

MODELING INSTRUCTIONAL STRATEGIES FOR PRESERVICE TEACHERS: USING TECHNOLOGY IN THE CLASSROOM TO ENHANCE STUDENT LEARNING AND ENGAGEMENT

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Abstract

Modeling is an important instructional strategy that is employed in the EC-12 classroom, but is often missing from the collegiate classroom where preservice teachers are training to become those PK-12 teachers (Watson & Bradley, 2009). In an introductory education course, preservice teachers were given an assignment with few parameters. They were to use technology to define levels of Bloom's Taxonomy for a general audience. There were multiple purposes for this assignment. 1) For preservice teachers to have the ability to expand upon and demonstrate their knowledge of Bloom's Taxonomy; 2) to work at the synthesis level using technology; and 3) to have the opportunity to share their knowledge with a general audience of non-educators using "lay-language." This article details three different preservice teacher engagements with this assignment, their perceptions of their own learning and growth, and how they plan to use this in their future classrooms.

Keywords: modeling, instructional strategies, preservice teachers, technology in the classroom, student learning

Introduction

While in teacher education courses, preservice teachers are introduced to multiple instructional methodologies; however, in a majority of circumstances, they never have the opportunity to employ them. According to Watson and Bradley (2009), “In most teacher education courses, instructional strategies are merely listed and explained. Students rarely have the opportunity to see these strategies in use until they become student teachers. What better way to teach secondary instructional strategies to pre-service teachers than by modeling these strategies using teacher education content?” (p. 3). In an effort to enhance instructional pedagogy within an introductory education course, a teacher employed using multiple instructional techniques within the course while having the preservice teachers participate in these activities as both students and teacher. For one particular assignment, preservice teachers were given few parameters. They were to utilize technology to define levels of Bloom’s Taxonomy for a general audience. In this assignment, preservice teachers were expected to: expand upon and demonstrate their knowledge of Bloom’s Taxonomy; 2) work at the synthesis level using technology; and 3) share their knowledge with a general audience of non-educators without speaking in “teacherese.” This article follows four different preservice teachers as they work through this assignment. In addition, students’ unique perceptions of learning and growth are noted.

Review of Literature

The following review of literature will briefly explore three different facets of teacher education: 1) using Bloom’s Taxonomy in teacher education, 2) utilizing technology in education as a profession, and 3) sharing knowledge in teacher education in a manner easily understood by those outside the discipline. All three facets are examined through the lens of preservice teachers looking toward their future classrooms.

Bloom’s Taxonomy in Teacher Education

Bloom’s Taxonomy is a learning framework that was developed by a committee chaired by Dr. Benjamin Bloom in 1956. This hierarchical model is comprised of six domains: knowledge, comprehension, application, analysis, synthesis, and evaluation (Persaud, 2018). In 2001, a revised version of Bloom’s Taxonomy was published that renamed all six levels and reorganized the top two levels. The renaming moved from a noun based model to a verb based model. The revised models domains include: remember, understand, apply, analyze, evaluate, and create. In both the original taxonomy and the revised taxonomy, the domains move from the concrete to the abstract or the simple to the complex (Armstrong, 2019). Building along these lines, the domains in both models are:

- *Knowledge/Remember*: The ability to recall information and processes. The students do not manipulate the information in any way. It is rote memorization. Some examples of this include citing definitions, memorizing facts and figures, and recognizing examples.
- *Comprehension/Understand*: The ability to demonstrate an understanding of the information presented. Students can transform, reorganize, or interpret the information. Some examples include explaining information in their own words, comparing information, and stating the main idea of material.
- *Application/Apply*: The ability to use information to solve a problem with one correct answer. The students can relate in the instruction to find a solution or an answer. Some examples include applying rules or formulas to solve problems, using acquired knowledge to investigate possible solutions, and demonstrating principles that have been taught.
- *Analysis/Analyze*: The ability to identify reasons and motives. The students can make inferences, analyze conclusions, and use critical thinking. Some examples include differentiating between facts and opinions, drawing conclusions based on experiments, and analyzing literature to make determinations.
- *Synthesis/Create*: The ability to create something new based on knowledge gained or learned. The students have the ability to use divergent and original thinking. Some examples include proposing ideas in an imaginary setting, designing something based on previous knowledge, or creating an original plan or story.
- *Evaluation/Evaluate*: The ability to judge the merits of ideas or information. The students can offer informed opinions or apply standards to make decisions. Some examples include judging other students creations, debating two sides of an argument, or offering an informed opinion about information that has been previously learned (Heick, 2018).

Technology in Teacher Education

Technology is being used daily in the EC-12 classroom, but not all teachers are using it in the same way (Friedman, 2019). Within teacher preparation programs, there is a continued push for the implementation of technology in teaching, but often it is done from a presentation standpoint where the teacher uses the technology, and not a learner standpoint where the

students engage with the technology for learning. This is being transferred to the schools and is most evident in low-income schools (Graves & Bowers, 2018). Teachers and teacher educators agree that technology integration is important in education, they often still struggle with how to do this. They are using technology for communication, personal, and often work submission purposes, but they have yet to apply technology to their teaching or for student learning (Alenezi, 2017; McVee, Bailey, & Shanahan, 2008). This is for a multitude of reasons from including comfort level, planning time, security restrictions, and lack of resources. Additionally, the EC-12 classrooms are often ahead of university classrooms in their technology capabilities. This makes it difficult at times for university faculty to model appropriate EC-12 classroom technology within the confines of the university.

Utilizing Technology in the Profession

Daily, the landscape of education and technology is evolving. As technology infiltrates all aspects of both the education profession and teacher education specifically, there is often a fear by teacher educators that pedagogical practices that do not involve technology will be lost and/or forgotten. (Oriji & Amadi, 2016). It is imperative that preservice teachers are exposed not only to the best integrative practices of instruction and technology; but also to the potential impact the effective use of technology will have on the academic success of their future students. “Effective teaching requires not only mastery of the subject content, pedagogical techniques, and technological affordances, but also how to achieve a successful dynamic interaction between those three factors” (Crompton, 2015, p. 82).

Sharing Knowledge in Teacher Education

Educators often have their own language known more commonly as “educationese” (Nemko, 2016). Just as with doctors, where often patients cannot understand what is being said to them (Lin, 2011), teachers often have the same problem when they use educational jargon when speaking to parents or to the general public. When educationese is used, it is possible that other educators may not understand what is being said. Although terms such as differentiation, pedagogy, formative assessment, authentic assessment, data-driven, scaffolding, etc. are important to student success, do all educators put the same meaning on these terms? To further complicate matters, it should be noted, there are multiple websites dedicated to explaining educationese or educational jargon; not all of which agree on the meanings of such words.

Teaching preservice educators to use educational jargon appropriately within educational settings is important. It is language that helps educators to more distinctly define what they are saying (Heick, 2018). The concern is that educators can only converse with other educators when using this type of jargon. It is imperative that educators are able to communicate with parents and the general public about education in a manner and through a language that is clearly understood. Therefore, teachers should be able to give those outside the discipline meanings of educational jargon in known terms. When educational terms are used, clear definitions and explicit examples will help ensure all stakeholders are accurately informed. (Heick, 2018).

Assignment Participation

Subsequent to instruction on Bloom’s Taxonomy (using classroom techniques and activities at the knowledge/remember; comprehension/understand; application/apply; and analysis/analyze levels), preservice teachers were asked to express their knowledge at the synthesis/create level. Preservice teachers were given very few parameters for the assignment. The instructions for this assignment were left intentionally vague, giving the preservice teachers the opportunity to expand and explore the assignment. Partnered with a colleague pursuing a similar certification field, dyads were told to find a way to teach Bloom’s Taxonomy to a lay person. Each team was to cover all six levels, define all six levels, and produce a video to demonstrate each level. They then presented their videos to the class. During each presentation, the other preservice teachers in the class were asked to evaluate each presentation. The evaluation was conducted via a rubric that each member of the class was completed. The purpose of this aspect of the assignment was to “force” the preservice teachers to examine the videos from both a synthesis/create level and evaluation/evaluate level.

The following four exemplars were prepared by undergraduate, preservice teachers after participating in this assignment. Each exemplar addressed: 1) what they did within the parameters of the assignment; and 2) what they learned from participating in the assignment. (Please note the writing and voice of the exemplars are the students’ own words).

Exemplar 1

As a preservice teacher, we walk a very thin line between being a teacher and still being a college student. Therefore,

we are in that place of learning “educationese” while also feeling sometimes like the confused parent trying to track what a teacher is saying. However, in our education course, we have used a Bloom’s Taxonomy project to bridge the gap between learning something and teaching something.

What I did in the process.

At first, Bloom’s Taxonomy was just a term used to provide knowledge to us as college students entering the field of education. Instead of simply reading from a textbook or listening to a lecture on Bloom’s Taxonomy, we were given instructions to take what we knew and develop a video to teach our peers and others about Bloom’s Taxonomy. We then evaluated our peers on their presentations and teaching, while at the same time reflecting on our own work throughout this process.

The Bloom’s Taxonomy video project highly appealed to my right-brained personality and I was eager to get started, to show my peers my work; and more importantly, see their work. I was able to choose the technology I wanted to use and the style in which I wanted to present it. The video I created defining Bloom’s Taxonomy allowed me to take what I learned and teach it to others by sharing it. Through scenes from *Grey’s Anatomy* and the iMovie App, I was able to explain the levels of Bloom’s Taxonomy. My fellow peers provided other ways to explain and present it through their own videos. Individually and collectively, we were able to take ideas, extend upon ideas, discuss each other’s ideas and grow.

Completing this video allowed me to be a college student synthesizing Bloom’s Taxonomy through while at the same time, being a teacher as I shared it with my peers for evaluation. Additionally, I was able to look through the lens of a parent (who was perhaps less familiar with the “educationese” of Bloom’s) as they might learn to understand Bloom’s Taxonomy in layman’s terms. In other words, projects like this helped me bridge the learning gap between my current role as a college student and my future role as a classroom teacher.

What I learned from the process.

The most important thing that I learned was that simply being given content does not mean something has been truly learned. On Day 1, if my professor had given me the six levels of Bloom’s Taxonomy and instructed me to “know” them because they would be asked on a test, I would have memorized the information and even told myself I had learned what Bloom’s Taxonomy is. However, I do not feel that I truly learned Bloom’s Taxonomy until I *did* Bloom’s Taxonomy. As new educators, I believe it is imperative to understand ALL levels of Bloom’s. We cannot stand at the front of the classroom and project terms and ideas onto a whiteboard and claim that our students “have it”. The lower levels of Bloom’s are necessary to build a solid foundation, but remaining there will never provide my students the confidence they need to excel.

Additionally, I learned that yes, Bloom’s Taxonomy has a set hierarchy; however, I do not believe the steps necessarily need to be followed in order. With this specific project, the synthesis level came after knowledge. Once I was able to create from what I knew, I was able to comprehend the process better and see the importance of scaffolding skills. Bloom’s Taxonomy is a model and method for instruction but despite its published research, wide usage and popularity, it is not a set-in-stone, one-way method, but it does work well when all levels are used.

In 2019, technology is not only a luxury, but it is also a necessity. In a technology-driven society, preservice and current teachers cannot escape the reality that technology integration is important to the learning process. Having technology present in the classroom, however, does not mean technology is being integrated for learning purposes. I have been present in college courses where technology has only been used to give information (i.e. document cameras and PowerPoint presentations). I have also been in grade-school classrooms where technology again is only being used to present information, or worse, used to occupy students (i.e. games). Technology integration is not a replacement of the teacher or the teaching being done in the classroom, but rather it is something implemented as a tool to enhance a student’s learning and engage them. For teachers, this means teaching our students safe ways to apply or further their learning with technological tools.

For the project, I completed in my college-level course on Bloom’s Taxonomy, I was not given any specifics on what technology to use, but only told it had to be a video format. Interestingly, many of my peers and myself used a variety of technology applications and tools in the videos we created. Some students used tools that allowed for interaction throughout the presentation, some had apps that sped up or slowed down specific parts of the video, some used phones, some used laptops, etc. What I learned from this is that, again, students think differently. If teachers allow their students to use technology—something they are naturally intrigued by—to take their learning to a deeper level, students will amaze us in ways we might not even expect! In addition, technology provides a way for students to illustrate their knowledge.

Lastly, an important factor I learned from working with technology is that I have to accept the fact that technology is always changing. I am not familiar or comfortable with all tools or methods of technology. Therefore, it is important to me to be willing to read up on and try out new technologies not only for my own use, but to safely introduce it to my students as well.

Exemplar 2

What I did in the process.

During this course, I have realized that not only do I have to think as a student but as a teacher as well. For my Bloom's Taxonomy project, my partner and I decided to make a video using Imovie. Imovie is a video editing software provided by Apple for their products. In this video, we knew that one of the objectives we wanted to incorporate was pop culture. Pop culture is something that I wanted to incorporate because children are able to be more focused and interested. After going through many shows we finally agreed upon "The Bachelorette."

Making our video have examples of Bloom's Taxonomy for the general public to understand was a prominent key for my partner and I. Once we accumulated all of the video clips that we needed, the next step was to put them together to make our final video. Thinking that this was going to be the easiest part of our project we began the process of using Imovie. However, we came to a quick realization that we had no idea how to use a video editing software. Personally speaking, I use technology on an everyday basis, which made me believe that I was highly familiar with technology. The first mistake we made was recording the video clips we needed on a non-apple product. After understanding our first dilemma we recorded our video clips again on an Iphone which would then be sent to my Macbook. Soon after uploading all of our videos to Imovie we were able to add freeze frames in which we would add all of the descriptions of the video clips for each stage. After hours of working on the video, I finally had our final product for the Bloom's Taxonomy project. The only thing left to complete our project was trying to sort out how we were going to present our video if Imovie was not a software which is usable on many computers.

What I learned from the process.

While doing this project, I gained a lot of experience. Learning about how limited my knowledge was on technology was an eye-opener. My partner and I learned that Imovie was a good video editing software program. Although the trouble we had was with uploading the video onto a site where we could show our video. We later figured out that Youtube was the best place to upload our video.

When it came time for the viewing of everyone's videos, I instantly became aware of many things I could have done differently. Unfortunately, I realized that although my partner and I did give examples of each level we did not give an explanation of the levels of Bloom's Taxonomy in our video project. Despite the fact that I realized what I did wrong, in that moment it was a great experience to understand what I could do better next time, or in the future. I have learned that it is imperative for preservice teachers to know the correct terminology and explanations for each level. In addition, it is important to learn how to interpret the levels of Bloom's Taxonomy for people, parents essentially, in lay-terms.

Additionally, when the last group presented their video project in Spanish, I came to a realization that I had never had someone explain any teacher terminology in Spanish or another language. As a parent who does not fully understand English, being presented with "educationese" can be extremely overwhelming not only for the parent but the student as well. For example, a bilingual child many times finds themselves trying to translate what their teacher or anyone is trying to say to their parents or guardian. As a young child translating words or phrases that even they have not heard is something very difficult to deal with, creating anxiety and potentially raising their affective filter. This project enlightened the lack of explanations we have, over what we are trying to or will be trying to convey, in another language.

Exemplar 3

What we did in the process.

For our Bloom's Taxonomy project, the pair of us elected to take a risk by choosing a technology tool we were unfamiliar with - Pear Deck. Pear Deck is an educational technology tool that engages students by allowing them to interact with PowerPoint slides that the educator controls. The students' interactions are viewable only to the educator. The instant feedback from students when using Pear Deck advises the educator of how well the students are grasping the material based on their responses.

As we began to navigate the features of Pear Deck, we discovered that we were able to incorporate activities with each of the stages of Bloom's Taxonomy. Because we chose Pear Deck as our technology tool, we chose our theme of the project to be pears. We explained each tier of the Bloom's Taxonomy through video, and we followed up with activities for each one.

- For the knowledge stage, we asked a basic question to the students: "What is a pear?" Following the question was a set of three answer choices the students could select: "Fruit", "Vegetable", or "Neither". We received instant feedback from the students, and we quickly reviewed their responses before moving onto the next stage of Bloom's Taxonomy.
- For the comprehension stage, we wanted to observe if the students understood the life of a pear. We asked the students to complete a matching activity where they were instructed to connect a line from the term to its proper stage of life. For example, the "seed" of the pear was to be matched to "the first stage". We received the interactions and moved onto the application stage.
- For the application stage, our activity was to allow the students to implement a plan for how they intend to grow and care for a pear tree. Some of the responses we were searching for included: knowing when to harvest the pear, gathering materials, preparing the soil, carefully planting the seed in a pot, watering the seed, and transporting the seed to well-soiled ground for further growth, water, and sunlight. Once we gathered and viewed the responses, we introduced our analysis activity.
- For the analysis stage, the students were instructed to compare and contrast the similarities and differences between two types of pears: an Anjou pear, and a Bosc pear. The students could simply type in their answers under each compare and contrast column. We were searching for responses regarding the pears' size, shape, color, or any other features the students could identify.
- Next, we entered the synthesis stage where students are encouraged to create something new. Our idea was to ask the students to invent their own pear sauce. We provided a brain map for the students to type in flavors and measurements they wanted to use to make their pear sauce.
- The last stage of Bloom's Taxonomy is evaluation. We asked our audience to evaluate and critique their peers' pear sauce recipes.

What we learned from the process.

A valuable takeaway from this process is that the lower-level cognitive skills prepare the platform for building higher-order thinking. Our professor taught Bloom's Taxonomy by mirroring each of the Bloom's Taxonomy stages. She allowed us to first become comfortable with basic terms and definitions before playing with them and dissecting their different parts. When we became familiar with understanding the terms, applying them in situations, and analyzing them, she allowed us to experiment with them and produce something original through the use of technology.

Another valuable takeaway from this process was when the synthesis level was reached, students provided a multitude of ideas for tackling the same task. Each group offered fresh suggestions of how to teach Bloom's Taxonomy with technology, and as a result, stretched and expanded our intelligence in the synthesis level itself. Overall, we have learned that introducing the very basic levels of learning and expanding on them can result in acquiring deeper levels of cognitive skills.

Exemplar 4

What we did in the process.

In this assignment, we chose to create our video using our phones because we know that in this age of technology most students have access to a phone. We created a video using two applications and the camera on our phone. The first technology application used was Hyperlapse which allowed us to take several pictures and create a time-lapse video of the artwork. We also went on a scavenger hunt on campus to find several students and professors that would participate in each of the six levels of Bloom's Taxonomy. We recorded our interaction with them using the camera. We also used the camera to take photographs of our definitions and explanations. The second application we used was iMovie where we compiled all of our pictures and videos to create our presentation. Since iMovie is an Apple application, we chose to upload our presentation to a private YouTube channel so that it could be played on any electronic device.

Our presentation was titled "Bloom's Taxonomy Explained: The Pencil Edition." We walked through the six levels of Bloom's in order from the knowledge level up to the evaluation level. We initially defined each level of Bloom's using layman's language that was easier to understand, rather than "teacherese." Then we moved on to a video in which we asked a person a question, or we actively demonstrated an activity, that was appropriate for each level. We closed each section with an

explanation of why it was an example of that level so that a non-teacher would have a clear understanding of it. When there was no speaking we chose to play an easy jazz that was fun to listen to and engages the mind.

- The first level of Bloom's Taxonomy is knowledge. We showed a professor a pencil and asked "What is this called?" She replied, "A Pencil". Then the explanation that followed was they recalled the name of the pencil and did not need to research it.
- The second level of Bloom's is comprehension. We asked a student "What are some uses for a pencil?" She gave us examples of writing a story, writing a letter, drawing, and taking notes. The explanation that followed stated that they understand the "how" to use the pencil.
- For application, we asked a student to write their name. We then explained they can only write one answer because that is their name.
- For the analysis level, we asked several people "If I were to give you this pencil, how would you use it?" This section had many answers: write a letter to their son, doodling, making a list of the most interesting things they had seen today, taking notes, solving math problems, write a letter to their sister, and write a story. After each answer we showed a brief video showing someone doing these things. Then at the end of these we explained as shown there are many answers to how they would use the pencil because it is based on their desires.
- The fifth level of Bloom's taxonomy is synthesis. We used a time-lapse video of an original piece of artwork being created using a pencil for the entire thing.
- For the final level, evaluation, we used an argument that we still need a pencil today because there are so many ways to use it.

What we learned from the process.

We learned to get out of our comfort zone by seeking people outside of our class for help with the project. We also discovered that it is fine to be told no and to work with what you have. We found that by working at the synthesis and evaluation levels of Bloom's Taxonomy, we were able to develop a deeper understanding of each level and how to explain them, as well as how to demonstrate them. These tools will be very helpful when we get into the classroom, in writing lesson plans, and as we execute the lessons with our students.

Additionally, we discovered that we cannot always speak in "teacherese," but that we must also translate in such a way that parents are able to understand and follow their student's progress. Effective communication is essential to building strong parent-teacher, student-teacher, and parent-student relationships. We need to understand that most parents we speak to are not fellow teachers, therefore communication needs to be clear and on a level that they understand. If we constantly use technical talk and teacher acronyms during meeting the parents may struggle and become confused with what we are trying to express. Even if they should know what the acronyms stand for, they may not fully understand what they mean. We as educators and future educators have to keep this in mind when talking with parents. We need to help them understand what we are saying so that we can share in the mission of what is best for their child. This also applies towards our students, as we must make sure the activities done and the language used is developmentally appropriate. The language used for a kindergartner would differ from the language used with a high-schooler or college student. We need to make sure our students are grasping what is being taught.

Implications for Further Research and Conclusions

Future research could be done examining the potential impacts this assignment will have on preservice teachers when they move into the EC-12 classroom. Additional research might also follow these preservice teachers into their future classrooms to see how and when they use the methodologies taught through this assignment as well as the impact these teaching methods have on preservice teacher instructional pedagogical knowledge.

Modeling instructional pedagogies for the preservice teachers in university teacher education classrooms is an important aspect of helping preservice teachers internalize authentic pedagogical behaviors before they enter into their future EC-12 classrooms (Watson & Bradley, 2009). Within university teacher education classrooms, instructional strategies are often discussed, but preservice teachers may not have the explicit instruction in how to use them or even had the opportunity to explore and participate in them as students and as teachers. By giving preservice teachers the opportunity to experience a synthesis/create level activity as a student as well as using it as a teacher to share information with non-educators, these preservice teachers gained the experience in using this teaching methodology first hand. Additionally, they gained additional work in presenting educational information to a non-educational population. When moving into the EC-12 classroom, this experience will not only help them with instructional strategies but will also help them learn important communication methods

for speaking about educational topics with parents and the public in lay terms.

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