

Integrating a Career Conference into the First Year Curriculum

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Abstract - To help improve students' understanding of the rewards, challenges, and incentives of "being an engineer," and to thereby improve retention in the freshman year, we created a number of engineering-related writing assignments in the University of Pittsburgh's Swanson School of Engineering (SSOE) first year Introduction to Engineering course. These writing assignments require that students research various aspects of engineering education and engineering careers, including research into the particular engineering field the student sees himself or herself being interested in. Despite our efforts, however, many students just did not seem to take the assignments seriously, often seeing this research and writing as not having much to do with "real" engineering (which, in their thinking, involved only STEM-related coursework). As a result, students were not getting the full benefit of the writing assignments.

To encourage our students to put more effort into the first year research and writing assignments and to impress on them the value of the "real world" applications of the learning and goals of the assignments, we created the SSOE First Year Career Conference. The conference is a Saturday event, modeled after career conferences at student professional conferences such as SWE, NSBE and SHPE. In the conference we bring in practicing engineers from various companies and organizations; these engineers give talks to the students, emphasizing the importance of thinking carefully and with well-informed awareness, about their career plans. This paper discusses the factors around creating such a conference and the impact it has made.

Index Terms – Career Planning, Advising

INTRODUCTION

Here at the University of Pittsburgh, the Swanson School of Engineering faculty and administration have worked in tandem with faculty from the Dietrich School of Arts & Sciences English Department Composition program as well as with University Library System Engineering Librarians to develop and implement the English/Engineering First Year Writing Program. The Program continues to create research and writing projects that promote learning through writing. Successful completion of the Program earns students the equivalent of the 3 credit composition course—Seminar in Composition—that all first year Pitt students are required to take. Rather than taking this separate, 3 credit course, students compose "thoughtfully crafted essays that position the writer's ideas among other views" and demonstrate their increasing skill in "writing with precision, nuance, and awareness of textual conventions". Through the SSOE English/Engineering First Year Writing Program, first year engineering students have the opportunity to learn about themselves as potential engineers, as they are learning about significant, current engineering-related technologies, issues, and professional methodologies - all while reaching required competencies in research and writing.

In many ways, the project of having first year engineering students gain the equivalent of Pitt's first year writing course has worked well - integrating the writing projects into the students' required first year Engineering Analysis course has made for smoother scheduling within a tightly packed first year curriculum, and students' research and writing skills were and continue to be notably improved when comparing first papers with the final papers of the semester and the year.

However, there remained a pervasive sense, given what we learned from formal and informal surveys, and given what faculty, advisors, and mentors heard from students that these writing assignments were not seen, by students, as relevant, in either gained skills or in gained knowledge, to being an engineer. Thus, though students would go through the motions of completing the assignments, they were not appreciating that these assignments were a way of learning about significant aspects of engineering as well as about significant aspects of themselves as current engineering students and as future engineers. Students seemed not to be significantly *applying* what they were writing and learning to understanding of the work of engineering, in general, and specific engineering fields, in particular. We wondered if students' writing and research skills could improve even more, retention could be boosted, and students could have an all-around more positive and meaningful experience, if they had a more immediate and powerful exemplifications of the significance of thinking early and carefully about their engineering education and career choices.

Who better than successful, practicing engineers, including alumni of the Swanson School, to speak with students about the importance and rewards of an ongoing awareness of *many* facets of education that bring students to understand not just where they want to go, but why they want to go there?

THE WRITING ASSIGNMENTS

In recent years, a number of writing techniques have evolved that make use of various writing-to-learn strategies within the domains of engineering, mathematics, and the sciences. [3-12] The use of writing in introductory classes for engineers may be an effective vehicle to help students enhance their critical thinking and problem-solving skills. Writing can also assist students in identifying and confronting personal misconceptions. We felt that by having the students take an active role in exploring their futures by researching and writing about their intended professions [1], we could address the various academic and advising concerns regarding communication and information literacy skills while also providing students with knowledge and experience essential to retention in engineering issues.

These writing assignments described below were developed by English faculty in close consultation with Engineering faculty, advisors, and librarians. The assignments are intended to enable engineering students to meet rigorous university-wide research and writing requirements, but each writing assignment also allows for each student to understand, through this research and writing, his/her particular what “engineering” is and why he or she “wants to be an engineer.”. The assignments, described below, and students’ reactions to these assignments, led to our consideration of an event or activity - a Career Conference - that would complement the academic *and* personal *and* professional learning encouraged and required by the English/Engineering First Year Writing Program.

Writing Assignment #1: “Why I am at the University of Pittsburgh Swanson School of Engineering: My Recent Past, My Present, My Near Future,” 950-1000 words

For Writing Assignment #1, each student describes key factors that led him or her to the University of Pittsburgh’s Swanson School of Engineering. Each student then describes what he or she hopes to achieve during the first semester at Swanson. Drawing on a variety of resources, including information from University sources and support services, as well as instructors, peers, and mentors, each student then discusses how he or she might actually achieve the goals noted in the second part of the assignment.

Throughout Assignment #1, students must be specific in their descriptions and explanations. Such specificity helps students comprehend how clarity, in their own minds, about their own processes of decision-making facilitates clear and significant communication with their readers. In addition to describing, explaining, and exemplifying the “why,” “what,” and “how” *within* each section of Assignment #1, students must also clearly articulate and explain the *connections among* the 3 sections of Assignment #1. This clarity and specificity of connection in their writing helps students see and appreciate the relationships among decisions, goals, resources, and outcomes, and helps students comprehend best practices in writing with clarity and impact. With Assignment #1, students begin the process of understanding and articulating what has informed their decision to “be an engineer.”

Assignment #1 also emphasizes, for students, the potential and significance of their own “agency,” while encouraging their awareness of various kinds of available support. Assignment #1 helps students realize that there is no shame or failure in asking for help, but that it is their responsibility to ask for help when needed - a potentially crucial aspect of the teamwork and ongoing learning central to engineering.

Writing Assignment #2: “Engineering and Me: Why I Want to Be a _____ Engineer,” 1600 words

For Assignment #2, each student investigates his or her current thinking and assumptions about the particular field of engineering he or she is considering as a major. Through research into a particular professional field, students familiarize themselves with aspects of the field such as educational requirements, work environments and conditions, and earning potential. In addition to consulting a variety of resources that describe and explain aspects of a particular field, students continue the research into “themselves” that also informed their writing in Assignment #1. For Assignment #2, a student is not only investigating and describing what, for instance, an environmental engineer “does,” the student is also investigating and articulating how what an engineer in that field does aligns with (or, perhaps, does not align with) the student, herself. How might being an environmental engineer fulfill a student’s proclivities, interests, hopes, goals, and dreams?

The research required for this continues to encourage students to see the connections between what they “do” and who they “are” and who they want to be.

Writing Assignment #3: “A Current Engineering Innovation and Discussion: What do I Have to Say?” 1300 words

For Writing Assignment #3, students identify a current engineering innovation which is of interest to them and about which there is ongoing analysis and debate. Students must consult at least 5 sources (appropriate to a university-level paper) from the past 3 years to gather information on an innovation and to become aware of some of the discussions and debates surrounding that innovation. Students then take a “place” in these discussions/debates, articulating their own views and describing, in detail, why they hold the positions that they do.

Just as students must do more than describe a field of engineering in Assignment 2, in Assignment 3 students must do more than describe an innovation. Students must consider and discuss potential positive impacts, negative possibilities, and “grey

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areas.” Students must clarify and contextualize what they mean by an evaluative terms such as “positive” or “useful” or “detrimental.” Students must also “connect” the innovation and surrounding debates to “themselves,” investigating and writing about why this particular innovation and these particular issues are interesting and important to them.

With Assignment #3, students increase their knowledge of what “goes on” in particular fields/areas of engineering, they hone their information literacy skills and, of course, continue to receive the instruction, practice, and feedback that improves their writing skills and outcomes. Along the way, students continue to investigate and articulate how and why they make decisions and “take positions,” and how and why this self-knowledge is significant.

Writing Assignment #4: How can I be an Ethical, Responsible, Perceptive Engineer? Ethics and Responsibility” 2200 words

For Assignment #4, students create a “narrative” involving of an “ethical scenario.” Drawing on their research for Assignment #3, students write about a possible work-related issue involving significant ethical considerations and decisions. In this narrative, the student casts himself or herself as a practicing engineer involved with and/or making these ethically charged decisions. Having created the narrative (which is, in many ways, a “case study”) as the first part of the paper, each student then writes about how he or she, as a “practicing engineer” might proceed to make an informed, responsible ethical decision.

Students must detail the kinds of sources they might consult as they proceed through a decision-making process. Students must show familiarity with at least 2 engineering codes of ethics, they must read several articles dealing with ethics in science, technology, and engineering, and they are encouraged to discuss other less “traditional” sources that they might find useful in a complex decision-making process.

Students describe the decisions they might make in the situation they have narrated. As with all the papers throughout the semester, students must clearly articulate, explain, and exemplify *why* they might make a particular decision or take a particular action.

Assignment #4 continues the semester-long theme of having students learn about themselves while simultaneously learning about various aspects of engineering education; engineering fields; engineering practices, achievements, and decision-making. Throughout the semester, as students understand and practice clear, cohesive, university-level writing, they are also coming to understand and appreciate their own agency and carefully earned authority.

Assignment #5: Summary Presentation: Completing the process by presenting findings

At the end of the semester, once all writing assignments have been completed, students create and deliver presentations that revisit, summarize, and reinforce the integral relationships between what engineering “is” and how a particular engineering degree fits within the students’ interests and goals. The purpose of the end-of-semester presentation is to have the student look at the big picture and complete the circle of inquiry and awareness. In their presentations, students comment on how they see the trends within an engineering area fitting with the students’ own interests, intentions, and strengths. Drawing from their work on the 4 papers, students provide evidence for their emerging insights into how their plans for the future are in line with major engineering trends and challenges. Finally, students provide a convincing picture of how they, their work, and society will all come together.

In addition to a PowerPoint, students create a poster based on the above assignments. The students present the PowerPoint and posters to the mentor and small group [2] of fellow students with which they have been meeting over the course of the semester. This provides an initial experience in presenting their “findings” before a group and in hearing about their peers own thinking and conclusions.

FRESHMAN CAREER CONFERENCE

“For students looking for a job after graduation, how amazing would it be to sit in a room where everyone is employed in your field of interest?” J. Sholnik. “5 benefits of joining a professional association.” USA Today College. 08.19.2013. <http://college.usatoday.com/2013/09/19/5-benefits-of-joining-a-professional-association/>

As noted, students’ research and writing skills improved over the course of the semester, but, for many students, it seemed as if the completion of the assignments was little more than an onerous task that someone said they had to do, and that, while required by the University, had little to do with what students liked to imagine “real engineers” actually needed to know. Perhaps, we reasoned, the students needed more high-impact content, early on in their education, with “real engineers” - that is, with engineers in addition to the engineering faculty and with a cohort of professionals who, as students might see it, weren’t simply espousing a University-required “party line” about such things as awareness of one’s own choices towards establishing and enjoying one’s own career and achievements.

To encourage students to put more effort into and receive the maximum benefit from the assignments, we created the SSOE First Year Career Conference. The Conference is a Saturday event modeled after career conferences held by student organizations such as SWE, NSBE and SHPE. For the conference we bring in practicing engineers from various companies and

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organizations; these engineers give talks and to the students emphasizing strategies for and the importance of beginning their career development plans, now as, freshman.

Beginning with Collaboration

We initiated the process creating an SSOE First Year Career Conference by meeting with the collaboration the SSOE Career Development Office, to get their general input and to work with them on recruiting speakers for the Conference. With that collaboration in place, we proceeded with the planning, implementation, and relationships detailed, here.

An optimal time in the semester

The first year we held the Career Conference during the Spring Semester. However, the date fell just after first year students had chosen their majors. In the feedback forms from students, it was clear that the information presented in the conference was good but it was too late. Thus, the second year the Career Conference was held in November of the Fall semester. This was seen as a better time, as it allowed students to get significant input about potential majors long before declaring a major. In 2016, we moved the Career Conference up even further, holding it early in October. Overall SSOE first year student surveys indicated that students wanted to know more about prospective majors as early as possible. We moved writing assignment #4, "Engineering and Me: Why I Want to be a _____ Engineer" up, making it writing assignment #2, and, as the Conference is a significant part of the assignment, we moved the Career Conference up, accordingly.

A workable schedule

In consultation with the Career Development Office, we decided to bring in representatives from each discipline of engineering represented at Pitt. This would allow students at the conference to preview and compare their top choices of majors. Having students attend a keynote talk, then attend talks by engineers from two different fields would work in terms of overall scheduling, would not provide so much input for students that they experienced information overload, and would allow students to compare 2 disciplines back-to-back. For the first year of the Career Conference, we decided on having a 45 minute keynote talk, with students then attending two 45 minute sessions, each on a particular engineering discipline of their choice.

We scheduled the Keynote at 9:00 a.m., with students required to arrive at around 8:30 a.m. This provided ample time for students to officially check-in; to settle in for the Keynote; and to then attend the two required choice-of-field sessions.

Attendance at the Career Conference is mandatory for all SSOE first year students. To track attendance, we use ID scans, and we also create name tags for every SSOE student. Students swipe their IDs upon entering, pick up their pre-made nametag and a Conference Program, socialize a bit, then move on to the Keynote talk. To determine the final student attendance, we cross-reference the recorded IDs and any nametags not picked up. The keynote lasts for approximately 55 minutes; students then head to their first session, which begins at 10:00. First sessions end at 11:00; students then proceed to their next selected session. Thus, the entire conference is over by noon. A typical schedule is shown in Figure 1.

Choosing and recruiting excellent speakers

From the first, we wanted prominent, distinguished SSOE alumni for the Keynote speaker, so we contacted Pitt's Office of Institutional Advancement and SSOE's Employer Development Specialist to assist us with finding alumni who would be willing to participate in such an event. Institutional Advancement was inclined to invite employers who have been generous donors. The Career Development and Placement Assistance Office was interested in bringing in specific companies who have a history of donating to the office and who hire many Pitt students. Outreach was made to the Co-op Office as well to solicit information regarding companies that they would be interested to create a relationship with.

The response from engineering alums has been enthusiastic. We have, so far, had 5 willing and inspiring alums deliver keynote talks, as well as a number of alums, and even engineers who did not graduate from SSOE, as session speakers. We have learned that speakers who initially agree, well before the actual time of the Conference, to speak, will sometimes need to cancel; having backup speakers, if at all possible, addresses this potentially very stressful situation.

The Career Conference and "Engineering and Me"

Encouraging the students to take an active role in their own educational and career choices and to choose a field of engineering that will best address their inclinations and goals, is a key aspect of the English/First Year Engineering Writing Program. The second Writing Assignment is the one in which each student researches a specific field of engineering and writes, in considerable detail, about how and why this field is (or is not) "for them." The assignment requires that students gather information on many aspects of an engineering field, including typical working conditions and locations, current employment prospects, pay ranges, and typical projects and daily tasks. In addition to using a variety of research sources, students must do "research into themselves," investigating and evaluating the alignments between a particular field and the student's own interests and proclivities. The Career Conference has become an essential (and required) part of this assignment. Having students attend a conference in which they are, in person, in the same room with, listening to, and can ask questions of an engineer who practices in a particular field every day, is a high-impact complement to the traditional and "self" research the students are doing. This opportunity for first-year students to experience a major and a field through the experience of an engineer working in that field

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was valuable late in the semester, but became even more valuable early in the semester, as students requested more such information as early as possible.

Attending the conference starts as meeting a course requirement and recording some data that can become part of the paper. But the speakers are also talking about what it is like to be an engineer and what it feels like, what you do in a typical day, and most importantly what personal satisfaction comes from being an engineer. Thus, the students think they are going to a conference to collect data, but what really happens is we are providing students with motivating insights into the experience of an engineering education and a particular engineering work and accomplishments. In surveys and in their Assignment #2 papers, students write with considerable enthusiasm about what they learned—about the challenges and rewards of an educational path, about the turns and fulfillments of points along a career path, and about the particular satisfactions of being a practicing engineer in a particular field.

RESULTS OF CONFERENCE

Figures 2 and 3 show the results of the data from the first two years. As can be seen from data by moving the conference from the second semester to the first semester we increased the value of the conference as a tool to help the students select their major from 70% to approximately 90%. However for both years the students satisfaction on the conference helping them learn more about the engineering profession was a positive 70-80%. For years three and four we expanded the student survey to the following 11 questions: (1) I am more aware of employment options in my desired major; (2) Know what discipline of engineering I am going to major in; (3) Have a clearer understanding of engineering discipline(s) I am interested in; (4) Have seen that the path to a successful engineering career is not as straight forward, or is possibly more complex, than I thought; (5) Have a better understanding of what it's like or feels like to be an engineer (e.g., an engineer's typical day, ethical and problematic issues encountered, personal satisfaction, etc.); (6) This conference pointed out ways in which I may need to improve to be a good engineer (e.g., professional behaviors and skills, technical skills, increased discipline, etc.); (7) This conference pointed out to me the benefits of being an engineer (e.g., social impact, personal fulfillment, daily challenge, helping others, etc.); (8) This conference showed me the importance of starting my career development planning now as a freshman; (9) This conference inspired or motivated me even more to be an engineer; (10) This conference gave me some potential connections or ideas related to a future job, internship, or co-op, or inspired me to network with others; (11) This conference taught me to ask better questions or do better investigation related to a professional topic. The results for the 825 students for the Fall 2015 and Fall 2016 are shown in Figures 4 – 14.

The results on all 11 dimensions were within a 70% - 90% Strongly Agree or Agree with the statements. This is a very positive outcome. This simple career conference concept has allowed us to open the students' knowledge of engineering and help them understand the requirements and expectations of what an engineer does in society. What we now see in the classroom is a group of students that are aware of the requirements of this field and reduction in the “complaining of the work load”.



Figure 1 Typical Conference Program

As a result of this Event:	Strongly Agree (3)	Agree (4)	Undecided (0)	Disagree (2)	Strongly Disagree (0)
1. More self-aware of employment options	87 30.00%	140 50.17%	27 9.31%	11 3.79%	9 3.03%
2. Gained new professional development skills	52 17.92%	138 47.89%	78 26.90%	19 6.51%	1 0.34%
3. Recommend event to future Freshmen	144 49.64%	125 39.66%	25 8.02%	4 1.30%	2 0.69%
4. Clearer understanding of what major to choose	86 30.18%	120 39.59%	18 5.74%	25 8.41%	4 1.30%

Figure 2 First Year Results

As a result of this Event:	Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
1. More aware of employment options in my desired major	96 32.65%	174 58.08%	13 4.42%	7 2.38%	2 0.68%
2. Know what discipline of engineering I am going to major in	71 24.25%	125 42.52%	76 25.05%	15 5.00%	2 0.68%
3. Clearer understanding of engineering discipline(s) I am interested in	118 40.14%	140 47.96%	20 6.80%	8 2.72%	3 1.02%

Figure 3 Second Year Results

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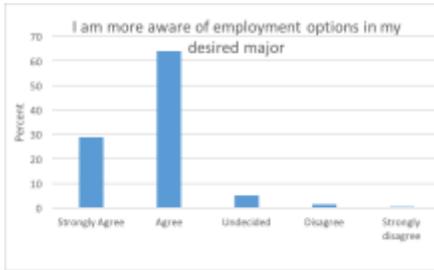


Figure 4 Question 1 Results

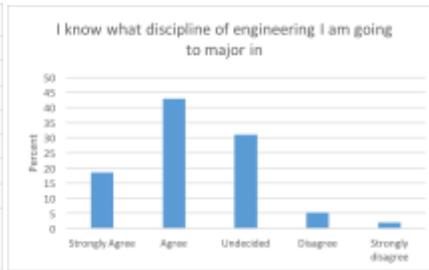


Figure 5 Question 2 Results

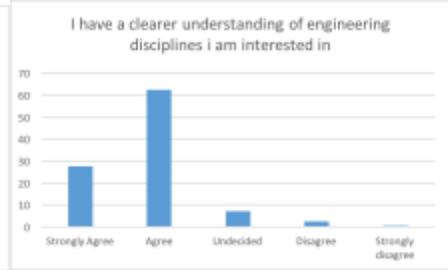


Figure 6 Question 3 Results

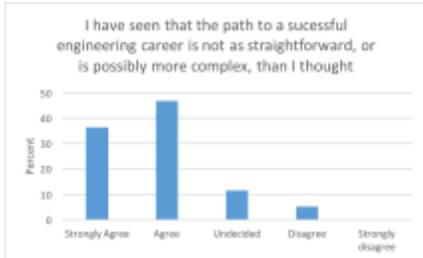


Figure 7 Question 4 Results

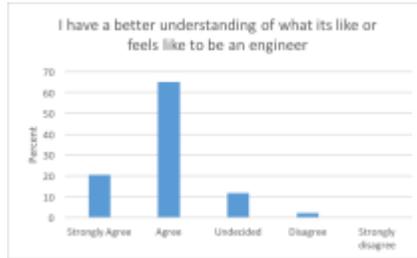


Figure 8 Question 5 Results

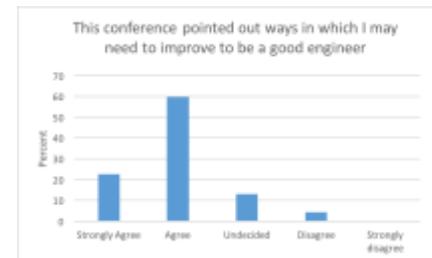


Figure 9 Question 6 Results

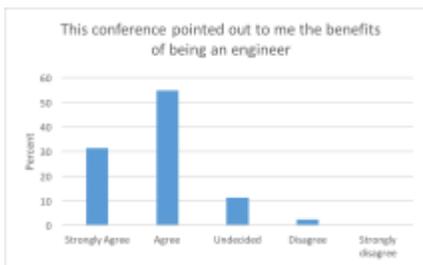


Figure 10 Question 7 Results



Figure 11 Question 8 Results

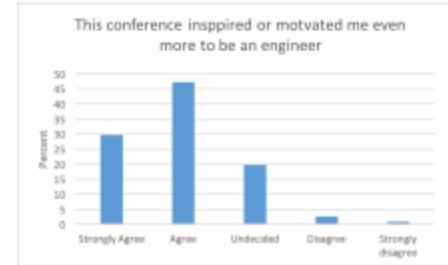


Figure 12 Question 9 Results



Figure 13 Question 10 Results



Figure 14 Question 11 Results

The final measurement of the conference success was the comments we got from the corporate speakers. Typical comments were:

- I had more students come up to me after to ask questions.
- Some students were very interactive which is a good step in their education.
- Programs like this will help them prepare for the profession.
- The students do appear to be well prepared, and were very engaged in the presentation.
- I think this conference is a great way to begin planting seeds about life after college and how to use college to make that dream job achievable - by showcasing alumni and business professionals who have been in their shoes.
- I am impressed that they are being exposed to different facets of industry at an early stage in their development.

Thus, based on the comments from the speakers, the faculty and the students we have concluded that exposing the students to the real world of engineering by having the students research their field of engineering together with input from practicing professionals has a positive impact on the student attitudes and their success in the Freshman Year.

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REFERENCES

- [1] Dan D. Budny, "The Freshman Seminar Assisting the Freshman Engineering Student's Transition From High School to College," American Society for Engineering Education 2001 Annual Conference, Albuquerque, NM, June 2001, pp. 1-7.
- [2] D.D. Budny and C. Paul, "Integrating Peer Mentoring Into the Freshman Curriculum," Proceedings 2004 IEEE/ASEE Frontiers in Education Conference, Oct. 2004, Savannah, GA.
- [3] American Library Association, Presidential Committee on Information Literacy, Final Report, American Library Association, 1989. <http://www.ala.org/ala/mgrps/divs/acrl/publications/whitepapers/presidential.cfm>.
- [4] Honora Nerz and Suzanne Weiner, "Information Competencies: A Strategic Approach," *2001 ASEE Annual Conference Proceedings*, http://www.asee.org/conference/search/00510_2001.pdf.
- [5] P. Connolly and T. Vilardi, *Writing to Learn in Mathematics and Science*, Teachers College Press, 1989.
- [6] Joan Countryman, *Writing to Learn Mathematics: Strategies That Work*, Heinemann Educational Books, Inc, 1992.
- [7] W.L. Kirkland, "Teaching Biology Through Creative Writing," *Journal of College Science Teaching*, Vol. 26, No. 4, pp. 277-279.
- [8] W.J. Mullin, "Writing in Physics," *The Physics Teacher*, Vol. 27, No. 5, pp. 342-347.
- [9] R.E. Rice, "'Scientific Writing' – A Course to Improve the Writing of Science Students," *Journal of College Science Teaching*, Vol. 27, No. 4, pp. 267-272.
- [10] J.E. Sharp, B.M. Olds, R.L. Miller, and M. Dyrud, "Four Effective Writing Strategies for Engineering Classes," *Journal of Engineering Education*, Vol. 88, No. 1, pp 53-57.
- [11] K. Walker, "Integrating Writing Instruction Into Engineering Courses: A Writing Center Model," *Journal of Engineering Education*, Vol. 89, No. 3, pp. 369-374.
- [12] S. Tobias, in Paul Connolly and Teresa Vilardi (Eds.), *Writing to Learn Mathematics and Science*, Teachers College Press, 1989.