



The Curious Mind: Fostering Critical and Creative Thinking in Students

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SPEAKERS

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Tierney King 00:01

This is the Faculty Focus Live podcast. This episode is sponsored by the Teaching Professor Online Conference - join us from the comfort of your own home and transform how you teach with nationally recognized teaching and learning presenters. I'm your host, Tierney King, and I'm here to bring you inspiration, energy and creative strategies that you can utilize in your everyday teaching. Today, we're going to dive into the world of critical thinking, a skill that's often misunderstood and rarely mastered. We'll explore how this skill can transform students into astute thinkers who question the world with curiosity and creativity. By the end of this episode, you'll have the tools to craft lessons that invigorate curiosity, evaluate learning, and inspire the minds of your students. To start, Linda Nilson explains what critical thinking is, and the complexity behind it, in her program, Teaching Critical Thinking to Students: How to Design Courses that Include Applicable Learning Experiences, Outcomes, and Assessments.

Linda Nilson 01:05

So what I'm trying to do here is to simplify the world of critical thinking for us. Critical thinking involves interpretation or analysis. And then some kind of evaluation or judgment - we can't get around these. All the frameworks agree on this. Another thing, critical thinking is difficult and unnatural. So it certainly takes students time and effort to learn it. So it's not going to happen in a week, it's not going to happen in a semester, it's best if you integrate critical thinking into multiple courses, and you get at least some of your colleagues to do it as well. So you're constantly reinforcing each other. Why is critical thinking unnatural? Because the way our brains are wired, we try to confirm what we already think we know or believe to be true. So we have what's called confirmation bias. This comes out of cognitive psychology. So we don't want really to hear things that might go against what's already in our head, the way we think the world. Well, critical thinking is in part about looking at our assumptions, looking at our conclusions, looking at our belief systems and examining them with an eye towards possible revision. So this is difficult, it's not the way our brains are wired.

Tierney King 02:35

In order to think critically, your students need information to think critically about. Sometimes giving students too much information can impede their processing and understanding of the content. In this program, Katherine Jones explains what it means to be an information literate researcher, and how

framing information in a puzzle can help student engagement, comprehension, and their critical thinking skills.

Katherine Jones 02:59

Our next step is to talk about information literacy and critical thinking that's really the core of why we're here today. But I also understand that not everybody is a librarian, and therefore you might not live, breathe and practically eat information literacy as a concept. So it might be beneficial for me to break down the concept of information literacy into its component parts so that we can really talk about it more clearly. Basically, being an information literate researcher means that you have the ability or have learned the skills that are necessary to accurately and easily find, evaluate and use information. There's a lot more elements to it. It obviously can get more complicated when it boils down to having those three skills. Similarly, not everybody spends a lot of their day thinking about what it means to be a strong, critical thinker. So at its most basic foundations, strong critical thinkers are able to understand, analyze, and apply information, often specifically for the purpose of finding solutions to various types of problems. Part of making critical thinkers of information users lies in determining how these two skill sets can be used in tandem to enhance one's research abilities. And so to help with the visualization of this overlap that we talked about, I pulled from two common educational schemas that some of you may recognize. The first is the information literacy Big Six. This is a popular schema that's most often used at the primary education level, but it could certainly be applied to higher education. The big six provides researchers with a series of guidelines that they can use to find, evaluate and use information. To find the task, which would be determining the research focus or topic, seeking the information, determining keywords and possible databases to use, locating and accessing the resources, which would be the process of actually gathering the items and articles, using the information, applying those resources to the topic, synthesizing what they've learned, putting it all together into a final project or paper, and finally, evaluating the final result to determine that the information has been used to answer the problem. Secondly, I pulled a parallel schema relating specifically to critical thinking, here are the six steps of critical thinking. And the first is defined as knowledge, in which you self-assess and determine what it is that you need to know and why. Analysis, the process of pulling together the information you know, and the information you do not know. Comprehension, the process of looking at individual pieces of the puzzle and breaking them down into their base elements, looking for points of comparison and contrast application, the process of applying those information pieces to the problem at hand. And then interestingly enough, we see a direct and undeniable overlap occur as the word synthesis is repeated to a similar effect. And basically, this is the process of critical thinking of putting all of your puzzle pieces together into one metaphorical image. And then finally, we see evaluation again, looking at that final result. So I'm proposing to you that instead of tasking students with a topic, and making them pull endless articles and compiling that into a paper, or an annotated bibliography, or a presentation or whatever, we start treating research like the interesting and engaging puzzle game that it really is. In puzzle and strategy games, we see important elements that would also apply easily to in classroom research of this type. So I want to point out some of that overlap and how it could be used primarily. Typically, puzzles only have one answer or solution, but there are many paths that could potentially lead a student there, and it's up to them to discover what path works best for them as individuals or within their small group. And this creates the immediate student buy-in via personalization of content. You usually need a specific skill or set of skills to solve a puzzle, and in this case, students need knowledge of how to find, evaluate and use information resources effectively, that's the research

component, but they would also need to pull from other abilities to find the solutions that they need to succeed. And those skill sets are going to vary depending on the students themselves and the question or the problem that you're asking them to answer. Finally, puzzles come in all types. So supporting a wide variety of learning styles and skill types is going to help students feel included and valued despite differing levels of inherent competency and also various levels of strength. Remember that good puzzle games are also replayable. So you should plan to use the same problem-based project multiple semesters. You should be more than capable of using those in perpetuity with minor adjustments. And there should also be some replayable elements within the project itself so that students feel compelled to continue to the end of the assignments. You need to set a deadline, obviously, and of course, the project has a turning date as any assignment would. But it's also important to build in periodic checkpoints throughout the project or assignment in order to give students goals to strive towards and to reduce frustration. So if you're working on a project or assignment that's research based, and it will take them a whole semester to complete it, it would be good if you could check in every week or so with your students and kind of give them that renew of energy. You want to include strategy to keep their brains going. Remember that puzzles have leveled that requires thinking outside of the box. So give them the problem, and maybe a few rules to follow. But also let them have some individual thinking as well and really operate in a direction that they find most comfortable. You'll want to provide markers of success. Give your students forms of praise when they're successful. And even something as seemingly juvenile as stickers or tchotchkes are going to go over really well with your students trophies to mark their progressive victories. Not only that, but giving them some kind of physical trophy tends to kind of up the level of competitiveness in the classroom as well. And that really builds students' buy-in.

Tierney King 08:48

Rebecca Zambrano also explains how there are three ways to use the wanting system in the brain to promote creative thinking and critical thinking. From information gaps to evoking ambiguity to offering real and complex challenges, you can foster both creative and critical thinking by designing highly motivating learning activities.

Rebecca Zambrano 09:08

Let's think of curiosity as a vortex. Our curiosity when we're in this vortex of curiosity, our curiosity increases. Our motivation to retain what we're learning, so to retain new information, and I really encourage you to go out and look up this research by Matthew Gruber from UC Davis, it is fascinating about curiosity and impact on the brain. That and other studies are showing that when the brain is curious, it generates dopamine, which then triggers the learning and then retention occurs. So dopamine, which we know is involved in pleasure processes, but dopamine when we are in a learning situation is also triggered by curiosity. And interestingly that curiosity that dopamine creates more retention. So a state of curiosity triggers what is being called in this research the brain wanting system, the mind becomes a sponge for new information. So a side effect of that curiosity vortex is a heightened capacity to learn all that other stuff around the edges of the main topic. So three ways that we can use that, that wanting system in the brain to promote creative and critical thinking. One is to create an information gap. Two evoke ambiguity and create cognitive dissonance, that kind of confusion that can that can help us want to understand how to resolve the confusion, and then three, offering real and complex developmental challenges. These three aspects of learning all take us deeply into critical thinking processes, and involve creative thinking as well. So the first one, creating an

information gap, that would be an activity where we purposely hide aspects of information, so that the brain fires up that wanting system to solve the puzzle. An example of an info gap is creating a mystery to solve. And you can do that with a factual, ethical or moral research puzzle. You can offer a complex case scenario and then only offer part of the information that they would need to respond adequately to that scenario, for example. And those who are motivated by competition, you could create teams that could join forces, especially with some undergrad students that might be especially motivating, earn the information into a detective game again. Here's another discovering English grammar, "Twas brillig, and the slithy toves did gyre and gimble in the wave." This comes from Lewis Carroll, and it's nonsense, but it follows the rules of English grammar. So students often will be able to determine which words in here are adjectives and nouns and so forth, and asking them why they know that and what rules they can create out of that for English grammar, can be very intriguing for them. We can use developmental assignments to evoke ambiguity to offer those complex challenges. So if we start our course with a really challenging problem, again, maybe a case scenario, and then we ask students to address the problem every week from a new angle based on new information and knowledge that they are studying that week, they will watch their own skills deepen and deepen each week of the course, over time, this will lead them to reflect on their individual and their group learning and you can ask them to observe and analyze their their own expanding abilities or the group's expanding abilities across that learning. You can ask students to develop creative portfolios, use knowledge to analyze aerial images of things. You can ask them to use Google Maps and Google Cardboard, which is a new thing that students can do that is really fascinating to analyze the world around them. So anything that we do that asks them to take new knowledge and look at the world around them, the sensual world, with new eyes, can really trigger a lifelong passion for for that content. Plan for relatedness by asking yourself if you design opportunities for interaction between you and the students, but also meaningful interaction between students and other students, meaningful interaction between students and maybe people in the wider community. And again, this is where adult learners it can be very important to them that an assignment in our course is pointing them back out to their own professional community, and helping them network either inside of their organization or outside of their organization. Because networking is something that many of them want to do anyway. So giving feedback that nourishes relatedness by saying what kind of community and and listening and communication we're looking for, can be really motivating to our students as well. And then also asking students to give feedback on my feedback to them. There's fascinating research and there's an article by Michael Wesch, called the crisis of significance that mentions this research that students who give feedback on their feedback tend to really integrate that feedback and retain it much better than if they're just given the feedback and then maybe toss it or don't look at it again. You can use creative methods to demonstrate group growth and learning. This comes from two of my colleagues who did work with students on understanding homelessness and institutional aspects of poverty. And they asked students initially to type in their answers into a discussion forum to some basic questions about what they thought of when they thought of homelessness. And this word cloud is the result, they copied and pasted all of those thoughts that they had typed up into one word cloud, the larger words represent what was said most often. And then at the end of the unit, they did the same. And here's how different the word cloud was. So they had students discuss the difference between these word clouds. What did the first word cloud tell students about their perceptions of homelessness before they'd actually studied it? And what did the second word cloud tell them about their current perceptions of homelessness? After learning about it from these new perspectives, these things can be very helpful to students who want to see how individually

and as a group, their perceptions, their knowledge, and their skills are changing. So take risks with your students and call those risks experiments that you're doing together. Aim high, do things that are difficult or perhaps even impossible. Make things meaningful, model and encourage passion for what you know and love to learn about. Encourage humility, not knowing along with knowing and model admiration for the group process, and enjoy the ride. Students love to be with people who are enjoying the learning process with them.

Tierney King 17:20

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