# *Introduction to Creativity and Innovation for Engineers 1st edition Walesh Solutions Manual*

SKU: 9780133587074-SOLUTIONS

make a strong case for nurture with this book being one example. However, at this point in the book/course, I suggest encouraging lively discussion.

**1.11 SUCCESS AND SIGNIFICANCE, YOURS:** This exercise uses the success and significance concept introduced in Section 1.2 and the creativity-innovation theme of this book, before really getting into that theme, to urge students to reflect on where they are and where they want to go. Engineering students are smart and most are willing to apply themselves. Therefore, most of them have great potential. However, like Yogi Berra said, "You've got to be careful if you don't know where you're going 'cause you might not get there."

By encouraging the success-significance thinking process, you will help students decide where they want to go and how to "get there," at least for the near future. You can also provide a way to help them reconcile selfish, self-serving intents with altruistic ones. Furthermore, the process may generate some insightful and helpful discussions, within and outside of the classroom, including the role of creativity and innovation.

A similar exercise appears at the end of Chapter 7 (Exercise 7.12). Assigning that exercise after you and the students have worked through most of the book will indicate whether students have changed their approach to taking on challenges. More specifically, do they enthusiastically and productively apply one of more of the book's whole-brain tools?

**1.12 CAPABILITIES OF TOMORROW'S ENGINEER, YOU:** This exercise's purposes are set forth in the exercise description. You may want to modify the exercise in that it is designed mostly for first-year engineering students. Given the exercise's personal nature, you may decide not to require a submittal to you. Instead, consider an in-class discussion on the day the exercise is due, which enables sharing by those who want to.

This work is protected by United States copyright laws and is provided solely for the use of instructors in teaching their courses and assessing student learning. Dissemination or sale of any part of this work (including on the World Wide Web) will destroy the integrity of the work and is not permitted.

---

## CHAPTER 2: THE BRAIN – A PRIMER

**2.1 BOOK REVIEW:** I suggest giving each student wide latitude in selecting the book he/she will review because this tends to enhance the student's enthusiasm about the book review project. On the other hand, I recommend providing structure for the final product, as indicated in Task c of the instructions because this will address a common student concern and enable them to focus on reading the book and thinking about its content.

I also suggest sharing pragmatic writing tips with the students while this and other writing projects are underway. (Twenty-one such tips are offered in my book *Engineering Your Future: The Professional Practice of Engineering,* Chapter 3, "Communicating to Make Things Happen," Wiley, 2012). Clearly, a book review project has benefits for the student beyond what they learn from the book, such as researching, critical thinking, and writing.

**2.2 ORIGINS OF A FAVORED FACILITY/PRODUCT OR SERVICE:** Expect a wide array of topics. In one class, students selected the ballpoint pen, lenses for eyeglasses, and the shape of the lead unit on a high-speed train. Collectively, these assignments discovered fascinating stories of



© 2017 Pearson Education, Inc., Hoboken, NJ. All rights reserved. This material is protected under all copyright laws as they currently exist. No portion of this material may be reproduced, in any form or by any means, without permission in writing from the publisher.

persistence, luck, and creativity-innovation. I and the other students learned as a result of each submittal, and some of what I learned appears in this book so others can learn from it. Besides what each student learns about their selected topic and the creative/innovative process that produced it, this project provides him or her with widely applicable benefits such as finding and using various sources, a glimpse at the value of history, planning the writing project, critical thinking, and writing and re-writing.

**2.3 RESEARCH PAPER (INDIVIDUAL STUDENT VERSION):** As with the book selection in Exercise 2.1, I suggest giving each student wide latitude in selecting their topic and, as with that exercise, I recommend providing structure for the final product because this will diminish a common student concern and allow them to focus on their research. I also suggest sharing pragmatic writing tips with the students while this major writing project is underway.

When a student prepares a research paper early in his or her engineering studies, the resulting experience may motivate later undergraduate research, capstone course topic selection, and graduate study.

In my experience, assigning engineering students (mostly sophomores and seniors) major research projects culminates in written reports that are well done. Success factors seem to be freedom in topic selection, carefully critiquing an early draft chapter, offering writing tips, and reminding students that effective writing is necessary for successful and satisfying professional practice.

**2.4 RESEARCH PAPER (TEAM VERSION):** See the comments for Exercise 2.3. In addition, this exercise gives students practice with the way reports are commonly prepared in engineering practice, that is, by a team. With that in mind, urge each team to select an editor up front and start their report early–during the first week of the project–by, for example, drafting the table of contents, the first chapter, and a glossary.

**2.5 MUCH MORE THAN A COMPUTER:** Some say that the human mind is just a glorified computer. While a programmed computer could take on the destruction assignment oblivious to feelings, the human would be able to think of destructive means while struggling emotionally with the idea of destroying a favored object (Adams 1986).

**2.6 ONE AT A TIME:** The items will have to be recalled sequentially and not simultaneously. We cannot do two or more conscious tasks at the same time. As noted in Section 2.9.3, "While the conscious mind can think of only one topic or thing at a time, the subconscious mind is a parallel processor." This simple, quick exercise can help drive home that point for your students (Adams 1986).

**2.7 HABIT CHANGE:** As stated in the exercise, doing this exercise is likely to be a personal matter and, therefore, you are unlikely to assign it in the sense that you ask to learn the results. However, I urge you to encourage your students to try the exercise. Only the most disciplined will succeed and, when they do, they will have learned a powerful tool that will help them achieve their desired mix of success and significance, as discussed in Section 1.2. Yes, we are, as they say, creatures of habit. However, we do not have to be victims of bad habits.



© 2017 Pearson Education, Inc., Hoboken, NJ. All rights reserved. This material is protected under all copyright laws as they currently exist. No portion of this material may be reproduced, in any form or by any means, without permission in writing from the publisher.

Introduction to Creativity and Innovation for Engineers 1st edition Wilson Solutions Manual

**2.8 TAKING MULTITASKING TO TASK:** Students, and maybe you, are enthusiastic multi-taskers. And, like many of our habits, once we've acquired them, we rarely examine them. This exercise challenges students to examine their likely multi-tasking habit and ask themselves: Does this make sense?

---

## CHAPTER 3: PRELUDE TO WHOLE-BRAIN METHODS

**3.1 RECOGNIZING THE EINSTELLUNG EFFECT TRAP:** This exercise drives home the unfortunate reality of considering only old solutions to new problems. While previously successful solutions are often appropriate, habitually considering only them lulls us into omitting creative/innovative approaches. Given the potentially personal nature of this exercise, you might not ask students to submit it to you.

**3.2 FORTUITOUS ERROR OR ACCIDENT (BY OTHERS):** As noted in the exercise's introduction, it is intended to be done by individuals and to further illustrate the possible positive role of errors and accidents in the creative-innovative process. Given the search capabilities available to students, each should be able to find an example. The collection of results, if shared with everyone in the class, will prove to be enlightening and useful.

**3.3 FORTUITOUS ERROR OR ACCIDENT (BY YOU):** We can learn so much by taking action, by doing, as opposed to overly contemplating what we might do, even when the result is an error or accident (hopefully not serious). This exercise stresses that concept and sharing of student results could provide some interesting, insightful, and helpful ideas.

**3.4 YOUR TURN TO FACILITATE:** Frankly, having sat through many fruitless -- or at best ineffective meetings -- like those referred to in this exercise, my hope is that the exercise will plant in student minds that this is not how things have to be. One way to increase meeting effectiveness, especially when the group is faced with a major challenge, is to use an outside facilitator. Ample facilitation advice is offered in Section 3.8. High profile meetings aside, for a comprehensive discussion of meeting orchestration, see my book *Engineering Your Future: The Professional Practice of Engineering,* Chapter 4, "Developing Relationships," (Wiley, 2012).

**3.5 HOW DO WE KNOW WHEN TO BE CREATIVE/INNOVATIVE?** Thinking in terms of personal and organizational situations, we might be motivated to be much more creative/innovative when:

- We are bored, individually or organizationally
- An "insurmountable" challenge threatens the health and well being of many
- We want to distinguish ourselves or our organizations
- Resources are declining and we have to do more with less
- We just received an unexpected windfall and want to use it wisely
- Our organization enjoys continued success and we are being lulled into thinking that this will go on forever



© 2017 Pearson Education, Inc., Hoboken, NJ. All rights reserved. This material is protected under all copyright laws as they currently exist. No portion of this material may be reproduced, in any form or by any means, without permission in writing from the publisher.

Introduction to Creativity and Innovation for Engineers 1st edition Wilson Solutions Manual