Integrating the ADDIE Model into STEM Didactics: Insights from a Professional Learning Community

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During our STEM didactics course (LeBlanc, Lirette-Pitre, & Richard, 2023; LeBlanc & Lirette-Pitre, 2022), we had to plan a STEM learning situation focus on a meaningful issue for high school students in New Brunswick. This situation also had to include two rich learning tasks (RLTs), one in mathematics and one in science, which we co-constructed as an interdisciplinary team of preservice teachers with backgrounds in science and mathematics. The project was carried out following the phases of the ADDIE model (analysis, design, development, implementation, and evaluation) (Branch, 2009) and was enhanced through our active involvement in a professional learning community (Robert & Pruitt, 2009). This communication seeks to share our experience with the use of this model and examine the impact of engaging in a professional learning community on our higher education experience.

Analysis

Before starting the project, we were informed that the situation had to meet the following criteria: (1) include two rich learning tasks (RLTs) (Flewelling & Higginson, 2002), one in mathematics and one in science; (2) be co-constructed by an interdisciplinary team of five education students from mathematics and science backgrounds; and (3) incorporate feedback from members of a professional learning community during the various design phases to improve the situation. Accordingly, the class was divided into two groups: the first consisted of three science students and two mathematics students, and the second of three mathematics students and two science students.

During the analysis phase, we brainstormed as a team to determine the purpose of the learning situation, the guidelines surrounding it, and its context. Thus, we created a situation entitled "Ma classe écoresponsable" (My eco-responsible classroom), with the primary objective of empowering students to find solutions for making their classrooms more sustainable and, on a small scale, to fight against climate change. The second group created a situation entitled "Ma planète, mes actions" (My planet, my actions), with the primary objective of helping students understand climate issues related to greenhouse gases and developing the ability to critically interpret data presented on social media. The diversity of perspectives within our team enriched our collaboration and facilitated the integration of various contents from the science and mathematics curricula, as well as ministerial documents, into the aims defined in the previous phase. It is worth noting that we went back and forth between the analysis and the design phases several times to ensure strong alignment between our learning situation, the expectations of the educational system, and the learning outcomes of our STEM didactics course.

Design

The professional learning community (PLC) was also established during the design phase and was utilized in all the other phases of the ADDIE model. The PLC, composed of a high school mathematics and science teacher, a mathematics and science pedagogical agent, our two didactics professors, and our classmates from the second group, was tasked with providing us with food for thought at various stages to help us improve our learning situation. The feedback received from various members of our PLC led us to revisit the design, development, implementation and evaluation phases at different times. Thus, formative evaluation was central to our design process. The various PLC members were involved at key moments during the different phases. We met with the pedagogical agent at the core of the design phase. He provided us with his expertise while challenging our choices in relation to the curricula objectives and pushing our didactic thinking even further. This influenced our design and had a positive impact on the development phase.

Development

During the development phase, we demonstrated positive interdependence by drawing on the knowledge and skills of each member of our team. At this point, we recognized the

value of having an interdisciplinary team to create authentic and diverse STEM learning situations. Once the pedagogical and didactic material had been constructed, we moved on to “implementation”.

“Implementation” and Evaluation

Due to the constraints of the course, we were unable to test our situation in a real classroom context. However, we did share a condensed version of our situation with our classmates and professors to gain their perspectives and enrich our learning situation. While nothing can replace a classroom with high school students, this exercise nonetheless allowed us to refine some of the less clear aspects. After the classroom “implementation”, we had a meeting with the mathematics and science teacher. Her comments, shaped by her field experience, focused more on the practical implementation of our learning situation in the classroom. Finally, we refined our learning situation one last time before submitting it to our two professors for summative evaluation, completing the final phase of the ADDIE model.

In this presentation, we will share our experience as preservice teachers with this model and discuss the impact of involving the professional learning community in our university training. We will also offer insights and suggestions for implementing such a practice in future didactics courses.

Type of presentation: in person

Type of communication: practical examples of interdisciplinary teaching and learning

References

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