Skills	242 (38.2%)	203 (32.0%)	103 (16.2%)	48 (7.6%)	38 (6.0%)	634

Self Confidence	210 (33.1%)	242 (38.2%)	116 (18.3%)	40 (6.3%)	26 (4.1%)	634
Answered						637
Skipped						167

## 5.2 Results by Academic Division

The academic divisions as defined by UNC Asheville were used to divide departments into their specified cohort.<sup>26</sup>

Table 5. Data on the academic divisions as defined by UNC Asheville and the alumni response count from each division

<b>Natural Sciences</b>	<b>Social Sciences</b>	<b>Humanities</b>
Atmospheric Science	Economics	Arts
Biology	Education	Classics
Chemistry	Health and Wellness	Drama
Computer Science	Management and Accountancy	Foreign Languages
Engineering	Mass Communication	History
Environmental Studies	Political Science	English
Mathematics	Psychology	Music
New Media	Sociology and Anthropology	Philosophy
Physics		Religious Studies
n=159, 24.8%	n=335, 52.2%	n=149, 23.1%

As shown by Table 5, the Social Sciences response rate exceeded both the Humanities and Natural Sciences combined. The large sample size may be attributed to the heavy concentration of alumni responses from the Department of Psychology. The Department of Psychology has historically been the largest department at UNC Asheville and in 2013 there were 91 graduates from the program. This number exceeded any other department graduates by a wide margin.<sup>27</sup>

Table 6. Which of the following describes the perception of the education you received while you were in college?

	Humanities		Natural Sciences		Social Sciences	
Excellent	85	57.0%	69	43.7%	166	49.6%
Very Good	49	32.9%	59	37.3%	132	39.4%
Good	8	5.4%	22	13.9%	28	8.4%
Satisfactory	5	3.4%	6	3.8%	9	2.7%
Poor	2	1.3%	2	1.3%	0	0.0%
Total	149		158		335	

Responses from the Humanities and Social Sciences tended to be more positive than those from the Natural Sciences. Both divisions had a higher percent of responses in the 'Excellent' category. Social Sciences had a higher response rate in the 'Very Good' category as well (Table 6).

The two sample t-test was used to assess if there was a significant difference between respondents from Social Sciences and Natural Sciences as well as a significant difference between the Humanities and Natural Sciences. There was a significant difference ( $p=0.017$ ) between the Social Sciences and Natural Sciences. Social science majors have a higher perception of their undergraduate education. There was also a significant difference ( $p=0.0136$ ) when comparing the Natural Sciences and Humanities. Thus, the Humanities respondents have a higher perception of their undergraduate education. A comparison between the Social Sciences and Humanities resulted in no significant difference.

Table 7. I attribute my career progression/success today to my senior project.

	Humanities		Natural Sciences		Social Sciences	
Strongly Agree	16	11.0%	25	16.6%	32	9.8%
Agree	29	20.0%	30	19.9%	58	17.8%
Somewhat Agree	47	32.4%	47	21.1%	100	30.7%
Somewhat Disagree	23	15.9%	17	11.3%	44	13.5%
Disagree	21	14.5%	24	15.9%	69	21.2%
Strongly Disagree	9	6.2%	8	5.3%	22	6.8%
Total	145		151		325	

Although there is a seemingly slight difference between the percentages of positive responses (Table 7) for Natural Sciences and Social Sciences, there was a significant difference ( $p=0.0099$ ) between the two divisions. The Social Science majors tend to attribute more of their career success to their senior project. When comparing Natural Sciences and Humanities there was no significant difference. Similarly, there was no significant difference when comparing the Social Sciences and Humanities.

Table 8. At what point(s) in your career have the skills learned and/or the topic of your senior project been helpful? (mark all that apply)

	Humanities		Natural Sciences		Social Sciences	
Finding my first job	28	18.8%	55	34.6%	67	20.0%
Gaining a sense of self confidence	68	45.6%	71	44.7%	125	37.3%
Getting promoted	10	6.7%	17	10.7%	41	12.2%
No help in my career	18	12.1%	5	3.1%	28	8.4%
Problem solving in everyday work	45	30.2%	83	52.2%	145	43.2%,
Verbal communication skills	70	46.9%	67	42.1%	133	39.7%
Very little help in my career	17	11.4%	27	16.9%	51	15.2%
Working independently	92	61.7%	91	57.2%	166	49.6%
Written communication skills	93	62.4%	67	42.1%	172	51.3%

For this particular question, a chi-squared test of association was conducted since the variables were categorical and taken from the same population. There was a significant difference ( $p=0.000$ ) between the academic divisions and what skills have been helpful to their careers. The chi-squared test acted as a preliminary analysis to determine if the question should be analyzed further.

To identify where the difference between academic divisions lie, each participant who responded to the questions will be assigned a composite score based on how many of the options they checked (for example, a respondent who reported that the skills of their senior project helped them with verbal communication skills, working independently, and gaining a sense of self confidence will be given a 3). Once the composite score is assigned to each participant, the mean composite scores of each division will be compared with ANOVA. The ANOVA will identify where the significant difference is between the three academic cohorts.

## 6. Implications and Discussion

Among the survey respondents, the reported perceptions of UR offer clear evidence that undergraduate research is an important part of the UNC Asheville curriculum. The findings of this study reinforce the mission of the URP. Further analysis will uncover departmental differences in UR requirements and how they affect alumni perceptions. Faculty and individual departments can use the information to refine their research requirements so students get the most beneficial experiences. In addition, the positive alumni responses show that there are valuable skills to be learned by engaging in research. These benefits provide incentive for students and faculty to become involved with UR.

With the overwhelmingly positive results, there is evidence that research benefits students across disciplines. Although the natural science responses tend to fall short in comparison to the other cohorts, the responses in aggregate are very positive. The research also indicates that there may be stark differences in the way research is promoted and conducted across academic divisions. One explanation could be the kind of UR that takes place. It may be that research in the Social Sciences and Humanities tends to provide students with opportunities to apply what they learn in the classroom to a real-life scenario. In the Natural Sciences, learning could often take place in a lab or class. This is where undergraduate research may also be held and the lack of environmental change may result in a less positive perception of the experience. Though this explanation contrasts with previous research that students in the Natural Sciences are able to see the real-world applications to their research<sup>28</sup>, it may be that at UNC Asheville, Social Science and Humanities research is more applied than Natural Science research.

The difference in perception could also be related to the research requirements of the academic divisions. The Social Sciences and Humanities divisions may have requirements that are more positively received by students. Each



department may differ in their expectations of UR, but the Natural Sciences could be less flexible in general. Future research will examine whether there is a difference in perception of UR experience by students for whom UR is required which help answer this question. In addition, it may be that Natural Science research is performed independently while Social Science and Humanities research is community oriented and results in greater student engagement and a more positive experience overall.

The UNC Asheville study of alumni perceptions of UR contributes to previous literature on the benefits of undergraduate research. The study gives insight into an institution with a long history UR where the established research culture gives a broad look into alumni perceptions over time. It also provides a compelling look at perceptions of undergraduate research across disciplines. The direct comparisons across academic division are possible because the surveyed alumni are from one institution. This provides insight into the differences between divisions in terms of UR as well as how alumni perceived their undergraduate education as a whole. As the search for the most beneficial undergraduate experiences continues, studying the benefits of UR will remain a pivotal part in learning about student success both during and after college

## **7. Limitations**

It is important to note that due to the self-select nature of this survey, alumni that chose to participate could have been more enthusiastic about their undergraduate experiences and therefore more inclined to respond to the survey. It is also possible that, due to the high average cumulative GPA of many respondents (between 3.5-4.0), the alumni that completed the survey felt a greater sense of accomplishment in their undergraduate career and therefore more motivated to positively reflect on their undergraduate research. Although the results of this study and the high levels of alumni satisfaction are promising, the reported experiences may not be an accurate indication of all UNC Asheville alumni perceptions of undergraduate research.

## **8. Conclusion**

Alumni perceptions of the skills learned through engaging in UR are relatively constant across academic divisions. Gaining a sense of self-confidence, problem solving in everyday work, verbal communication skills, written communication skills, and working independently all had the highest percent of responses from each cohort. The most effective ways to prepare students so that they are successful after college is often a point of concern for universities nationwide. UNC Asheville provides its students with a liberal arts education, which comes with the common belief that students will have a more difficult time ensuring a job after graduation. However, if a student exhibits the right skill sets, the belief that they are unemployable is a misconception. The skills employers are looking for are often gained when participating in additional academic work through college.<sup>29</sup> Engaging in undergraduate research provides students with the necessary tools to be competitive after graduation. The positive alumni perceptions of their research experiences, as well as the clear belief that they gained vital skills by completing research, illustrates the crucial place UR holds in a liberal arts education. These experiences have as much value after a student graduates as they do when a student is actively engaged in their undergraduate education.

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