

Rafael Torok Capstone

Annotated Bibliography

Byrne, Matthew. "KSP Curriculum." *Google Slides*, Google, 15 May 2018, docs.google.com/presentation/d/1gyjRcTz7ghn8zhCnz_JXEFvIZJNWgqt--yODsUhnmek/edit?slide=id.g3ade1f600b_0_29#slide=id.g3ade1f600b_0_29.

This is an example KSP curriculum that the original SLA KSP curriculum was inspired by. Some aspects of it are very good, and I plan to imitate them; for example, the process for designing a mission is quite close to the way I would do it myself. I will draw heavy inspiration from that aspect of this curriculum. Other aspects, however, are much less helpful to students. I can see how students may not have been engaged. I will certainly change the section where the slides go over seemingly every part in the game. This is simply not helpful; it overwhelms the students. In short, this curriculum will serve as heavy inspiration for my curriculum in some areas. In other areas, not so much.

Sharrow, Travis. "Reaching for the Stars: Is Kerbal Space Program (KSP) Educational?" *SoftHandTech*, 10 Apr. 2025, softhandtech.com/is-ksp-educational/.

This source describes some of the ways that Kerbal Space Program is educational. Using these principles that are outlined in this source, I will be able to apply to my KSP curriculum a number of different ideas. These will enable me to further my ultimate goal of achieving intuition for both student and instructor. One of the principles I will use is that Kerbal Space Program has a quite accurate physics that can be easily used to generate intuition about orbital mechanics. I will also use the fact that nearly every part in KSP is an analog to a part of a real-world rocket or spacecraft to incidentally teach about the history of spaceflight, although it is not my main focus.

Mallory, Stephen. "To the MUN: Kerbal Space Program as Playful, Educational Experience." *SpringerLink*, Springer International Publishing, 16 June 2019, link.springer.com/chapter/10.1007/978-3-030-22602-2_24.

This paper describes some of the ways that KSP can easily be adapted from the originally entertainment-focused game that it was designed as into a naturally flowing educational game. It indicated how the design of KSP easily allows the student to be drawn into the flow of the game, a state which is exceptionally conducive to learning when in a game such as KSP, which is inherently educational with its content. I plan to use the goals of the game to guide the student to this state of flow. As not all students will be able to connect with it and find the flow, I will make the curriculum work acceptably for a student who cannot find that state.

Dolan, Erin L, and James P Collins. "We Must Teach More Effectively: Here Are Four Ways to Get Started." *Molecular Biology of the Cell*, U.S. National Library of Medicine, 15 June 2015, [pmc.ncbi.nlm.nih.gov/articles/PMC4462934/](https://pubmed.ncbi.nlm.nih.gov/articles/PMC4462934/).

This article spells out four good strategies I plan to use when creating the curriculum. It includes Backwards course design, giving students messy problems, expecting students to learn more than facts, and expecting students to talk and collaborate with each other. Backwards course design is the practice of planning the curriculum starting from what you want the students to come away from the course learning, and building to that point as opposed to starting at their current level of understanding and building up somewhat aimlessly. Messy problems in this context are those that require more than factual answers and have a non-standard approach to the answers. I intend to include these in the discussion. The article also touches on teaching more than facts, and on collaborating with peers. I intend to include these by having students solve messy problems in groups.

Романенко, Павло. "Гейміфікація при вивченні небесної механіки за допомогою Kerbal Space Program." *Aerospace Technic and Technology*, no. 1, 23 Jan. 2025, pp. 59-69, <https://doi.org/10.32620/akt.2025.1.06>.

(Translated to english)

This will inform my reasoning for using Kerbal Space Program. This is another point of evidence toward the incredible educational potential that KSP has. It mentions how the gamification and slight simplification of orbital mechanics within the game create a very useful tool with enough accessibility to let a layperson without much experience in orbital mechanics understand without compromising its educational value. The instant feedback afforded by KSP is touched on as a point of value. It, of course, talks about the limitations of KSP, namely its lack of 3-body simulations. This limitation is implemented as to make it simultaneously very accurate on small and large scales, and in simplified situations. In short, I will use this as a guide to where KSP's usefulness as a teaching tool ends.

Prior, James. "Good Teaching Practices: 17 Habits of Highly Effective Teachers." *DoTEFL*, 6 Apr. 2025, www.dotefl.com/good-teaching-practices/.

This source is a collection of teaching advice I plan to implement in my teaching. Some of the points I will actively keep in mind while teaching are the following: being flexible and organized, engaging students, communicating clearly, and preparing well. I will be sure to be flexible because things will go wrong. I can't expect perfection, so I have to prepare for the flaws. This ties into preparation, as preparation is a good way to adapt to the unexpected. Having a good plan for a lesson and unit can be essential for having a cohesive learning experience. In addition, being organized and clearly

communicating are essential for the students to understand the lessons and assignments. This will be a useful source for informing my teaching. Many of these points may seem obvious, but it's essential for me to keep them all in mind.

Perkins, David. *Making Learning Whole: How Seven Principles of Teaching Can Transform Education*. Jossey-Bass, 2013.

This book will influence my approach to teaching and designing the curriculum. Like a number of my other sources, it emphasizes agency in the classroom. A student can more easily be engaged with a lesson if they feel like they are doing something, and not simply going through the motions. In the past, the KSP curriculum was very procedural in the sense that students were told essentially exactly what to do and how to do it. I want to change that in my curriculum. This book will cover some of the big-picture design needs that I have when designing the curriculum.

Pahomov, Larissa. *Authentic Learning in the Digital Age: Engaging Students through Inquiry*. ASCD, 2014.

This book will inform my use of technology in the curriculum. As KSP is a piece of software, there will necessarily be a liberal presence of technology in the classroom while it is being taught. I will quite possibly use this book's advice on using technology to make students' reflections shared and have students respond to them. I also will use much of the book's other advice. For instance, I will intentionally let students have a lot of control over what they do in KSP. I think that a problem with the KSP curriculum in the past was a lack of control.

Lehmann, Chris, and Zac Chase. *Building School 2.0: How to Create the Schools We Need*. Jossey-Bass, 2015.

I will use this book to inform my approach in the classroom. There are a few concepts from it I will keep in mind. For example, I will be sure to be silly. I will do this by incorporating humor into my curriculum, and into my teaching. I will use this book to guide my teaching, and make it fit with the SLA philosophy. Parts will be easier than others. For instance, it will be easier for me to connect with students, as I am, in most other contexts, their classmate and friend. It will however potentially be difficult to have authority over the classroom. I don't anticipate this being too much of a problem due to the mutual respect my classmates have for each other.