

**HIGH SCHOOL STUDENTS' PERCEPTIONS
OF THEIR INTERNSHIP EXPERIENCES AND THE RELATED
IMPACT ON CAREER CHOICES AND CHANGES**

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Introduction

According to Franco, Patel and Lindsey (2012), schools offer a range of career counseling and career exposure opportunities throughout the middle and high school years. However, non-educators, including parents and career professionals, have the potential to greatly influence career choice, if students are able to gain access to these people. One such mode of access is the internship. Some high schools operate internship programs with the purpose of providing authentic work experiences to students. These experiences exist to develop knowledge and skills of practice (Levine, 2010). Such high school internships can offer opportunities for enhancing classroom instruction, differentiating the curriculum and providing academic rigor. These advantages may be particularly valuable for gifted and talented students (Templin, Engemann, & Doran, 1999) and often arise from the provision of authentic opportunities during real-world applications requiring complex synthesis and problem-solving (Levine, 2010).

Student internship programs should foster career interest and help students to transition from school into career pathways (Kash, 2009). Moreover, internship opportunities should offer authentic, real-world experiences (Templin et al., 1999) that facilitate the acquisition and use of skills in authentic settings (Kash, 2009). Through participation, students can formulate connections between practice and the classroom (Roth, Eijck, Hsu, Marshall, & Mazumder, 2009) and explore career options (Kash, 2009).

Roth et al. (2009) suggest that internships allow students to explore future possibilities, reflect introspectively and realize the unrealistic nature of their perceptions of practice. In essence, “these programs also help give students a better understanding of a career that they want to pursue during and after college” (Kash, 2009, p. 3). Stake and Mares (2001) found that some students who participate in science apprenticeship programs tend to redefine original career plans

through recognition and understanding of personal empirical experiences that include the nuances, facets and realities of practice associated with a particular science career option. In essence, individuals in these redefining situations seem to “reevaluate their goals and possibly entertain alternative directions in science without losing interest in pursuing a science career” (p. 1080).

In general, students realize and value the uniqueness of internship opportunities. Moreover, students, through internships, come to realize the complex and mundane aspects of practice (Roth et al., 2009). Since these realizations may be a function of program length, long-term internships may be more impacting than short-term placements. Longer time periods allow students to become more self-directed and productive and allow employees to focus on work and not students (Kash, 2009). However, some interns may not recognize the impact of internship activities until after leaving the internship. The use of debriefing activities is crucial for enhancing the impact of student internship experiences. In relation to science-related internships, this “delayed recognition of program impact on science attitudes after reentry to the home high school” (p. 361) is known as the splashdown effect (Stake & Mares, 2005).

According to Richmond (1998), becoming a scientist is very much an apprenticeship process. Interested individuals become associated with experts (i.e., scientists and practitioners) and then learn the art of practice of the discipline, including acceptable practices and norms through increasing levels of complexity, stages of training, constant feedback and vicarious learning experiences. In a process similar to apprenticeship, internships involving actual scientific research represent opportunities for modeling the process of science and utilizing collaborative efforts (Templin et al., 1999). Research-based internship experience “not only makes student affect toward science more positive, but also facilitates personal growth and

changes epistemological beliefs about science--- orienting the individual toward becoming a problem solver” (Templin et al., 1999, p. 210).

Yet, even individuals who report less favorable feelings about internship experiences describe gains in motivation and confidence (Stake & Mares, 2005). These gains may be related to the artificiality of the classroom (Lave, 1988). Internship-based, authentic science experiences of practice can facilitate the development of expertise with respect to practice and the actual epistemological nature of science (Roth, 1995). Since the traditional high school is responsible for providing a general education to a general population, meeting the needs of diverse students often supersedes keeping students in the science pipeline (Richmond, 1998). As a result, students may value the internship-based experiences that school classrooms cannot provide (Templin et al., 1999). Although a variety of initiatives have been undertaken to increase the number of U. S. high school students who choose to pursue STEM (i.e., science, technology, engineering, and math) careers (National Science Foundation, 2007), in many respects “public schools have very little to offer students who identify a career path at an early age or who might use these years to do so” (Richmond, 1998, p. 585). The internship experience might help to remedy this situation by diminishing resistance to entry into science study (Roth et al., 2009).

No doubt, authentic laboratory internships can effectively transmit scientific knowledge and practice. Unfortunately, however, these internship experiences do not necessarily lead students to science careers. One possible explanation is that advanced students may have solidified career decisions prior to their internship experiences (Roth et al., 2009). According to Aschbacher, Li, and Roth (2010), although considerable research exists in relation to keeping students in the science pipeline, the actual reasons students interested in science often forgo science careers remains elusive. This retention of students in the science pipeline seems to be

impacted by (a) attitudes toward science; (b) in-school science activities; (c) out of class science activities; (d) science achievement and (e) science-related behaviors and decisions that impact future study and work (Gilmartin, Li, & Ashbacher, 2006).

Yet many students who enter high school with high science interest do not ultimately pursue science careers (Ashbacher et al., 2010). However, STEM school students enter the science pipeline at a rate as much as two times greater than the rate of traditional high school students (Franco et al., 2012). These relative losses may be attributable to weak experiences and interactions at school that may ameliorate science interest. For many individuals who remove themselves from the science pipeline, school experiences serve as the only source of science access. Often, these school experiences are perceived negatively with respect to ability to foster science interest. Moreover, other factors may help to facilitate the exit of high-interest individuals from the science pipeline. These include: (a) competing interests; (b) lack of family support; (c) lack of out-of-class science experiences; (d) perceived difficulty of school science; and (e) perceived difficulty of science careers (Ashbacher et al., 2010).

Conversely, individuals who persist in the science pipeline, unsurprisingly, exhibit passion for science careers. Interestingly, however, these individuals, although remaining in the science pipeline, exhibit a range of academic achievement (Ashbacher et al., 2010; Tracey, Robbins, & Hofsess, 2005). While these individuals desire to help people using science, most consider a range of careers, rather than a single profession. Individuals who persist but do not achieve well often have career aspirations that do not match academic performance and, as a result, these individuals may have to adjust career aspirations. Yet, students who persist and achieve have positive views of school science. These individuals exhibit resiliency and perceive that peers experience the same difficulties and academic setbacks (Ashbacher et al., 2010).

In 2010, Aschbacher et al. examined students' accounts of their daily science-related experiences in order to gain understanding of their science identities. In a similar fashion, Roth et al. (2009) utilized a phenomenological approach to examine student experiences, including internship experiences, in relation to ability to persist in the pipeline. In the same manner, examining students' accounts of internship experiences might yield insight into their perceptions and the actual impact of these experiences on their career choices.

Purpose

The purpose of the present study was to (a) identify and describe students' perceptions of the internship requirement component of their educational experiences at a specialized science and mathematics magnet high school and (b) relate these perceptions to students' career and college major choices and changes in these choices (i.e., career status).

The research questions were:

1. How impacting were internship experiences on choice of college major?
2. How do students describe the relationship between internship experiences and career choices and changes in choices?
3. How important was the internship process in keeping students connected to science careers?
4. How do students describe their internship experiences?

Participants

Participants for the study were 52 senior students (i.e., 31 females and 21 males) at the Academy for Science and Health Professions (ASHP), a selective science and mathematics

magnet high school in Texas. Students in the present study were accepted into the school through an annual application process and entered the program during the freshman year.

Upon acceptance, students and parents sign general release forms agreeing to participate in interviews, research projects and recruiting efforts. However, for any given research project, permission, consent and assent are sought. Institutional review is conducted by the Headmaster and a staff committee.

With respect to career status, 42 participants planned to pursue science careers and 10 were moving to other areas. Of the individuals choosing science careers, 12 had planned to pursue specific science careers and remained focused on those areas (i.e., static science students); 17 had planned to pursue specific areas in science and then changed to other science areas (i.e., dynamic science students); and 13 changed from non-science to science careers (non-science-to-science changers). Of the non-science majors, five arrived at high school, despite enrolling in a science academy, with no science career aspirations (i.e., static non-science students) and five others decided to leave the science pipeline before graduation (i.e., science-to-non-science changers). Table 1 illustrates these trends.

Table 1

Participants' Career Status

Career Status	N	%
Dynamic science students	17	32.7
Non-science-to-science changers	13	25
Science-to-non-science changers	5	9.6
Static science students	12	23.1
Static non-science students	5	9.6
Total	52	100

Methods

This qualitative, phenomenological study was an attempt to identify students' perceptions of their internship experiences and then relate these experiences to their career choices and fluctuations. Elements of design of similar studies (Aschbacher et al., 2010; Roth et al., 2009; Stake & Mares, 2005; and Templin et al., 1999) were utilized. Specifically, the primary data sources were: (a) individual student questionnaires; (b) individual follow-up interviews; and (c) small group interviews. Questionnaire responses were the primary data source. The interview data were used for clarification of the primary data source. In a manner consistent with Aschbacher et al. (2010), survey and interview data were compared and combined to identify themes, "identities, participation and aspirations" (p. 567), along with patterns, "characteristics and trajectories" (p. 567) in relation to internship experiences and students' respective career statuses. The primary thematic responses that emerged were affirmations and denials of the reported impact of internship experiences on the career-related attributes studied. These

affirmations or denials were reported as percentage responses of each career status group. All questionnaire items were open-ended. Further, interviews were unstructured with only initial prompts, similar to the process utilized by Templin et al. (1999). Interviews were scripted but not audio-recorded. All data were collected two years after students completed internship activities (i.e., thus controlling for splashdown effects).

The questionnaire was presented along with the normal senior exit questionnaire and was evaluated for construct and face validity by a team of teachers and a community advisory panel (i.e., including science and math teachers, a school counselor, parents and health care professionals). Individual items were piloted through incorporation in senior exit surveys for the two years prior to the study year. Survey questions are available upon request.

Setting

The Academy for Science and Health Professions (ASHP) is a public science magnet high school in Conroe, Texas. Admissions are selective and the Academy matriculates about 90 students into each freshman class. In addition, the ASHP is a member of the National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology (NCSSSMST). Students are required to complete at least three Academy science, technology and/or math courses each year. Students take other courses on their home high school campuses. In essence, ASHP operates as an independent school-within-a-school. In addition, all students must complete an 80 hour internship at the end of the sophomore or junior year. This internship requirement can take place in a variety of settings. Lastly, for health science students, the internship requirement may be met through participation in clinical rotations required in health science technology courses during sophomore or junior years.

Results

Participants identified four program factors as highly influential on career choice and college major. These were: (a) clinical rotations; (b) courses; (c) internships and (d) teachers. Comments indicated that students closely associated course and teacher attributes. Again, internships referred to the 80-hour summer internship program required of all students. Clinical rotations referred to the internship option embedded in the health science course.

(Q1) Role of Internships in Influencing College Major Choice

With respect to the career changers, 47% of the dynamic science students (n=17) reported internships as a key program factor in influencing choice of college major. Typical responses were: *“My HST internship helped me reinforce I wanted to be a doctor”* and *“It was fun. It made me realize I’d rather be an engineer than a doctor.”*

Likewise, 77% of the non-science to science changers (n=13) reported internship experience as a key factor in choice of college major. Responses included: *“Observing three live births and a c-section was awesome”* and *“My internship influenced me because it put me up close and personal with careers.”* One student commented, *“My internship maybe did not influence me but more like put me to the test of if I really wanted it or not. Actually, the internship started it all.”*

With respect to the science-to-non-science changers (n=5), 60% reported internships as a key factor in choice of college major. Responses included, *“It helped me to decide what I did not want to do”* and *“my internship convinced me that medicine was not for me.”* Another stated: *“It was fun. It showed me I didn’t want to be a vet. So yes, it did impact me.”*

Of the static science students (n=12), 42% reported internships as a key factor in affirming choice of college major. Typical comments were: *“It hasn’t really influenced me because I had my mind set from before high school”* and *“My internship strengthened my interest in biology.”* Lastly, one claimed: *“My mom set me up with two surgeons...They actually taught me things...Yet, it was very impacting because it reassured me that I have made the right career choice.”*

Interestingly, 60% of the static non-science students (n=5) reported internships as a key factor in supporting college major selections. Typical comments were: *“It had no effect, although I did consider pediatrics because of rotations”* and *“My internship was very helpful. I was able to see a lawyer in action and know exactly what I would be doing.”* These percentage responses are summarized in Table 2.

Table 2

Participants Reporting Internships as a Key Factor in College Major Choice

Career Status	N	%
Dynamic science students	8/17	47
Non-science-to-science changers	10/13	77
Science-to-non-science changers	3/5	60
Static science students	5/12	42
Static non-science students	3/5	60

(Q2) Role of Internships in Career Decisions

In response to the direct question, “Did your internship help you decide what your career would be?”, overall 65% of students responded affirmatively. Of the career changers, 65% of the dynamic science students (n=17) responded affirmatively. Typical responses were, “*It showed me I didn’t want to work with animals*” and “*Yes, it did help me realize what I wanted to do for a career because of all the neat experiences I accumulated.*” Other similar comments were, “*Yes it made me realize I do not want to be a dentist*” and “*Sort of, it helped me see more of what medicine was like, but it just confused me more.*”

Likewise 69% of the non-science-to-science changers (n=13) affirmed the impact of internship experiences on their career choices and changes. Typical responses were: “*Yes, observing gave me a hands-on feel of what the career was like on a daily basis*” and “*Yes, it made me realize I did not want a career in law. I saw that the job was not right for me. The internship was very important for my career goals.*” Another similar comment was: “*Sort of because it opened my eyes to something in the medical field but also showed me some careers that I knew I wasn’t going to pursue.*” A negative comment was: “*No, it did not show me interesting stuff.*”

In addition, 60% of the science-to-non-science changers (n=5) responded affirmatively to the question. One response was, “*Yes, it helped me see that I don’t want to be a lawyer or veterinarian.*” Another student claimed, “*Yes, I wanted to do engineering. It was perfect before, now not so much.*”

With respect to the static science students (n=12), 67% found internships impacting on career choice. Responses included: “*Yes, it made me want to pursue it more*” and “*Yes, it*

helped me find my passion and fall in love with the career.” Other comments were: “It allowed me to see firsthand how a surgeon works and the inside of a human body” and “I already knew what I want to do. It has only reassured that idea” and “It showed me the joys of the medical field.” A typical negative response was, “Not really, I interned based on what I plan to do.”

Lastly, 60% of the static non-science students (n=5) reported affirmatively to the career impact question. One student responded, “It just helped me know my choice was right.” Another claimed, “No, it didn’t because I only observed and saw. I gained no experience and was not really sure of what it took to get to the position they are in.” These responses are summarized in Table 3.

Table 3

Participants Reporting High Impact of Internships on Career Decisions

Career Status	N	%
Dynamic science students	11/17	65
Non-science-to-science changers	9/13	69
Science-to-non-science changers	3/5	60
Static science students	8/12	67
Static non-science students	3/5	60

(Q3) Role of Internships in Maintaining Commitment to a Science Career

A third question asked students to respond to the query of how important the internship process was in keeping them personally committed to a science career. In response, overall, 62% reported that internships were very important for retaining a science career focus.

Specifically, 71% of the dynamic science students responded positively. Typical comments were: *“It helped me a ton with figuring out what I want to do as a career”* and *“The internship actually let me see firsthand how a science career would be like.”* Another comment was: *“It has taken me to the next level of researching careers and understanding each one and has helped me pick my service-related career: optometry.”* Negative comments were: *“My internship was cool but not needed”* and *“I feel like the internship didn’t keep me interested in a science career, but it helped me realize the things that truly interest me.”*

Likewise, 54% of the non-science to science changers reported positive impact with respect to science career retention. One student stated, *“They were really important to me because they allowed me to explore many different aspects of science.”* Another claimed, *“It kept me connected to what I believed was important to me.”* Other comments were: *“It was very important; it kept me out of film”* and *“My internship broadened my view of the different fields of engineering.”* Negative comments included: *“It wasn’t really that important. I really didn’t benefit much from it”* and *“My internships were both not in science. They were boring and just showed me what not to do.”* Lastly, one student stated, *“Not very. The internships were forced on us so I saw it more as something to check off the list than as an approach to see a science career.”*

Lastly, 60% of the science-to-non-science changers described the internship as a factor in keeping individuals focused on science careers. One student claimed, *“Super important! Without the internship, I never would have known how enjoyable fitness and working with special needs children could be.”* Another claimed, *“My HOSA internship made me realize that medical fields might be good for me. But I’m heading another direction.”*

Of the static science students, 67% found internship experiences impacting upon retention of a science career choice. Typical responses were: *“Internships are very important cause they make you see what it is like in a field and you get to decide if it’s good for you or not”* and *“Very important. Being at a dental practice for the entire summer gave me the opportunity to learn how a day in the dental practice is really like.”* Another comment was: *“My internship with the doctor not only reassured my career path as a pediatrician, but taught me more about life, too.”* Another positive comment was, *“It was very important since it strengthened my views on my career aspirations through biomedical studies.”* Negative comments were: *“Not very, I found that in the fact that I was forced to do this, it actually repulsed me”* and *“It wasn’t that pertinent to keeping me personally in my science career because I was already set on it. But it was reaffirming and eye opening.”*

Likewise, 60% of static non-science students found the internship process impacting on career retention. Typical comments were: *“It was important because with every project I gained knowledge and experience that it takes to work problems out in medical fields”* and *“I’m not headed for a science field, but it did help me continue on my path.”* Also, one student commented, *“I adored the experience but I did not change my mind. If I didn’t have such a strong passion for helping people, I would have easily chosen a more science-related job.”* A more negative comment was: *“Not at all. But once again, I had preconceived notions of science careers and already knew I would not pursue a science-related career. But my internship did make me consider pediatrics.”*

Table 4 summarizes these percentage responses with respect to the role of internships in maintaining commitment to science careers.

Table 4

Participants Reporting Internships as a Factor in Science Career Commitment

Career Status	N	%
Dynamic science students	12/17	71
Non-science-to-science changers	7/13	54
Science-to-non-science changers	3/5	60
Static science students	8/12	67
Static non-science students	3/5	60

(Q4) Open-ended Perception of the Internship Experience

Lastly, in response to the question, “what was your internship like?”, 56% of students responded that the experience was impacting; 27% claimed no impact; 12% found their experiences to be fun; and 10% claimed that the internship dissuaded them from a career. However, surprisingly, no large percentage of any groups claimed that the internship dissuaded them (i.e., including the changers) from pursuing their original career interests. In specific terms of finding the internship impacting, 65% of the dynamic science students found their experiences impacting. In relation, these science-to-science-changers offered a variety of comments. Typical comments were: *“My internship helped me with watching surgeries and stuff, but although I love animals, I couldn’t do it”* and *“It was long 8 hour days, five days a week. I was constantly on my feet and tending to patients; giving massages made my hands cramp and get stronger.”* One student who changed from engineering to dentistry commented: *“My internship was impacting...I was able to see tons of procedures and saw not only the dental, but business and financial sides of...practice.”* Other typical comments were: *“It was great, and it opened*

my eyes to a field of medicine I might like” and “It was pretty cool, it was impacting because I got to see what architects really do.” Lastly, one claimed, “It was fun but redundant; it had no impact on my career choice.” Another student who shifted from biology to optometry claimed: “It was unbelievable. I was shown different pictures of real people’s eyes... I got a feel of what I was going to be seeing...It impacted me to become an optometrist...” Still another who shifted from architecture to nurse anesthetist stated: “It was very interesting. I was able to see surgeries such as crowning of a tooth and two other tooth related surgeries.” Another one who shifted from medicine to petroleum engineering claimed: “It was boring. It helped me realize that I didn’t want to become a doctor.”

Also, 38% of the non-science-to-science changers found internship experiences impacting. Typical comments were: *“I tried geologist and pediatrician. I didn’t enjoy either one of these so there was no impact”* and *“It was kind of impacting but it didn’t impact my career choice.”* Still another claimed: *“My internship with a dentist office was very impacting because I got a good bit of experience and met some new people.”*

In addition, 40% of the science-to-non-science changers found internships impacting. A typical comment was: *“I did an internship at the YMCA working a special needs camp that allowed me to see how passionate I was about working with these kids.”*

Further, 58% of the static science students agreed. Typical comments were: *“I loved my internship with the dentist. I ended up working for him”* and *“It was alright; I went to a vet clinic and didn’t enjoy it as much as I would have liked.”* Another comment was: *“It was wonderful! It taught me that many doctors are perfectly capable of leading a family life while working long hours. I also learned that UT is a great place to go to school.”*

Likewise, 80% of the static-non-science students found their experiences impacting. Typical comments were: “*My internship was HST rotations. It was an educational experience. I enjoyed learning how the body works*” and “*My internship was helpful. I was able to see a lawyer in action and know exactly what I would be doing.*” Another comment was: “*I love the vet clinic. I love animals. It was like a family to me.*” Table 5 summarizes these responses.

Table 5

Participants Describing the Internship Experience as Impacting

Career Status	N	%
Dynamic science students	11/17	65
Non-science-to-science changers	5/13	38
Science-to-non-science changers	2/5	40
Static science students	7/12	58
Static non-science students	4/5	80

Discussion

(Q1) Role of Internships in Influencing College Major Choice

In general, internship experiences did influence choice of college major. This influence apparently varied in relation to career status. Of the dynamic science students, 47% reported that internships were impacting on college major choice decisions. These responses indicate that some students simply disliked their internship experiences and selected other areas of science as majors. More importantly, over half of these individuals felt no connection between major and the internship process.

The strongest influence was evident in the non-science-to-science changers, with 77% of them affirming the importance of internship experiences in impacting college major choice. Comments indicate that these experiences were impacting because of: (a) excitement; (b) intensity of experience; (c) affirmation or denial of career beliefs; and, unsurprisingly (d) simple access to professionals and practitioners.

For the science-to-non-science changers, 60% reported experiences as impacting college major choice. These individuals reported that the experiences helped them to understand that areas chosen for internships became undesirable as career choices as the natures and nuances of respective practices emerged.

Only 42% of the static science students reported that internship experiences impacted college major choice. Comments indicate that these individuals were: (a) set in their choices before entering internships and were not impacted by their experiences; (b) found choice affirmation; or (c) chose internships that were perceived as unrelated to college major choice or interests.

Lastly, 60% of the static non-science students found internship experiences impacting on college major choice. Most of these individuals had chosen non-science internships. Responses ranged from affirmation of career choice (i.e., law) to enjoying the experiences without acknowledging any impact on major.

(Q2) Role of Internships in Career Decisions

In response to the second research question, 65% of the dynamic science students found internship experiences helpful in making career choices. These students reported that either

internships in new areas positively affirmed new career choices or that internships in original interest areas were negative enough to generate career change.

In response to the internship-career choice question, 69% of non-science-to-science changers reported internships as helpful in making career choices. Some of these individuals, after negatively experiencing non-science internships, moved into science career orientations. Others experienced science internships and became enamored with disciplines. Individuals who found no impact generally expressed no interest in the internships, either finding the experiences boring or perceiving them as unrelated to career choices.

Likewise, 60% of the science-to-non-science changers found the internship experiences impacting on career choice. Responses indicated that these individuals had selected internships related to career choices and then were disappointed and consequently decided to pursue non-science careers.

Of the twelve static science students, 67% found internships impacting on career choice. Responses indicate that experiences fomented interest and further ignited strong desire with respect to chosen careers. Moreover, these students suggested that internships transmitted information about the details and nuances of career practices. Yet, several did assert that choice impacts the internship and not vice versa.

Lastly, 60% of the static non-science students found internships impacting upon career choices. Responses suggest that students who chose non-science internships received affirmation of non-science career choices. Yet one suggested that the internships had no impact.

(Q3) Role of Internships in Maintaining Commitment to a science Career

In response to question three, 71% of dynamic science students affirmed the importance of internships in relation to science career commitment. Comments suggest that internships provide empirical experience which allows career choice affirmation or refinement and renewed commitment. Yet, several students asserted that the internship was not needed to support science career commitment.

Of the non-science-to-science changers, 54% reported positive impact with respect to science career retention. In general, students reported that internship experiences broadened their perceptions and understanding of science and science careers (i.e., which serve to motivate continued study). Other comments suggest no impact on decisions to change. Also, while some individuals simply viewed the internship as a program requirement, comments do suggest that experiences served as an impetus to change by either refining choices or by allowing individuals to discount prior choices and, as a result, further served to keep students in the science pipeline.

Interestingly, 60% of science-to-non-science changers acknowledged the ability of the internship to keep them focused on science careers. Yet, despite this fact, these individuals had decided to leave the science pipeline. Some of these individuals reported that although they chose to pursue non-science careers, the internship had caused them to carefully reconsider science careers. Also, some of the individuals had chosen non-science internships in areas of likely career choice.

With respect to static science students, 67% asserted that internship experiences were impacting upon retention in the science pipeline. Comments suggest that students recognized the power of an internship to allow an individual to truly experience the nuances of a profession and

the related personal fit. Others recognized the power of the internship to dissuade them from secondary choices. Others found internships non-impacting because of previous career connections.

Very similarly, 60% of the static non-science students found internships impacting upon career retention. Comments suggested that students enjoyed internship experiences but these experiences did not impact career choice. Also, students reported that experiences did facilitate the continuation of original non-science career plans, while allowing them to consider other careers. Yet, despite other career interests, students did realize, through internships, the viability of science careers.

(Q4) Open-ended Perception of the Internship Experience

In response to the descriptive question about the nature of the internship, 65% of the dynamic science students found experiences to be impacting. In essence, the internship allowed some of these individuals to test their career choices and then move on to their secondary science choices. Interestingly, some of these internships were in secondary choice areas, while others were in primary areas. Either way, the secondary choice was affirmed. Despite these shifts, most individuals reported internships as positive experiences. Several, however, had negative comments.

Likewise, 38% of the non-science-to-science changers found internship experiences interesting and impacting. Thus, the dramatic shift from non-science to science was likely facilitated by a range of experiences for this percentage. Yet, some individuals assumed that not enjoying or embracing the internship meant the experience was non-impacting. Regardless, the

low percentage creates the question of what other factors influenced the non-science to science shift.

Only 40% of the science-to-non-science changers found internships impacting. Yet, again, the question arises in relation to what created a shift in the 60% of individuals who did not find them impacting.

Further, 58% of the static science students described internships as impacting. These individuals responded positively, but realistically, and were not deterred when experiences did not meet high expectations.

Lastly, in response to the open-ended description question, 80% of static-non-science students found the experiences impacting. While several students completed non-science internships, most chose science-related fields. Despite this fact and their proclivities towards non-science careers, these individuals were positive about science internship experiences.

Comparison of Percentage Responses to Research Questions

Perhaps a more meaningful analysis lies in a comparison of differential percentage responses to questions made by each career status group. These values are reported in Table 6.

Table 6

Comparative Summary of Percentage Responses

Career Status	Q1	Q2	Q3	Q4
Dynamic science students (N=17)	47%	65%	71%	65%
Non-science-to-science changers (N=13)	77%	69%	54%	38%
Science-to-non-science changers (N=5)	60%	60%	60%	40%
Static science students (N=12)	42%	67%	67%	58%
Static non-science students (N=5)	60%	60%	60%	80%

Interestingly, while only 47% of dynamic science students (n=17) found internships to be key factors in college major selection, these individuals exhibited stronger responses to questions of impact on career decisions (i.e., 65%); commitment to a science career (i.e., 71%); and description of the internship as impacting (i.e., 65%). This differential suggests that students may not consider college major as directly related to specific career choice. This lack of correlation may be due to the nature of the career (i.e., choice of major is less important for some careers like medicine than others like engineering). Or these individuals may perceive no connection between internships and majors, while they do perceive the connection between internships and career choice. This disparity may indicate a dichotomy between students’ perceptions of the academic world and students’ perceptions of “real world” applications.

A similar measure-to-measure comparison of the percentage responses of affirmation for non-science-to-science career changers (n=13) indicates a dichotomy of strength of response. These students found internships to be a key factor in major choice (i.e., 77%) and additionally found internships highly impacting on career choice (i.e., 69%). Yet, despite shifting to science,

only 54% thought internships crucial to commitment to a science career. Moreover, only 38% felt internships were impacting. Thus, the internship experience, for the most part, helped these individuals move from non-science to science majors and careers. The lack of perception of internship impact upon career commitment might be a reflection of the shift in careers.

The science-to-non-science changers (n=5) exhibited fairly consistent, yet only moderate strength responses. For these students, 60% responded affirmatively to the college major, impact on career decision and science commitment questions. However, only 40% described internships as impacting. In general, this small group acknowledged the role of the internship in major and career selection and commitment.

Static science students (n=12) exhibited response patterns similar to the dynamic science students. Essentially, the weakest response (i.e., 42%) was reported for the college major-internship impact connections. Yet, 67% found internship experiences impacting on career decisions and commitment to science careers. However, a slightly lower percentage (i.e., 58%) described internships as impacting. Likely, these individuals planned science careers somewhat independently of specific major. Yet, no doubt, internship experiences reinforced, for this group, career decisions and commitment in relation to science.

Lastly, static non-science (n=5) students produced the most consistent percentage responses. Astonishingly, 80% described internship experiences as impacting. In a very consistent manner, 60% of these individuals found internships as key factors in college major; impacting on career decisions; and as a key factor in science career commitment, despite not planning to pursue science careers.

Conclusions

No doubt, the internship process is impacting on high school students. The nature of this impact is dependent upon the career orientations of individuals. In the present study, dynamic science students (i.e., individuals who changed from one science career to another during high school) showed the strongest response in relation to the ability of internships to produce retention in the science pipeline. The non-science-to-science career changers showed the strongest responses with respect to internship impact on college major and career choice. The science-to-non-science changers showed consistent and marginal impact responses and very few described internships as impacting. Static science students found internships to be especially impacting on career choice and on retention. Lastly, static non-science students acknowledged great impact of internships. The present study is, of course, descriptive. Further investigation should focus on causal relationships and identification of factors that influence the impact of internships.

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