

# **AI: Myth Busting**

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KENNETH HERGENRATHER: So our speaker is Dr. Ryan Watkins. He's the Interim Associate Dean of Research in the Graduate School of Education and Human Development at the George Washington University. And Dean Watkins is a professor of educational technology. Also the author of 11 books and more than 95% articles. His websites include www.ryanwatkins.com and www.wesharescience.com. His publications are frequently cited in the performance improvement literature, making him the fourth most cited author of journal articles in that field.

Ryan is an active member of the International Society for the Performance Improvement, the American Evaluation Association, and has served as a Vice President of the Inter-American Distance Education Consortium. In 2005, Dean Watkins was a visiting scientist with the National Science Foundation and he routinely works on projects with the World Bank on applying needs assessment, instructional design, and performance improvement to international assistance programs, including his work in China, Laos, Kenya, and Tunisia.

Dean Watkins has created two free tools related to AI for instructors that I'm sure he'll share with the audience today. I am pleased and honored to introduce Dean Ryan Watkins. Welcome.

RYAN WATKINS: Thank you very much. So welcome, everyone. I'm Ryan Watkins. It sounds funny to be called Dean. It's my six weeks into an interim position, and that's the first anyone has called me Dean. I'm like, who's Dean?

So I'll go ahead and share my slides and get started. So I've been working around AI since about 2014, 2015 when we first started to recognize the rapid development in some of these areas. So when I was asked to present, I thought of 100 different things that I might want to present. But kind of where I've landed on is I think that it's critical for us to have a little deeper understanding of how these technologies work so that we can better understand when they're going to be appropriate and useful versus when they're just going to be something that is a gimmick and may not really add real value to what we're doing.

So as I said, we've been working with these models both in our master's program that I teach in as well as in our research areas in our PhD. And we were working with them before ChatGPT became a common household name. And so it's been very interesting for the last 14 months, 15 months since the company OpenAI released their AI tool called ChatGPT to see how the world is shifting and all the discussion around these topics.

And it kind of has put me in a position where I feel kind of like what Dickens was talking about in A Tale Of Two Cities. It is the best of times, it is the worst of times. It's an age of wisdom and an age of foolishness and so forth. And I think we're seeing all of this.

Sitting in a school of education within a university, I can definitely see how some perceptions of this as this is becoming of the worst of times. We do see students using these tools to cheat. They can write an essay very nicely and very quickly at no cost. Cheating, of course, is not new to universities or to schools, but it is a challenge that we continually have to confront if we're going to assess learning.

At the same time, it's also the best of times. There's a lot of exciting advancements. And I think as we just heard in the previous presentation, there's a lot of ways, these tools may be useful to different people and different contexts. And we can start to leverage those as we learn more about how these tools actually work and how we can make the best use of them.

So it is both an age of wisdom where we can create really powerful tools that will make our lives better, but it's also an age of foolishness where people are doing some things that we probably shouldn't be doing with these tools. So it's always this double edged sword. And this is true with most any technology. We love our cars, and yet we also know that cars are one of the leading causes of death in our country. So we go back and forth. We have this love hate relationship with technologies quite often, and AI is going to be no different than that.

One thing to understand too is though you'll hear a lot about AI in general, it is a mix of different types of tools. There is not one AI. There's not even one real concept of AI. Most of what we're hearing about now is within a subfield of artificial intelligence that is called natural language processing. So it just works with where there is language involved. And more recently with the release of OpenAI's ChatGPT, we're really focused in on a subclass then of that, which is called large language models. And that's where I'll talk a lot about today, because that's where most of the last 14 months of exciting development has happened.

And though OpenAI was the first to market and they've done a good job of becoming the tissue of AI, so you just refer to AI as ChatGPT even though there are many products and many different competing companies in this area in different types of service models. So you may have heard of Google's Gemini, which is their version of OpenAI's ChatGPT. Khan Academy has developed their own as well, and it integrates in with their instruction. It's an education focused version. Meta, who most of us may have known as Facebook for a long time, they released models. There's also Copilot, which is Microsoft's version.

And then there's this open source area, and these are models that are not owned by anyone, but models that are made publicly available. And there are literally hundreds of them. There are about 15 that are really pretty good. And these are publicly available. So you don't have to go through a company in order to do that to use this type of model. Now, there are some limitations with that that I'll talk about a little later.

But it's important to understand that ChatGPT is not the only player in this game and it's definitely just one type of AI. So if you think about what they're doing in science with folding proteins and trying to look for new materials and engineering, those are a different type of AI. They're not using the same AI systems that we are when we talk about these language models and how do we have conversations and do things with AI like that.

And they're multi-use models. And think this is one of the big differences from prior generations of AI development in that these tools can be used for lots of different things. So it's one tool, but it can do many different things for us. Whereas in the past, tools were often closer to what you might think of as an expert system. It was expert at doing one thing over and over and over again. But now these new tools can do lots of things for us. So you can use ChatGPT to have chats and have conversations.

Within education settings, we have that it can do adaptive learning. I can give it different learners and it can have different questions for them. It can facilitate conversations. It can do grading. I'm not saying that you should have it do grading, but it is definitely capable of doing grading. It can also create content. And again, so these aren't separate tools, but it's one tool that can do all of these things. And that's fairly new. And I think many of us in different professions are still trying to figure out how to make use of that, how you can have one tool that can do so many different things for you.

And because of that, there are many, many companies being developed around it. So again, I focus mostly on the technology components. So how they're being used in schools and in education contexts. But you could do the same graphic for most any industry. You could do 100 companies that are working on how to use AI in hospitality, how to use it in health care. You name the industry, and there are people working on how can we best integrate these new multifaceted tools into our different workflows.

And this has some advantages and it has some disadvantages that I think in the VR community are then have to be considered as you start to think about how these tools are interacted with by people. Essentially, we are a big component of what happens with these tools. The tools are learning from us as we learn from them, which is quite different than you think of the calculator. It was not learning about the type of math that you did with a calculator. And you may learn a little from a calculator, but it's not actually that much of the learning tool. It provides you with the answer.

So with that, there are a duality of considerations when we start to think about AI and its integration into many different environments. So there are some technical challenges that I think everyone should be aware of. One of the primary ones that you will read about with AI is the challenges related to bias. And we'll talk more about these in a few slides, because it's a big part of the ethics conversations going on around how do we use AI? When should we use it? What are the dangers in using it. So I'll talk more about that one.

But there are some other technical challenges that we have to figure out going forward, such as transparency. You sometimes hear about AI models being described as black boxes and that we don't know what's really going on. Now, technically computer scientists do know what's happening, but it's not always easy to explain, because it doesn't necessarily get represented easily in a manner that we as humans can understand.

But it is an important topic. Should people know what is happening when AI systems are making decisions that will impact their life? So if it's making a job placement decision, if it's deciding if you're going to get a car loan or not. Those are important points when you probably want it to be able to explain to you why you did or did not get that service.

There are also concerns around privacy of data. Who owns the data that they come out with? So for example, many media companies do not allow their reporters to use AI at this point, because technically OpenAI, if you're using ChatGPT, still owns the content that it is putting out. And until the courts settle that, they're unlikely to take the risk that OpenAI might decide to claim ownership of content that they're putting in their magazines, newspapers, TV shows.

There are also environmental concerns. These computer systems use a whole lot of electricity and they're running 24/7. I read the other day that in order to keep up with the number of data centers being housed in the state of Virginia, it's expected that we're going to require three to four nuclear power plants in the next decade. That is a lot of power being used, and there are big environmental concerns. For now a lot of that power is being generated by coal.

So how can we think about when we're using these tools? Again, they are wonderful. They do many things. But they come at a cost, like anything. There's issues around geopolitics. There's issues around inequality and access as well. Currently these are not super expensive to use, but they're not free to use either. And the quality of the different models will vary and the open source models are typically not as good as the ones that you have to pay to gain access for. So there's a variety of issues around equality and access as well.

And of course, there's the kind of fear of AI. And this is often in AI terms we talk about it as the alignment problem. And how do you align the computer with the values of the people using the system? And so there are concerns. I wouldn't say that they're big concerns, but there are a fair number of people who are fairly panicked about how close are we getting to a Terminator type situation where at some point the AI may decide that its values trump human values and it should do what it wants to do instead of what we want it to do.

Now, I can tell you these large language models like ChatGPT that is not a threat. These only produce words in certain ways. They have no intelligence behind them, per se. They're statistical probabilities. But we are one step closer to that path, and many people are concerned. So I'm happy that people are concerned, but my message wouldn't it be one that you should be overly concerned about that at this point in time.

There are a couple of other what I call the low attention concerns that I think we should all be aware of. And I think this applies in education. It definitely applies in your context of vocational rehabilitation as well. And this is one of human agency.

Now, when we use Google and Google gives us 1,000 websites that we could look at to find our answer, we still have some agency in choosing which ones of those do we go to. Do I use the Wikipedia answer? Do I use the encyclopedia answer? Do I use a combination thereof? AI systems don't do that. They remove your choice and just give you the most highly likely answer. It's normative. So it's just based on what is the common, what it has seen most often.

But this has a definite implication to we as humans and the agency that we feel in trying to solve our own problems. And if we're not careful, it could end up like the characters on that movie Wall-E where they have the AI and the super computers doing all the work for them and they're floating in space in lounge chairs just drinking and eating and getting very overweight.

So I think we have to think about how do these things influence us. And that could almost be as big a question as how do we influence it. But it is going to change human behavior. It's already changing how we search for information, what type of information we value. And so I think it's worth spending some time thinking about those implications.

There's also a concept of anthropomorphism, which is where we start to think of these as human. So I can tell you for sure there is not a human sitting on the other side of ChatGPT. I know this, but yet I am still very polite to ChatGPT. I caught myself this morning asking a very polite question. Could you help me solve this problem?

Now, of course, I don't have to ask it. I can just say, this is my problem. Solve it. But because it communicates back with me in a way that seems so human-esque, I end up being polite back to it, and I start treating it. And one of the oddities of it is it actually seems to give you better answers if you are more polite and more positive in how you ask the questions. That's one of the areas that computer scientists are trying to figure out as well. And we don't know why that happens in a language model.

So if those are some of the challenges, what are some of the things that are just really exciting about these technologies? They do offer new ways to engage. It's a new type of way to engage with, let's say, historical figures. So I have children and they are taking history classes, of course. And they get the opportunity to have fictitious conversations with historical figures, which could be really interesting and help them start to think more critically about the context.

Now, it does better with some historical figures than others. So if you ask it to respond as if it is Abraham Lincoln where it has lots of information about Abraham Lincoln, you're going to get a better response than if you ask it to respond as Martha Washington where we know some but not nearly as much about Martha Washington and how she may have responded to different questions. But again, it gives us new ways to have interactions with information and knowledge.

It allows for personalization. If you think of customer service chat bots is a great example where it can be personalized to you. And if you go back to it several times, it will know what it's told you before. And it can use that information. It will know, oh, you're a customer who has this type of appliance. I already know that appliance, and so I can just jump right into asking you questions to help solve your problem.

You could also see this being used for policy documents. So if there are thousands of pages of VR policy that have to be utilized by people providing services, could a chatbot make that easier where you don't have to know the documents or even have access to them? It has access and can answer the questions out of it.

Accessibility is another one. So I have an example of this. My in-laws who English is their third language and they've been in the US for a long time, and I would say it's very good, but they primarily speak Chinese and two different dialects. And they were moving down from New York to Virginia to live closer to us. And this was last spring. And bless their hearts, they're the type of people who actually believe the saying that don't sign anything that you don't understand.

And so they wanted to understand pretty much all 8,000 pages of legal documents for buying a new home. Now, my wife and I are not lawyers. And so when they asked about section seven, subparagraph three, clause four, what does that mean? We had no idea either. And it did a great job of translating legal documents into things that we could share with them and we would have a general understanding. Was it perfect? Would a lawyer have described it the same way? Probably not. Was it good enough? Absolutely. It's one of those cases where 90% understanding and feeling comfortable with was the goal anyway. We were never going to become lawyers in order to sign these documents.

So as you could imagine with legal, medical type records and stuff, these tools have great potential. Medical is a concern area, of course, because even small changes could be quite drastic. But a lot of medical pieces, you just have to understand the basics. Now, the doctors have to understand the details, but we as consumers don't always have to.

These tools are being integrated into our technology. So it's in your phone. It's in Zoom, whether we have it turned on or not. It's in Google Docs. It's in MS Word. And you can use these in a variety of different ways. And some of these are going to be very helpful and they're going to help us get things done that were maybe challenging prior to, but it's going to come with risks too, and I think we have to understand that.

So here are some of the ways that I've been using it. And I know this is a long list and I don't actually expect anyone to read it all. But I think this is just to illustrate the wide variety of things, again, that you can use these tools for. So you can use them to explain concepts that you're not familiar with. I find myself having it open whenever I'm reading now, because if there are words where the definition isn't really what I want but I want to understand the context and how the word is used within this particular context, it will give me that much more readily than having to search through eight different Google Sites on a search. They're really useful for brainstorming ideas.

If I have an idea to start a new program, I might run it by it. It's really good at evaluating ideas. It's good at checking your logic. You can ask it here is my idea. Where is my logic? Or what are the counterarguments to why this may not be good? Which I could imagine, I was a debater in high school, would be an excellent tool to practice debates with. Here are my five arguments. What are the counter arguments to each of those? And could have that at any time of day. I don't have to be in a classroom. It could be 1:00 in the morning and it will provide the same thing that it does at 1:00 in the afternoon.

I've also been thinking a lot about how to use it in the classroom, of course, thinking about minority viewpoints. So how can you represent viewpoints that you may not have represented already in your classroom? So for example, in a college classroom, we know that there's a strong liberal bias. The students, being of the age that they are, are often liberal and faculty are often liberal. So who's there to represent the conservative viewpoints? Well, we could use AI to represent those conservative viewpoints for us if we don't have those represented.

So again, I'm not going to go through all of these, and the slides will be shared and you're welcome to look through all these different uses. But I think the interesting part to me is, again, these tools can be used for such a wide variety of things. That's what makes them really powerful.

So last March, I started a little challenge. And I think if you haven't been using these tools, it's a good way to get used to them and to see how it might be applied in your context. I said for the next two weeks, I'm going to try to use it every day to do something.

And it was small things to start. Like the first day I think I had it with my, who was then a sixth grader, we had it write some poetry for us. We had it write poetry as Winston Churchill, which turns out to be really funny if you want to just have fun with it. Winston Churchill wrote a lot, so it understands his voice quite well. And it turns out he would have been a pretty funny poet, at least according to ChatGPT.

And then as I got used to it, I found more and more ways to use it. And now I just keep collecting my list of how might I find it useful. And now I have it on every day, and I'm using it all the time. It's really great for starting an email. Now, I will put the clause in you don't want to use any of it without reading it again yourself.

It is not perfect. It will write things that are incorrect. And it will sound very confident in whatever answers it gives you, even if those answers are not correct. Because again, it does not know the meaning of what it's saying. It just knows the words that it is using, which is a hard concept to wrap your mind around when you're thinking about the conversations you're having and it doesn't actually know or care what the meaning of the individual words are.

So why might that be? And think this, again, is where I wanted to go with this talk is to talk some about understanding how the language models work so that you can better understand what they're going to be good for and what they're probably not going to be really that useful for, both for you as well as for clients you may have and so forth. So this will be a little bit of language models 101. I'll try not to get too technical but more conceptual so that you can have a better concept of how they're working and how you might want to use them and where bias may enter in and so forth.

So as you may remember from middle school, high school, we have the grids that we can create coordinate grids. And we can put things on one, two, or three dimensions. We can have an x-axis, a y-axis, and a z-axis. And those are represented by numbers. So for example, we can represent the word man as being somewhere on an x-axis and a y-axis and a z-axis. So it might be the number 3 comma 2 comma 4 is the place where the word man in this case shows up.

And we can do the same then for a similar word, like the word woman. And we would assume that the word man would be somewhat close to the word woman and that the word dog or cat or car would be somewhere further away from that. And similarly, we can do king and queen, which are related. And king would probably be closer to man and it would be to woman, but it would still be fairly close. And we could do that for verb tenses too. The word walked and the word walking would be pretty close to each other. And we can represent words in this way.

And so that's what we do. And computer scientists have been doing this for a long time. This is not new. But the size and scale that we can do this is getting bigger and bigger and that's how we ended up with what we call large language models is that every time it gets more information, it changes the relationships between those words.

So in the first sentence, the word man and woman might be four numbers apart from each other. As it reads the rest of the paragraph, it may move women just a little further away. Then it picks out a different paragraph. It goes through that. And woman is used following the word man more closely, so it ends up moving it back toward it. And so it's just doing that. It's moving these relationships of words in a grid. In this case, these have three dimensions, x, y, and z.

We call these word embeddings. So for example, if it was a three dimensional word embedding of the word swam in this example, it would be represented by those first three numbers, the 0.52, the 0.56, the negative 1.67. That would place it on that grid.

Now, as I said, though, this has been going on for a long time, and we now have computers that can do much more than that. So they actually do it on more than 1,300 different values. So each word is represented by 1,300 plus numbers. And every time it is fed content, it changes those numbers based on the words that are before it and after it and so forth. So those numbers are always in fluctuation while it's training.

So now instead of having that three dimensional grid with the x, the y, and the z, you have 1,300 dimensions. Now, of course, we as humans can't imagine 1,300 dimensions, but computers don't care. They're just looking at numbers. So it's fine for them.

This is one of the challenges. So earlier, I said we have a problem with transparency and explainability. This is one of the reasons we have that problem is these are working with really large numbers representing concepts on a very large scale.

And so it is very hard to explain why the word in should come after the word swam when it's really just the relationships on these numbers combined together. So 1,300 digit long numbers combined together would tell the computer after the word swam, you want the word in to follow it in most cases. Because that's really what these models are doing.

So they're prediction models. Again, as I said earlier, it doesn't know the meanings of any of the words. So if you feed it the best thing about AI is its ability to and you ask it to predict the word that will follow, it just looks back at that model. And it says after the word to, what word is highly predicted? Well, if its ability to, what word is highly predicted? If it's its ability to, what word is highly predicted? And it does all these calculations to figure out that the word learn should be the word that it should put after the best thing about AI is its ability to do something.

Which is amazing. I mean, this is marvelous technology. But again, it doesn't know the meanings of any of those words. It is not thinking about AI. It is not thinking about what does best mean or what is ability versus capacity versus capability. It's just looking at the percentages.

And this, I think, is really important for understanding when these models are useful and when they're not that useful. And it turns out that a lot of life, you don't really have to know the meanings of all the words to get most of it right. So if you're writing an email, maybe 80% there is good enough from a model like this. Then you go in as the human and you add the 20% around the important things. That can save you time. And saving time is really important in our busy world. If it can draft a letter of recommendation and then you go in and fill in the details, that's a really helpful thing.

So this is all language models are doing. They're predicting next words. They're using statistics to do that. But it gets a little more fun and a little more complicated. So we've been able to do that. This part has been around since about 2014. Where it's gotten more interesting is now what we can do is look back at other words to provide context. So we can provide more context.

So if the sentence is she is eaten a green something, in this case, we're putting in the word apple, we can predict apple better if we know that green is a type of apple and that eating is something that you do with an apple. So the more we can understand of the context of this sentence, the better the computer can predict what word should follow. And this was the breakthrough that led us to ChatGPT and this big hoopla of all the things going on with the AI for the last four months is we got really good at doing this. Or computers got really good at this.

And we could do more of it. So if you add Alana was sitting on Waikiki beach. She is eating a green something. Apple may not be the high priority choice anymore, because Waikiki and beach probably don't align well with eating apples. So maybe it's eating a green avocado, a green papaya. So the more context you add, the better able you are to predict a word that will make sense to follow that word before.

So how do they do this? So you'll hear people say, oh, they trained it on the whole of the internet. It's not quite true. It's not really everything on the internet. But they did use a lot of it. Many, many gigs, like hundreds of gigs of information. Now, text isn't that big. And so learning text doesn't require as much as learning images.

But they take all those words that are on the internet and it starts somewhere and it starts to draw those relationships. Remember how I was showing earlier man is related to woman? Well, that's where it started. It got fed more and more information and it kept moving where man and woman are related to each other, where king and queen are related to man and woman, and it builds a model out of that. And the model can understand, not really understand, but it picks up on what are the syntax? What is the grammar?

So it can pick up, for example, that if you have an a, then the next word is then a be singular. Whereas if you have-- or if you have an a, the next word is going to start with a consonant. And if you have an, it's going to start with a vowel. Or if you have they, then things after that are going to be plural. And it picks up on all of that by looking at all the patterns and the data that come off of the internet.

And based on that, it can do these things. It can do text generation. It can translate between languages. It can answer questions based on that knowledge. Again, it's not understanding the meaning of the question, but it's looking at the word frequencies.

So if you ask a question about who was the Dalai Lama, it just goes and looks for the words Dalai Lama and what words come close around that and it knows how to answer a question. And it can do classification and other things. And this is what we call a pre-trained model. So this is what ChatGPT is at its base. This is what Gemini is at its base and so forth.

To that then, they teach it to do things. So it's really interesting to have that pre-trained model, but you don't want it to go off on a racist rant. You don't want it to do some things. You want it to act more like an assistant. You want it to act more like a librarian. You have to teach it to do that. And so they do that and they call that fine tuning. So when you go to chat.openai.ai or whatever their website is, you're interacting with one of these robots on the right. You're not interacting directly with just the base model.

And they did that by teaching it through labeled examples. So you give it 100,000 examples of how to answer a question like you're someone's assistant. And it learns how to do that. The example is change the way that the model looks at that information. They also do a lot of human feedback.

Again, this is one of the ethical challenges some people have with the coming up of these models is there are people around the world, primarily in poor countries, not getting paid real great wages who are providing feedback on how well did the model answer the question. And they do this for hours and hours a day. It gets fed a question, they read the answer, they give it a thumbs up or a thumbs down.

And all of this is done to get scale. Thousands of examples will change the behavior. It's like when you're training your dog. So if your dog is that pre-trained model when you come home from the pound where you adopted, you do reinforcement learning to get the behaviors you want. You go sit and nothing happens. You go sit, hold out a biscuit, nothing happens. You go sit, hold out a biscuit, maybe they squat a little. Ah, then you reward them.

Thousands of examples will get you a well trained dog with well trained behavior. Same thing with these language models. The more examples it gets trained on, the better it performs the way you want it to perform. Now, they're not as bright as a dog. So it's like in the hundreds of thousands of examples, not the 50 examples that you might do when getting your dog trained.

And then of course, you're further refining the model by the types of questions that you ask it and the information you give it into its context. So by adding the sentence about Alana was sitting on Waikiki beach, we were able to influence what came after.

So when we talk about bias, we're talking about a lot of different things. There isn't just one point of bias. So what they chose to pull off of the internet to train the model biased the model. Some of that we're happy about. Some of that we might not be happy about.

I'm happy that they didn't train it on everything on the, quote, "dark web" where there's some really bad stuff going on that we don't want to have in our normal, everyday culture. So all the drug dealings and pornography, they didn't train on any of that.

But they did make decisions to train on this or something else. So maybe they trained more on Wikipedia and less on religious websites. Well, that influenced the model. That created bias. Now, who gets to make those decisions? Well, the companies who are making the models are making those decisions. We're happy about some of them. We're happy they didn't train on the dark web. We're not so happy that maybe they left some information out that we feel affinity for.

They added more bias then when they fine tuned that model and they gave all those examples. So they fed it 100,000 examples. Who chose what those examples are? We hear a lot about this for example around when they train models to make judicial decisions. And they trained it on prior judicial decisions, but we know there was human bias in those decisions.

So if you take 100,000 examples and you know that there's bias in those and you then train a model, it's going to represent those same biases. It's learning those biases. And then there's us on the far right. We're adding bias into it too by what we choose to add into the questions that we're asking in that context we're providing for it.

The context is important because it's getting bigger and bigger and it can remember more and more contexts. So these are the OpenAI GPT models. So I started using it at model two and it could remember basically about a page and a half of content. As you can see now in GPT 4, it's remembering about 48 pages of content.

So if my chat goes on for 48 pages, it's using all of that information to provide the context, just like the Alana was at Waikiki beach, but 48 pages of context to predict one next word. And that's the part that still is amazing to me, how many computations it's making to predict that next word. Because it's using all the words in those 48 pages to make that.

Now, another company called Anthropic, they have a model called Claude and they're on their third version. They call it Claude 3. And my understanding is it has about five times as much memory as a context window as GPT does. So it's remembering about 250 or 300 pages of context.

And this becomes important because all that context is helping define what it says next. And you're choosing what goes into that context. So in a way, you're biasing your own models. And that's an important concept. So bias isn't just something that the companies do, but it's something that we do as users as well.

So when we use these models, there's really several different ways that we can customize them, bias them, whatever term we want to use. And I just want to cover these briefly, because you'll hear more about these. And you may be wondering, huh, I wonder what that means. So obviously, we get the choice of which model we choose to use at this point.

We can use ChatGPT. They have a free version. They have a $20 a month version. We can use perplexity. We can use Google Gemini. If we want to get a little more technical, we can download an open source model. Some of these you can run just on your computer. They run kind of slow though. At this point, I wouldn't recommend using an open source model. But in the future, I won't be at all surprised if we'll use open source models. Again, they are biased too, though. So be aware of that.

There's also something that you can do. You can't do this with ChatGPT, but most of the others, they let you set the temperature. And if you think back, I showed that chart where it says it's predicting the word based on the probability that it would be the next word. So if you set it below 1 and all the way down to 0, being very cold, it always predicts the highest possible word. Whatever the highest probability is, that's the word it picks.

Most of them are set at 1 by default. And that usually picks between the top 5% ones. So it doesn't always pick the highest percentage word, but it predicts one of the highest percentage words. And this is actually what makes it sound more human. If it only picked the highest, it wouldn't sound that human.

And then if you set it all the way up above 1 to 2, then it's going to have a lot of diverse and creativity in it, because it's picking from the whole range of possible words, which can be fun and interesting. It's not always that useful, though. And so you can change this. And that's going to change the results that you get from the AI.

And so if people are saying they're using an AI or the company is trying to sell you an AI product, it would be important to know what their default setting is. Because if it's set up higher than 1, it's probably going to have more hallucinations. It's going to say incorrect things. It's not going to behave quite the way you want it to all the time. And if they set it all the way down to 0, it's going to be very precise, but it won't be that interesting.

And as said, you're adding your own context. And three, actually I have two number threes. So the second way you can add more to your context window is most of these systems let you attach a file. For ChatGPT, as I was just showing, this goes into your context window. So if it's less than 24,000 words, it will go into your context window. If you try to attach something bigger, it will just tell you it's too big of a file.

There are two other concepts. This next one is a little important, because this is probably where any companies that come in are advertising services with AI. Most of them are using this number four process, which is what computer scientists call RAG. But it allows you to attach a lot bigger files, because it doesn't use the whole file.

So let's say the file you want to attach is VR policy regulations and it's 200 pages long. Well, that's too much to fit into your context window. So what you do is you can use this process and it breaks it into pieces and it breaks it into lots of small chunks. And then it determines which one of those chunks based on your question it should put into your context.

So I may ask it a question about policy related to employment law within a state and it goes through those 200 pages and it says this chunk and this chunk are most likely to help answer your question. So we'll toss those into the context and then the model will answer.

So if people say, oh, it read the whole document, it probably has not really read the whole document. It has broken the whole document into small chunks and then used math to see which of those chunks is most closely aligned with your question and then used those chunks to better predict what words should come after the next word.

So the way we talk about these, it sounds very human. Like oh, it read the document and it is explaining it to me. When in reality, it has not read the document. It doesn't read. It doesn't know meaning of words. It doesn't care what the meaning of words are. It is just doing different types of math to give you responses that are going to make you happy with what the responses are. And a lot of times, it works really, really well.

This is in no way to disparage the technology, but it's to be realistic about what you're getting. Because as you can tell, if I ask my question differently, it might not find these two chunks in my large file and it might bring back information that isn't about the right policy, because it doesn't know what policy. It's not trying to read my mind to know. So I have to be very careful about how I prompt it to make sure I get back what I'm looking for.

I'm not going to talk about transfer learning, that number five, but just so that you know, we can do more training of these models and train them to do things we want them to do. Kind of like the companies do, they are training the dog. You can do that too. But you have to have a lot of examples, not just 100. Lots of examples.

This is just a graphic to show what the open source models are. So these are models where they have those first two pieces and you can download it from the internet and then you can do the right hand side stuff to teach it to be your own model. And again, this isn't probably something you'll want to do at home. You could. You don't have to have a computer science degree. You can do this without knowing any code even.

But you probably don't have enough data in the examples to make much use of it. But a lot of vendors might be coming to you saying, we've taken an open source model and we've trained it. And again, you want to be aware. That means they've taken a model that has bias in it and then they've added more bias to it.

And that can be very useful and helpful. Or it could be things that you don't want or you want it biased in different ways. So you can ask a lot of questions, like what data sets did you use to train the model? How did you use reinforcement learning? Who was giving the up and down or deciding what was a good change to the model and what was not a good change to the model?

Oh, I guess I had one more side too. All of this doesn't happen just in one model either. We also use what we call agents. And this is becoming very popular in computer science, but also in business and stuff now where you send your request to one master language model, who looks at your request, breaks it into small pieces, and sends it out to other specialized models to do specialized things and bring back their information so it can feed you back the answer. So you don't have to have one AI assistant. You can have one master assistant who then has assistants of their own. And you're going to see a lot more of this, because it can be very helpful, again.

So this was an example from a podcast. The URL for the podcast is at the bottom. But they were talking about voc rehab related pieces. And the part that caught me was really the second sentence here or third sentence where Cassie Villegas, I guess, from Washington General was talking and said, so instead of spending hours looking through regs, regulations, trying to figure out, can I do this? Can't I do this? Why? They go directly to that type. You can type in your question, take something that maybe used to take hours, complete it in a few minutes, and then move on to the true meaning of your work in voc rehab.

And I think it's these little time saving things. It's not always going to be the big things. But if you can save three minutes here, 10 minutes here on something, all of that adds up throughout the day. So if it takes me a little less time to respond to emails in the morning because I can have it draft the first part of it and then I just have to do corrections. If it can write interview questions for me and then I update them and make a few corrections. Instead of being an hour long task, it's a 45 minute long task. Well, that's good enough. That's 15 minutes I can do something else with.

So I'd encourage you to think about how AI might be useful to you, to your clients, to others in your field. Think about how you might get started using them, just to get comfortable to know your way around the technology. And hopefully by now knowing a little bit more of how they work kind of at a base technical level, you'll have a better understanding of when they're useful, especially if people are trying to sell you products that say, oh, we use AI. Well, now you know some of the questions that maybe you should ask about it so you're ensuring that it's the AI that you want to use and not just the AI that they developed. So I'll stop there and I'll take any questions for a few minutes.

MAUREEN MCGUIRE-KULETZ: I picked up a couple of things from the chat, if I may.

RYAN WATKINS: Oh, of course.

MAUREEN MCGUIRE-KULETZ: Dr. Watkins. Sure. Oh, it was interesting. Someone made a comment that backs up what you said. They said they use for resume development for their clients or customers Kick Resume, K-I-C-K Resume, and they said that it saved a lot of time. However, back to your point, you need to reread it, because sometimes it gives incorrect text or incorrect word order. So that speaks to you can't just do it and then walk away and think it's going to be perfect in terms of that.

Several other people agreed about being polite to your AI and said they often thanked Alexa when they asked the app a question and they answered quickly.

[LAUGHS]

RYAN WATKINS: It's hard to get around. Again, they're feeling more and more human-like. There's a new one of these large language models that came out 10 days ago now. And it is so fast. You could actually have banter with it. By the time you hit your question mark, it is responding and you could go back and forth like it's a real person. And that's just going to make it all the harder to differentiate between am I talking to a human or am I talking to a machine.

And they're building them in such a way that there's no way of knowing. I mean, we found this out the hard way in education. People can use this to write their essays. And there's no tool for telling you, if they did. There are tools that kind of try to guess. They can get up to 80%. They're 80% confident it was written by an AI.

But of course, I'm not going to accuse a student of cheating and say I'm 80% confident you cheated. That's not going to work. But there's really no way to know. This is text. You can copy and paste it. You can put it into other files. It's a little easier with images. They can kind of build things into images to know. But with text, it's just so portable.

MAUREEN MCGUIRE-KULETZ: Now, here's another comment. And actually, I could have written this. It said, this has been eye opening information. Thank you. I can imagine that VR could use AI to draft IEPs for students. Where do I get started to learn more?

RYAN WATKINS: So I'd say the best starting place is to start using it yourself. Again, even if it's just for fun, try seeing what its capabilities are. I wouldn't bring it in professionally to start until you have a better feeling for what it does well and what it doesn't do well and what types of things you have to keep an eye out for.

And then I would bring it into low risk type of work activities. So for me, I've had it help me write my syllabus. I had kind of a bland introduction. My wife always makes fun of me. My presentation titles are dull. My titles of my articles aren't that interesting.

So I just cut and paste it in. I said, you are a professor. You are teaching a course. Here is the course description. Can you make this more engaging for students who are, in this case, it was adult learners who are working professionals in instructional design. And it changed it and it was better. I mean, I was more interested in the course having read its description than how I would have written it.

But a great thing about it, I didn't mention this, is again, it's a computer. It doesn't care. Ask it to write 10 and then choose the best parts out of all of them. It's not a person. It's not going to roll its eyes and get irritated with you. You can ask it the same question 50 times and it's just going to keep answering. Which you think, oh, that's kind of neat. It's a huge advantage in your life. Because a lot of times you do want to just keep going.

And if I ask my wife to read 10 iterations of different course descriptions for every time I teach, she's not going to be happy with me. But I can do this at 11 o'clock at night. Give me five course descriptions and I'll choose which one I want to edit off of. So don't ask for one. Always ask for 5, 10, 15 things. And then pick and choose. Maybe it's the last sentence of one and the first sentence of another that takes you where you want to go.

Yeah, be sure to apply your human intelligence. Again, I go back to that's one of the risks is we lose agency. Do take time to consciously apply your human intelligence to it. And think that's what we have to train students to do is you don't just ask it the essay question, take the answer, copy and paste it into your assignment, and turn it in. But rather use it as a starting place. So I have a high schooler too, and he's using it all the time. But we've talked a lot about it's a starting place, not an ending place. It can help you understand the context. It can give you examples.

Yeah, he took a personal finance course last summer. So he was in ninth grade, and they had a thing like on interest rates. And the example they gave wasn't really helpful. He wasn't getting it. So said ask ChatGPT. Say I'm a ninth grader. I'm trying to figure out why I should learn about interest rates and why they matter to someone my age. Give me five examples.

And a minute later, he had five examples. They weren't perfect. Three of them were really probably pretty good. But it really helped him understand, because it took it to his level, gave multiple examples of where interest rates are for a kid who's in ninth grade. I mean, he doesn't have a credit card. He's not buying a car. Those examples don't really help. So yeah, fun things like that I think will help us understand the boundaries. And then you can get more technical in your use, whether you want to write an IEP or something.

But I'm sure there are then big companies coming to sell you that they've created models that do this. And some will probably do it very well. Again, you just have to be aware to ask the good questions about what base model did you use? How did you train it? What did you decide to include and why did you decide to include that but not that? And they should be able to answer that. If they can't answer that, then you probably don't want their product.

MAUREEN MCGUIRE-KULETZ: OK, great. Piggybacking on that, is there an AI platform-- piggybacking on where do I begin and what should I think about. Is there a platform that you recommend to start with? Maybe ChatGPT or do you recommend something else?

RYAN WATKINS: I still use ChatGPT. It's the most robust. It can do the most different things. Though you wouldn't have to-- so in my Google Docs, I have the Google product. It just shows up. What do you want to start writing? And I can just start putting in there. And it's the same thing as ChatGPT. It's free and it's right in my Google Docs.

You can go to Claude. A lot of people really like this new Claude model. They say it's fast. It's a little better in some domains. My guess, and again, I'm not a computer scientist. I don't know all the directions it could go. But my guess is that the major companies will each have their own models and then there will be a proliferation of smaller models that are really for different tasks. And in the future, in two or three years, you might have, oh, this is a model I use if I'm doing this type of work. If I'm writing creatively at home, I use a different model because it's just better at that.

So I think we'll end up with lots of different models. My fear in that is that people will have developed a conservative model and a liberal model and we'll all just get into our own little bubbles with our models that don't ever challenge us. So I worry a little about that concept. But from a professional point, it would make sense. If I have legal questions, is a model better at-- been more trained on legal stuff will give me a better answer than just a general all purpose model, which ChatGPT is. It's a general all purpose model at this point.

MAUREEN MCGUIRE-KULETZ: OK. Well, thank you very much. I appreciate it, all this information. I did want to wrap up with something that somebody pointed out, and it's very timely in light of the fact that Dr. Froehlich is our next presenter. And they said that you must always keep in mind that CRC ethics, Certified Rehabilitation Counselor ethics, always apply and we need to be assured of security, confidentiality, and be sure to control and limit information sharing. But thank you so much, Dr. Watkins. It was just an excellent presentation. I know it gave me lots of food for thought. So thank you very much. I'm going to turn it over to Dr. Hergenrather.

KENNETH HERGENRATHER: Well, thank you, Dr. McGuire-Kuletz. Dr. Watkins, that was enjoyable and I'm going to incorporate a lot of it into my courses, so thanks.