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Matthew Worwood:
Hello, everyone. My name is Dr. Matthew Werwood.

Cyndi Burnett:
And my name is Dr. Cindy Burnett.

Matthew Worwood:
This is the fueling Creativity in Education podcast.

Cyndi Burnett:
On this podcast, we'll be talking about various creativity topics and how they relate to the fields of education.

Matthew Worwood:
We'll be talking with scholars, educators, and resident experts about their work, challenges they face, and exploring new perspectives of creativity.

Cyndi Burnett:
All with a goal to help fuel a more rich and informed discussion that provides teachers, administrators, and emerging scholars with the information they need to infuse creativity into teaching and learning.

Matthew Worwood:
So let's begin.

Matthew Worwood:
Hello, and welcome back to another season of the Fueling Creativity in Education podcast. And we're kicking off season eight with Dr. Janet Raffner, who is the junior center director at the center for Hybrid Intelligence Department of Management and a fellow at the AhAs Institute for Advanced Studies, co funded by Shape. She's known for her interdisciplinary research in human AI, interaction and creativity. Her publications spans citizen science, psychometric creativity assessment, hybrid intelligence, game based assessment, and computational co creativity. Janet, it's a pleasure to have you on the show today.

Janet Rafner:
Thank you so much for having me. I'm really looking forward to the chat today.

Matthew Worwood:
Now, obviously, with your background, we're going to be talking a lot about generative AI, but you're talking a lot around co creativity and computational creativity. So I wondered if you could start by talking a

little bit about those two terms and telling us why they are important to distinguish at this time.

Janet Rafner:
Yeah, absolutely. So, as this is a creativity podcast, I think most people may have a general familiarity of what human creativity is and what we think about with human creativity. But when you talk about how algorithms are influencing creativity, you have this first area, which is called computational creativity, which is where AI or computer science researchers are developing algorithms that create something that could be considered creative. So it's really the researcher develops an algorithm, they apply the algorithm, and then that goes off and makes something that is considered to be creative, whether that's music or artwork, images, whatnot. So then you have this human AI co creativity, or computational co creativity, where the human and the algorithm are working together, for example, in turn taking. So the human does one aspect and then the algorithm does another aspect, and then there's some feedback loop between them. And so that's really where the human and algorithm, particularly generative AI, especially now, are working together in a process that is considered creative and to make what could be considered a creative outcome. And so those are really two differences.

Janet Rafner:
One is where the algorithm is more or less working independently after the human has created it, and then the co creativity is where the human and the algorithm are working together. The computational creativity really lies in the field of computer science and artificial intelligence, where the focus is almost solely on the algorithm itself. So new types of algorithms that can make things, whereas the co creativity field is much more interdisciplinary because it's really focusing also on the interaction. So, of course, the algorithm is important, but it's focused a lot more on the modalities. So how is the human interacting with the algorithm? What is their process together? How is the human learning over time? How is the algorithm learning over time as opposed to really focusing on the algorithm? Both of them are important and valuable. But for me, my main interest is in the co creativity.

Cyndi Burnett:
So I'd love to bring this co creativity into the context of education. So, as Matt mentioned, an example, I'd also like to share an example of how I've been using it for my own creative work, and that's in writing. So when I used to write, I would write and write, and then I would go back and I would sort of edit, and I would look at what I would do, and I would.

Janet Rafner:
Say, I'm stuck here.

Cyndi Burnett:
I don't know how to make this transition. And now I use generative AI for co creativity, and I put it into the system, and I say, can you help me make this flow better, or can you make this more engaging, or can you make this more succinct? And it does that for me. So is that what you mean by co creativity? And what does that look like, do you think, in

terms of education and how we might teach our students to use generative AI in an ethical way that also gets them thinking?

Janet Rafner:
Yeah. So I'd say that's one good example of something that could be considered co creative. Just a question for you. When you refer to a system that you're using, would you describe it as more of a chat bot system, so that you're giving an input and then it responds to you as if a chat bot would respond to you? Yes.

Cyndi Burnett:
Or it would say something like, I want to do a content improver. So I put something into the content improver, and I put all this information in and then it turns out a better paragraph for me.

Janet Rafner:
Yeah, absolutely. So I think that specifically with respect to creative writing, which is super interesting, I just supervised a master's thesis student Ida Hansen here in Denmark, on working on a co creative writing project. And I think it's important for creative writing to think about that modality. As I said, is it the chatbot modality? Because that's not the only way that you can co create with generative AI. We did our study together with a tool called pseudorite, which is a tool specifically designed for creative writers. And instead of simply giving responses, it can provide you with different cards. It's digital, but these cards of possible suggestions. And in our research, we focused on what's called integrative leaps.

Janet Rafner:
So how and in what ways can you integrate, and when are creative writers interested in integrating suggestions from generative AI? In your case, you said to improve writing style or content, but we found that it was also very valuable for what could be considered a convergent leap, which is where you're writing a story and you're trying to figure out, okay, so what happens to this character before I can end this chapter? And so then you integrate something that helps you close it off versus integrating something that helps you explore. So there are many different ways that you can consider using a generative AI tool in creative writing. And another example, there was a recent paper earlier this year, coming out of Harvard on a tool that they developed, which also gave multimodal suggestions, so that it would be this interface where you have a tool that's supposed to assist in creative writing, but when you ask for suggestions or push the suggestion button, you don't just get text back, you could get a sound bite back of, for example, train tracks, or you could get an image of an elephant. And then to use that multimodality as a way to provoke your imagination or to help you if you're stuck in the flow. Another way, also, that we found that many creative writers used the generative AI was not just on content, but, for example, on character development. So coming up with the rich back history of characters and how that can help them improve the complexity of their story. And so specifically, if we're talking about education, I think that it's really important to encourage students to be curious with these tools and to not use them in what would be considered really the standard way of simply asking, help me expand this story, or correct x and correct y or whatnot,

but really to use it as a way to enhance their imagination and to really think about all the parts of the process of creative writing and to consider in which phase of the process is it most helpful and what is meant by helpful in that way. Is it the copy editing or is it the idea expansion? Is it the convergence on ideas?

Matthew Worwood:
Do you know what I like about this, at least for me? And I think people I talk to, I think some of us kind of feel the pressure of kind of rushing to work out how does generative AI impact me, and what does it mean for me in my classroom? And I think for the most part, what I'm lean more towards is that we're on a journey, and we can't really necessarily answer all of these questions yet. But I think it's important for us to recognize, I think that generative AI really is a new technology, and that new technology has been integrated into different tools that are going to become available to you and your students. And you've got to be selective of what type of tool you want to introduce into your classroom environment. Take time to explore it, and to your point, then determine, right, what is the benefit of this particular tool, and how am I going to facilitate my student creativity using this tool? And there's lots of different ways. By the sounds of it, sometimes it's the fact that there are different tools that are designed to do different things. Based on the example you just shared with Cindy.

Janet Rafner:
Yeah, absolutely. So different tools designed to do different things and in different parts of the process. So if you really creativity, which it's not one thing, it's not one particular instance, it's not one element, but it is a process, and these tools can be more beneficial in some parts of the process than others. And I think that it's good to reflect also on the individual needs of the student, and how can their needs be supported by different forms of generative AI and different types of interfaces.

Cyndi Burnett:
So, Janet, I want to talk about co creativity a little bit more around education, because I know there are a lot of teachers out there, and I have teenagers at home who are talking about it as well. But how do we allow our students to explore generative AI in a way that's ethical and appropriate? What does that actually look like? This is the question I keep coming back to is how do we help them and teach them about co creation within the constraints of ethics?

Janet Rafner:
Yeah, that's a great question, and I think there are a couple of key points to be very attentive to. First is educating students about data privacy and what the difference between using tools that are designed, for example, by researchers and research purposes and are open source, and you can securely store your data versus using tools that have been made by some of the major corporations and are more opaque on how data is stored and what they could use your data for. That being said, I use Tetgpt, I use Dali. I use all of these different types of tools, but to be very aware as to what type of information that you're putting into it. And so I think that that is something that is important, even if it is

already conveyed at an administrative level. So deciding what tools can and cannot be used within the classroom, I think it's also really important to have some education about that for students. But that is not creativity specific. I think that is very general with regards to all of these tools.

Janet Rafner:
And then I think another important discussion is how the tools are trained with regards to the ethics behind there, because generative AI is trained on large data sets, and it's a question of whether or not those data sets were ethically attained. And then to consider a little bit about how you want to use those tools, knowing that some may have been created in a gray area, specifically with that, with respect to images, there's a lot of controversy over how these tools trained their data sets. This was before training for generative AI was put into copyright. It wasn't really considered at that point. So it is still being discussed in many cases. But I think that the training is one aspect and then the ownership is another aspect at the end. So how do they consider, how do students consider the outcome or the output of a product? And the product could be creative writing, could be images, it could be a theater play, whatever it is that they're doing, and consider what their role has been in it and what the algorithm's role has been in the creation process. And I think that at this stage, it's really important to engage students in those discussions and ask them, what do you think? Let's map out the process of how you did your project.

Janet Rafner:
In what parts do you think it's okay to use generative AI, and why? In what parts do you not think it's okay to use it? And to really allow students to be part of that process. Instead of simply saying, you can use it for this, you can't use it for that? Because we're still figuring it out. We at the research level, at the university level, are still trying to figure this out, too. I mean, for example, in academia, how these tools are used in writing papers or tools in data analysis. And I think that giving some of that agency to the students to allow them to map out their process and talk about what they think is right or wrong and why is really valuable. One last thing. I've also found that with respect to understanding that process, it's important to, for example, have the students include their history with the tool when they submit their project. So they would submit their dialogue with Chat GPT or their image generation process or whatnot.

Janet Rafner:
So that in itself can be a critical thinking process of trying to understand how to be in dialogue with a system and to use your own critical thinking as to what is correct, factually correct, factually incorrect, how do you verify it? And in that way, there is some transparency, but there's also dialogue between the student and the instructor as to how these tools were used.

Matthew Worwood:
If I'm an administrator listening to this now, I feel like I would kind of second guess a decision if I've kind of completely locked out these tools from the classroom environments, because it's obviously a lot

harder to go on that journey with the students if we've made the decision to not have some of these tools available to students in the classroom. But I also totally respect about the fact that this is a new world for everyone, right? And maybe we don't bring those tools in until we're in a position where everyone feels comfortable. But I also make this connection with social media, and I hope that there's an opportunity to learn from social media a little bit, because I feel like we didn't bring social media into the classroom. And I'm not necessarily saying using social media from a learning perspective, but you're talking about understanding algorithms, you're talking about understanding data. And I feel like some of the challenges we currently have in society centered around social media come about because so many of us who have graduated from school haven't actually been taught about algorithms and how they work on our newsfeed and all of the different filter bubbles that we're now dealing with. And I think you've really given administrators who are in a position to make decisions about what tools are available in a classroom a lot to think about. So thank you for that.

Janet Rafner:
Personally, my view is that criminal is a hard word, but I have used it in some talks at the university level that it is nearly criminal not to teach students how to use these. I say at the university level specifically because the job is to train students how to be productive members of society, be it in their career or be it in their community, or be it in academia afterwards. And by banning the use of these tools, sort of categorically or categorically in certain cases, I found that it really instills a great fear in the students that they're going to fall behind so that everyone else is using them. Even if I don't say I need to use it in my writing process or need to use it in a planning process, I know that everyone else is going to be using it, and then I'm going to be at a loss when I am out in the real world or out in my job. With regards to consider k through twelve, I think that there should be some serious consideration as to which tools are used. As I mentioned, there are the tools made by major corporations that have limited transparency with respect to their data, and then there are lots of other tools that researchers or that other smaller companies are making that are more transparent in their security. But I think that the discussion on generative AI and how it can be used in various processes, and the understanding of how it works, whether you're using text prompts or whether you're using other forms of input, and how that correlates to a product generated at the end, that information really needs to be conveyed to students, even from quite a young age, because then we get into lots of problems, as you said, where students don't know. What's the problem with asking Chat GPT something? I've also run into cases where people don't know the different that Chat GPT isn't a search engine.

Janet Rafner:
So they're going in and it says, oh, it's just like Google. I put something in and it's like Google, and it comes out, I mean, to understand these nuances and to understand how to process the information, I think is something that's really important to include in education.

Matthew Worwood:

And Janet, you've also spoken a little bit about hybrid intelligence. How does this fit into this conversation?

Janet Rafner:
Yeah, absolutely. So I work at the center for Hybrid Intelligence, and here we can consider hybrid intelligence to be much more than just an algorithm. You can think of AI as a piece of code, and then it can be used in many different ways. But hybrid intelligence is really a process, and trying to fully understand how to create synergies between humans and algorithms, not just in creative ways. Creativity is my area of expertise, but really looking holistically in many different settings, be it educational or corporate settings, how algorithms, be it generative AI or other forms of AI, are integrated well to support a psychologically safe environment and to promote upskilling. And specifically on that upskilling area, we talk a lot about mutual learning. So the human learning over time as well as the algorithm learning over time. And the concept of hybrid intelligence is closely linked to another field called human centered AI, where you can consider when you're designing a system that you want to maintain both high degrees of control as well as high degrees of automation.

Janet Rafner:
So high degrees of human control and high degrees of algorithmic automation. But with respect to hybrid intelligence specifically, it really focuses more on that whole process and also not exclusively considering an algorithmic support tool as a tool that the human is using, but also exploring the possibilities of partnership and the disruptive possibilities in a positive way for influencing many different areas of work.

Matthew Worwood:
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Cyndi Burnett:
To learn more, check out curiositytocreate.org or check out the links in the show notes for this episode. Okay, so Janet, as we are meeting with you today, and it is December 15 of 2023, you are about to have your first baby. Congratulations.

Janet Rafner:
Thank you. Just about one month away.

Cyndi Burnett:
Matt and I are so excited for you. And I know that your partner as well, is also your partner in your intellectual work. So I'm sure that the two of you have some really amazing conversations about what the future is going to be like for your child. Right. So what I'm really curious about is when you have those conversations, what are the jobs that we're going to prepare your child for in the future?

Janet Rafner:
That's a great question. And I think that there's a lot of fear about AI taking over jobs, various jobs. And I think that I'm happy that you didn't just start with the fear, but I should say, I mean, that is true. A lot of people are concerned about that. My feeling, and our feeling is that the jobs will not be replaced or not as many as people think will be replaced by artificial intelligence, but rather be replaced by someone who knows how to work with it and knows how to use it. And that is a much more both optimistic future. But I also think much more realistic example could be radiologists. That job has often been said, oh, okay, now our algorithms can read images much better than the humans, so we can get rid of that job.

Janet Rafner:
And if you actually look at the list of everything that a radiologist does, it's only one aspect of it where they're reading an actual scan or image and interpreting it. So I think that the hype about losing jobs to artificial intelligence, yes, there will be some job loss, but not nearly to the extent that people are discussing it, will be more adaptation of the jobs. Everyone will have to adapt. Another really fun example, if you consider the current situation with children or with my upcoming child, is bus drivers. If you think about, okay, what happens when we have automated cars and we have automated school buses, any thoughts on who you would hire instead of a bus driver? Are you just going to leave the bus filled with children to drive? By itself, that would be a little chaotic. Well, here in Denmark, it's called a pedagogue, but it's someone who is more trained in teaching and in childcare and in social situations and conflict resolution. And rather, you would have someone like that on the bus with the children. So I think that looking out into the jobs of the future, my hope and my intuition is that it will be a workforce that is augmented by artificial intelligence, but having a really strong focus on how employees are upskilled in the various capacities.

Janet Rafner:
So asking the question to employees, okay, if you're going to make this or two managers, if you're going to make your job x amount more efficient, what are your workers going to do with that time? So how are they going to spend that time? Instead of asking, you're going to automate it? And then will you not need workers, but rather consider what can they do with their time? And that also gets back to the hybrid intelligence concept of really looking at the whole process. So the whole flow. I mentioned a business, but in any type of production or in any type of situation, what is the whole flow? And in what cases will there be a need for an algorithm to take over a specific aspect of it? In what way will the knowledge and the process of artificial intelligence change

the whole workflow itself? And then in what ways are the humans involved in the process being upskilled?

Matthew Worwood:
Now, we had James Kaufman on the show, and he said something. You've referenced it as well, this idea of the possibility of will the rich get richer? And there's lots of different ideas around whether generative AI will assist in the achievement gap or make it worse. And it might be, there might be some areas where it's better and some areas where it's exasperated. What's your thoughts of this? Based on our current understanding and trajectory with these tools.

Janet Rafner:
My opinion on it is that it could go either way. We have to act and efficiently plan and produce tools that will not widen the gap for the rich get richer. I think that if you just go forward as is with status quo, without taking this into consideration, will very well increase the divide. But I don't think it's an inevitable. It has to be something that we are aware of. And I mean, all of the points I brought up about the training data, about the interface, about understanding also individual differences in children, how they learn, what they're learning, taking all of this into consideration, which it's big to take that all into consideration, but I think that if it's done properly, it can be used to even the playing field more than to make the rich richer.

Matthew Worwood:
And the reason why I'm bringing this up, and it's just to share my personal thoughts based on my experience this semester. My worry is that we've got some groups of students already starting to use these tools and use these tools relatively effectively, and then we've got other people who are also using these tools, but not using these tools very well. And they might be the tools that the students that are standing out more. And that really, really bothers me because the students who are, I don't want to use the word getting caught, but it's obvious that they're using these tools. I really fear for them because they're not learning how to use them productively. But the issue is, I feel like it's happening right now.

Janet Rafner:
I completely agree with you. And I think that one of the key issues is that there isn't training, informative training for students on these topics and guidelines about, I would say, proper usage or usage that has the most benefits for the students themselves. Because while it's not all students, I generally think that students also in higher education, or maybe more specifically in higher education, if they're either paying for it themselves or very highly invested in it, they do want to learn. And it's a question of not knowing if the use of the tool in one way is the use of the tool affecting their learning. And so I think that this understanding of the process and understanding of, for example, prompt engineering, the types of dialogues one can have with tools, how you don't simply have to say, please write this article on whatnot, but rather say something like, I'm in the brainstorming phase. What are potential different directions I could go in, what are resources I could look at? So I think communication about that is really important. I think

that the discussion which seems that you're leading towards also about plagiarism. It's really tough because quite straightforward.

Janet Rafner:
We don't have a way of really detecting whether or not something has been written by AI or not. Of course, people have these intuitions and you see it and you see a phrase and you know, oh, okay, that's definitely a Chet GBT phrase, but there is really not a good way of proving it, which makes judging these cases extremely difficult. And another example of this, I was just in a symposium a couple of days ago where a professor out in California said that, for example, a case was brought to their judiciary committee at the university where the student had clearly used words that they didn't know, and it was clearly not what they had written. However, the student had been instructed that they could write in their native language and then use Chet GPT to translate it. And so the case was that this particular student, who was Chinese, had written the whole paper in Chinese and then translated it. And while she didn't know the word in English, she did know the word in Chinese. So you really get all of these complex, nuanced cases. So I think there's many, many conflicting results that are coming out.

Janet Rafner:
And so it's very difficult to make a systematic assessment at the moment. But I think it will all really come down to the education of students as to how, again, I said how these tools are trained, how do they actually work, and then what are the various ways in which you can use them other than simply give a text prompt and it provides you with a response?

Cyndi Burnett:
Well, Janet, our time is up, but every episode we ask our guests, what are three tips you would give educators to bring creativity into the classroom?

Janet Rafner:
Great. Yes. So I do have three points. The first one, and I did mention it earlier, is to really approach generative AI tools with curiosity and a sense of exploration. So how can you have fun with them? How can you play with them? How to experiment? I really find that that's a really interesting point. Experimenting with these different tools, that often doesn't happen so much. It's more looking for answers and solutions, but to engage in that curious question phase with students about how it works and trying random, fun stuff to promote both their curiosity about the tools itself, but also about what they can do with it. What can they do with it that they couldn't do before? So that's one point.

Janet Rafner:
The second is to be also very aware of critical thinking. So when using a generative AI broadly, but also, I mean, as we've mentioned in creative processes, to think for yourself about the outputs, about integrating them into your work, and to not take them as is, to know that they need to be considered and discussed instead of simply taking one for one from these tools. And the last point is something that I don't know so much about, no one knows so much about. But I think that it's going to be really important for researchers, and also researchers, creative

practitioners, teachers, to be aware of is to think about whether or not engaging in the creative activities that students normally do that have a lot of benefits, for example, physical, mental health, personal, social benefits, et cetera, also apply to co creation. That's a question we don't have the answer to. So does a student get the same type of physical or mental social benefit from creating a storybook online with Dali as they would sitting there and drawing a storybook themselves? We don't know. And this would really be a call to teachers to be very attentive to that and attentive to how their students progress over time using these technologies as opposed to using traditional, non algorithmic technologies in the classroom.

Matthew Worwood:
So, Janet, thank you so much for coming along. At 30 weeks, 36 weeks pregnant, I have to say, I was thinking that by the time this is released, you're going to be a mother.

Janet Rafner:
Let's hope it's not.

Matthew Worwood:
Yeah, that's very exciting. So we wish you all the best on that, and we look forward to bringing you and your partner, maybe Jacob, onto the show in the future, maybe talk a little bit about assessments and how AI might support creativity assessments as well. If you've enjoyed the show, we do encourage you to grab this episode and share it with a colleague. I think there's some really, really great stuff. Perhaps you also might want to share it with some administrators who are in charge of those technology decisions as well. My name is Dr. Matthew Werwood.

Cyndi Burnett:
And my name is Dr. Cindy Burnett. This episode was produced by Matthew Warwood and Cindy Burnett. Our podcast sponsor is curiosity to create, and our editor is Sam Atkinson.