



[pedagogical]

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Building a Solutions Manual as a Pedagogical Tool

Open Collaboration^{*†}

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Abstract

This is a theoretical proposal built upon some teaching and learning methodologies and written as an Idea Report.

keywords: solutions manual, mathematics, physics, teaching, learning, peer instruction, problem-based learning, flipped classroom

Introduction

1. This is a *theoretical* **Idea Report** written to promote and foster collaborative learning through some blended teaching strategies.
2. Students can help each other by **Peer Instruction** [1–3], and jointly build a **Solutions Manual** in *Mathematics* and *Physics* disciplines.
3. The purposes are two-fold: to create a *Solutions Manual* to problems within a technical book, and to engage students in **collaborative learning**.

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The Methodologies

4. For this proposal, the following methodologies turn out to be very convenient to use, namely **Problem Based Learning** [4–7], **Flipped Classroom** [8–12], and **Peer Instruction** [1–3].
5. This strategy is expected to work both in *online* and *on-campus* classes.

Building a Solutions Manual

6. In the beginning of a class (mathematics or physics, for example), Teacher A defines the set of technical books (that will be considered in the discipline), $B = \{B_i : i \in \mathbb{N}\}$, for $\mathbb{N} = \{1, 2, 3, \dots\}$.
7. Each student is assigned to answer different questions from the i -th book (B_i).
8. The set B is sufficiently large enough to contain a number of exercises. Statistically speaking, there will be room for all levels of difficulty, i.e., easy, medium, and difficult questions.

Final Remarks

9. One clear benefit of our proposal is that, at the end, a (*partial*) **Solutions Manual** is built.
10. Subsequently (9), other students can access a number of *Solutions Manuals* from a variety of disciplines, thereafter.
11. (9) can be accomplished as an evaluated activity.
12. In addition to (9), there are more benefits, that is, students can collaborate while trying to answer their own assigned questions.
13. It is worthwhile to mention that **there are healthy ways of using a Solutions Manual**.

Open Invitation

Please *review*, *add* content, and **co-author** this article. *Join* the **Open Collaboration**. Send your contribution to mplobo@uft.edu.br.

Ethical conduct of research

This original work was pre-registered under the OSF Preprints [13], please cite it accordingly [14]. This will ensure that researches are conducted with integrity and intellectual honesty at all times and by all means.

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