

Rob Kelly:

Hello, and welcome to Magna's online seminar Concept Mapping: How Visual Connections Can Improve Learning co-sponsored by *Magna Publications*, *The Teaching Professor*, and the Society for Teaching and Learning in Higher Education. I'm Rob Kelly, editor of *The Teaching Professor*, and I'll be today's moderator. I'm pleased you could join us.

Before we begin, I'd like to point out a few things about how this seminar works. If you have a question or comment for today's presenter, you can enter it in the chat box at the bottom of your screen, and the presenter will respond to your questions. If you have any technical problems, please call our customer service department at the number listed on your screen. Well, actually, the number is 800-433-0499, extension 2.

Today's seminar also includes polls. When it's time to participate, you will see the poll box on your screen, and we'll ask you to select your answers, and you will see the results as well. This seminar includes handouts. If you haven't already printed them, click on the handouts box on the left of your screen, and then click on handouts, and a PDF will open.

And now I'm pleased to introduce Alice Cassidy. She is the principal of Alice Cassidy In View Education and Professional Development. For the past 15 years, she has held leadership roles at the University of British Columbia's campus-wide Centre for Teaching and Academic Growth and associated Institute for the Scholarship of Teaching and Learning. Welcome, Alice Cassidy.

Alice Cassidy:

Thank you, Rob, and welcome, everybody. It's a pleasure to be here, and I was watching the chat and seeing the weather reports from around both Canada and the United States. And I can report that it's quite a gray, flat day here in Vancouver on the west coast of Canada. So welcome to Concept Mapping: How Visual Connections Can Improve Learning.

And as Rob said, we are co-sponsored, including by Magna and *The Teaching Professor* and also a Canadian society that I've been a member of for many years, the Society for Teaching and Learning in Higher Education, which is holding its annual conference this June in beautiful Saskatchewan on the Canadian Prairies. So maybe some of you will be joining us there.

This is me, and as Rob said, I've had some leadership roles at the University of British Columbia, which is a large research-based university in Vancouver. I also am, I wear several other hats, and all of my academic training is as a biologist.

And I've also done some work as a consultant as a science educator mainly in the areas of natural history, taking people out into the wilds and showing them birds and other animals that they might not have noticed or knew what they were.

And, in fact, this picture that you see before you is me on a, 120-feet up in the canopy of the Amazon Jungle in Ecuador on a trip just over a year and a bit ago where I saw something like 90 new species of birds in 6 full days. Quite amazing.

You're going to see a variety of images throughout the online seminar today, including some of my students' and my colleagues' materials and also a few other things, and just to make note that everything has been used with permission. There are 3 main learning objectives for today's 75-minute session, and you can see the 3 bullets there.

The main thing that I want to emphasize today is that we really are going to work on practical things. I want to involve you actively as much as we can in an online seminar. So I want to give you an opportunity to think about how you already do or might involve concept maps in your practice, your study, anything that you do in your daily life as a matter of fact.

We're going to be taking a look at several different kinds of models of concept maps. And you're not only going to start one very simple concept map just to let us dive into this, but you'll have an opportunity to start and work through a concept map of your choosing as the session progresses. Okay. So we want to start with the first poll. And this is to get a feeling for your background and experience with concept maps.

And so you can see the three questions there, actually four. And I just want to get a feeling for the kind of experience in the group. And we have, it looks like we have about 25 institutions represented today. And I see the numbers are rolling in, and I'm just going to give another few seconds for the poll to be completed. It's looking like a lot of you have heard the term, and about half of you have made one yourself.

The numbers are going up and down just a little bit. Fewer than half of you have asked your students or others to make one. And a small proportion of you have no experience with concept maps. So I want to thank you for going through this first poll.

That really gives me a good feeling for the kinds of experience that you've had, and I'm hoping that after the session is over that perhaps, well, I can tell you that all of you will have at least started two different kinds of concept maps today.

And I'm going to give you a challenge to think about the materials and the discussions today and see if there's an opportunity for you to invite others, whether it's students or learners or participants in something else that you need to create a concept map. So let's close that first poll, and thank you very much for your contributions.

As Rob said, there are some print materials or materials that you can view online, and the first one is the supplemental material. And the start of that handout is quite a long list of the disciplines that I have evidence that concept maps have been used. And this is either from looking through the literature or doing Web searches or talking with my colleagues.

And I also, below the list of disciplines, you'll see a list of kinds of contacts, the reasons, the ways in which people have used concept maps. So I want you to take a brief look at that if you have that available to take a look at, and I want to just give a second or two and see if you are involved in a discipline or a context that's not listed on the handout.

And I see a couple of people starting to type, so I just want to get a feeling for that. And I will add your discipline or your context to my list. Some of the, I basically wrote down or listed the disciplines as I found them, so some of them are general education, and others get more specific, educational development, multimedia, psychology, etc.

So we've got, thank you, sociology, nutrition, faculty development, health education, agriculture. This is great. Thank you, folks. I'm going to add all of your additional disciplines to the list, and I see more coming in. Leadership, very nice.

As we go through some of the other examples today, you'll get a chance to, perhaps in the chat, to give a few more details of your experience with concept maps that, things that might help other people. Nursing, math, career development, very nice. And I'm just going to wait for one or two more to come in, and I'm wondering if there are contexts as well.

Environmental chemistry, game design, that's interesting. Family and consumer sciences and developmental reading, I'm assuming that means. Correct me if I'm wrong. Social entrepreneur, physiology. That's great. Keep those rolling in, folks, and also if you have a context that you've used concept maps for that you don't see on the list, and I will add those.

So I'm going to move along, but anything that you add or that comes up as you're thinking about it, human sexuality, physiology, thank you very much, I will add them to the list. Thank you. Okay. Well, let's just see where we're at in terms of how did concept maps come about. This is a picture of Joseph Novak.

And Joseph Novak has a background in biology and math, and he's also taught science and teacher education at Cornell University. And it was during his time there that he was doing a long-term study to look at how children understood science concepts.

And he developed, at that time, the idea of concept maps in order to track how children were understanding science depending on the kinds of ways that, teaching techniques that were being used. And Joseph Novak is now retired from Cornell, but he's very associated with the Institute for Human and Machine Cognition, which, if you've ever been to any of the concept mapping seminars, you'll see a lot of Joseph Novak.

So he's definitely around and very key in concept maps even today. This is a couple of introductory comments about concept maps that came from a fairly classic paper in my view from the mid-'80s from Joseph Novak and his colleague, Bob Gowen.

And these are points from the paper that, it sounds fairly straightforward, and it is, is that you start with a list of either terms or ideas or concepts, main points. They could be topics. And the main thing is to have two different concepts on a piece of paper or on a computer where you draw a line or arrow, and preferably an arrow, between them, and you say what the connection is.

And Novak and Gowen call this, could also be considered a proposition or insertion. Once you get a bunch of those on, in one place, that's a concept map. You can have a simple one with 3 or 4 or 5, or you could have a complex one with 20 or 30 or 40. And they say that this process of writing things down or doing things in this way really does mirror the processes of thinking and learning the way that the brain processes information.

I just want to give you an example. If I had been drawing this on a piece of paper, in this case just in word, and the blue are the four concepts in this example, and then the phrases that are in black and that are in italics show what the connection is so that you might, if you were putting two concepts down to get started, you just want to say what, how does the first one relate to the second one?

You might subdivide a concept into, well, it's made up of this, this, this, and that. And just to make that a little more realistic, one of my favorite topics is dogs, and I chose a couple of my favorite breeds. And so in blue are the four concepts. Pets include dogs, so include shows the connection. And I know that a lot of you have, or, well, it looked like at least half of you had made a concept map, so this might not be too unfamiliar to you.

And I'm hoping that for those who haven't done one before that this serves as a good sort of just a starting point of a concept map can be as simple as this. Well, here's one that's a little more complex. And this is actually from the website that's listed at the bottom, which is the Concept Mapping Conference. I've never been to this conference, but I would love to go.

It tends to be held every two years, and what I really like about these folks, and this is, again, the Institute for Human and Machine Cognition, IHMC, is that they really walk the talk. And so they include, when you go to the website for the conference, the different concepts or terms are in navy blue in the rounded rectangles. And you can see arrows with words or very short phrases to show the interconnection between the concepts.

Now I also want to point out to you that up in the top left I've written tree in kind of a pinky-fuchsia color. And in various of the other slides and examples that are coming up, you'll see, always in the top left and in that color, I'll describe the type or model or style of concept map. And that's something else that we're going to be going through today in the session.

And in your handout materials after the list of disciplines and contexts, there is an example of quite a few types of concept maps with references to the literature so that you can actually look up these articles and see on particular pages different examples or models of concept maps. And I also refer to the slides in this PowerPoint so that you can go back later and study this in more detail.

Okay. We're going to move on to our second poll now, ways that you can use concept maps. And as I emphasized, we really are aiming for the practical here. And so I've listed just, I'm going to show you the next two slides, they relate to the poll questions exactly, is there's a variety of ways that I know of that you can use concept maps in teaching undergrad or, for that matter, graduate courses.

For those of you who lead workshops for your fellow faculty members or others, making notes, the brainstorming, trying to come up with some, a new project and thinking of how the, all the things that you need to be thinking of and how they connect, or you're doing a reading, and you want to try to make sense of that.

And so the second poll, how have you used concept maps? And as I said, it mirrors the six examples that I just showed in those slides, and I'm just going to give you a few moments to complete that.

As you're working through the poll, I can see the sample sizes going up there, and I'll comment on these in just a minute, remember that any time

a question is raised for you or you have an additional comment from your own experience or something else that you'd like to share with the larger group, just go ahead and type that in chat.

And any questions that come up that I don't have time to answer during our 75 minutes together, I will be responding by e-mail to any question that's left unanswered that you've typed into the chat. Okay. I see the poll is slowing down, so let's just take a look at this.

And, yeah, this is great. It looks like one, two, three, out of the six different types of ways that, and I made this list, by the way, from the ways that I personally have used concept maps and found them to be really helpful, so about three-quarters of you have used them in teaching and about the same percentage to brainstorm a project or plan.

And we're going to be doing that in a little bit, so I'm glad that some of you have had experience with that and about half of you for some of the other examples. So I'm glad to see that. Thank you very much for completing the second poll, and we'll close that one now. Now I listed, as I said, six examples that I've used, and what else do you add to the list, different ways that you would use concept maps or have used them?

And I'm thinking that someone here has written, oh, just sliding down here, as a conceptual framework to contrast two models or approaches. In problem-based learning, very interesting. I have tutored problem-based learning, and I can definitely see, I've never used it for that, but I could see that being very helpful. Curriculum planning. Thanks, folks.

Assessment of student or own learning, data search and query creation, wonderful. Explain the theory, one-on-one counseling. Wow, this is great. Diagram courses, clinical plans of care, teach graduate clinical concepts, really, really nice. Okay. And keep those examples coming in as well. Thanks, folks. This quote by Einstein is an important part of my teaching philosophy.

I really think that there's a lot of value, whether teaching graduate students, undergrads, faculty members, members of the community, to really show them different ways that their own personal curiosity and the kinds of things they do in their everyday life can lead to connections to formal education and academics.

I also think that because people are naturally curious about some things, you can really pull on that or take advantage of that in all kinds of wonderful teaching and learning techniques. And I see concept maps really tying in well there. Okay. I think that we should try a simple

concept map. It might seem simple at first, but let's see how we do. So you're going to, you see 11 terms here, and they're in alphabetical order.

You might see a bit of a theme. So you're going to need a blank piece of paper. It can be a full, sort of 8½ x 11 sheet or a half sheet or whatever you have around your computer right now. And I'm going to give you not very much time. I'm going to give you less than a minute. And I want you to put down at least two of the terms.

The important part, of course, in a concept map is that you draw the arrow between the two terms that you choose and say what the connection is. And if you want, you can add more than two terms. As I said, I'm not going to give you a lot of time to do this, but, and I'm also not going to give you any more instructions or guidance. I just want you to give it a whirl.

And I know that you may have two terms, and I'm not sure if you have more than two. Now as you're working on that, we're going to move on to the third poll. So I want to know what term you started with out of those 11 terms. That's the first question. The poll is coming in, and some of you might have, might still be, I'm just going to give you another minute to complete this.

Yes. I know some of you are, have multiple people in a room, and if that is the case, and I know it is true for many of you, you could have one representative to put up their hand and tell you what they did and type that in. Or if you are feeling daring, you could ask for a show of hands for some of the terms and just see what you get there. And I think the poll has come back for those of you who are saying that the poll went away.

Okay. So of those of you who completed the poll, and thanks for giving it a whirl, it looks like half of you at least, over half of you, put pets as your first response, the first term that you put down, followed by people. Interesting. No dog lovers out there. Or there might be, but you aimed for pets first. Okay. I'll comment on that in a minute.

I want to invite you to do the fourth poll, which is the last poll, of where on the paper did you put it, the first term? So for many of you, it was people, or, sorry, pets. Where did you place it on the paper? And just a few seconds to see how we're doing here. And the poll is slowing down just a little bit. Okay. So a majority of those who responded put it at the top, and about 30% of you or just fewer than that put it in the middle.

Thank you very much. And we'll close that poll. This is a, just a few other reflective questions, and we'll have some of these throughout the session where it's just something for you to think about on your own. And if

you'd like to make a comment or to respond, I will invite you to do so in the chat.

So I gave you 11 terms, all fairly familiar terms to most people I would think, and I'm just wondering, so pets might have been easiest for a lot of you to start with. What if I'd asked you to make sure you started with goldfish? Would that have been harder to start with?

And as you were doing it, and I didn't give you a lot of time to do it, but how did it feel when you were drawing the arrows, you were choosing the words and adding words? So this is just our very first chance to get everybody on the same page and give it a chance to try out a really simple concept map. Terms are easy to cluster, yeah, yeah. And it might have been in this case the particular words that I chose.

What if I'd chosen ten random words from a thesaurus or from a dictionary? What might that have been like? How vital is the linking concept words? Well, I've, I really think that that's at the key of a concept map, is that if you're just putting words on a piece of paper, and you're clustering them, there's great value in doing that, but it's not a concept map.

It might be a mind map, or it could be a word cluster, but it's by making the connections and for you to really think about what are, for you, the connections between each of the two terms or multiple terms that the real thinking is going on.

And just a couple of things to think about, if you were going to try to finish this particular simple concept map when the session is over, is would you be able to add the rest of the terms?

And seeing the kinds of comments that have come up, how would working through this as a group, so if those of you who are in a room right now with other people, if you, if I'd given you five minutes, which we don't tend to do in these seminars, how would that have been if you were each working through it together, and someone was up at the white board of flip charting drawing what you were saying?

So somebody has said feeling pressured, and, yeah, I didn't give you a lot of time to do it. What I'm going to invite you to do is, even with this simple example, is when the session is over, is to try it out and see what it's like to put all 11 terms in. And, yes, a little bit later in the session, just to respond to Beth's question, are you going to discuss the difference between mind maps and concept maps, yes, I am.

And there's also some references in your handouts that you can take a look at. So thanks for taking part in the polls. I want to start out in a little bit of theory that might mirror some of the experiences that you just had in creating this simple concept map to get started. So the first one is that there's no one correct way to create a concept map.

Each one of you probably created something that was very unique to you, and it's your perceptions, and that has been shown in the literature time and again. And also, as I said, I tried to choose fairly simple terms, but what if I gave you complex terms from a second-year engineering course or from some other area that you might not know very much about?

I suspect there might be a few engineers in the room, but what if I gave you words that you were unclear what they even meant, so you had to look up and find some background material before you could even write the connection between them? So what Wandersee says is that it's a great way to organize knowledge and helps in understanding. Is there a wrong place to start? No. I would say there's definitely not.

And work out the hierarchy both before and during the mapping. I agree. And we're going to be getting to that when we go through some steps in concept map construction and also some dos and don'ts. And you will get a chance to do another concept map a little bit later on that is a concept map of your choosing. And we'll work through some examples so that you can try it out.

Okay. A few other bits of what I think are interesting points from the literature. So, again, like I said, if I were giving you a set of terms, and I asked you as an in-class assignment to tell me the connection between these terms, and you didn't know what they were, you really have to focus and reflect on what those terms are and how you're going to find out what they mean so that you can describe them in your assignment.

And, hence, you're constructing meaning as you go, and that's what Ian Kinchin has said. It's very process-oriented. And I see Katherine saying context influences how we map. I agree totally.

Well, since the time of Ernest Boyer in the 1990s and even before then, there's been an increased recognition of the many different ways that people learn effectively and also a lot of discussion about the kinds of things that we can do to enhance learning. And just a couple of examples that have been put forward is Howard Gardner's multiple intelligences and Benjamin Bloom's taxonomy.

And in your handout material, I give a very clear, specific example from a colleague, Kurt Grimm, who teaches earth and ocean sciences at the

University of British Columbia, where he uses Bloom's taxonomy and the material within it to explain to his students how he wants them to create a concept map so that they're going both from the lower stages to the higher order thinking skills.

And he wants to encourage them to do all of that. This last point, I really do think it's important to value students by motivating them to take things on for themselves, and I think that concept maps is an excellent way to do that.

And just to summarize a rather large base of literature, as you'll see just by glancing through the reference list and Web links in the handout material, some of the other ideas and philosophies that come up that show the benefits and values of concept mapping to enhanced learning are listed here. The higher order thinking really connects to Bloom's taxonomy as do complex ideas. We talk a lot these days about meaningful learning.

And I would say that if I had to give one view of my philosophy of teaching and learning, it definitely is constructivism where people have to hang something new on something that they already know. The folks at George Brown College, it seems like a good formative assessment tool to identify gaps in understanding. Yeah, I think that's a really good idea, and I think I've seen examples of that in the literature where that's been used.

There's actually a wide base of material in the literature talking about ways of assessing concept maps, and I won't be dealing with that in the session, but there's, I purposely included a lot of references for you to explore later. Well, what about empirical studies?

You know, it's great for people who do research on teaching and learning or are doing scholarship and in the field right in the classes, but what about studies that show is this effective? What do the students say? And here's a couple. So students say, yeah, I really had to reflect on what I was doing, and I found it to be very creative.

And I think, isn't that a nice thing to have students say about any kind of an assignment or in-class activity that you give them? And I like this one from the mid-1990s, that it really helped me to think about how I'm going to present the information and especially if I had to look at a lot of readings and literature. And so for these students I've taught in Kirk, it helped the students to make sense and, therefore, meaningful learning.

And as Ian Kinchin said, I like this, why aren't we all using concept mapping in the classroom if they're so helpful? And I think he's sort of putting this forward as a challenge. And I think that in one of the polls, quite a few of you were using them in the classes. Do you use them in all

your classes, like every course that you teach? Is it maybe not, does it not work in some courses, or have you just not tried?

And I would encourage you just to think about that question. And more recently, Tom Conlon, and this sort of speaks to the really wide range of literature that's out there, especially some of the growing body of empirical evidence that concept maps really are showing positive results, is that why don't we see a broader use of this. And I think, yeah, it depends on the construction of the course.

I agree totally, Beth. Thanks for that contribution. And I, you know, I think that Tom is referring to school at all levels, so K through 12 as well as post-secondary institutions. Most recently, I don't know, I've, I don't know if any of you have been to the concept mapping conference. The most recent one was just this past October in Chile.

And if you check that out, the URL is in your handout, you will find the most recent discussions and presentations and findings in concept mapping. And Joseph Novak is a big name, as is Alberto Cañas, is also someone who presents at these conferences, and, really, I have a lot of time for these folks. They're really moving forward in helping us think about how we can use concept mapping in a variety of ways.

And a classic book, *Classroom Assessment Techniques* from the early 1990s, Tom Angelo and Patricia Cross, and, you know, if you took out concept maps, the CM, at the start of this term, and you said, this is, as a teacher, this is what I want to do, this is what I want to stimulate students to do, wouldn't that be great? You know, you're synthesizing the course content.

You're showing as a student your intelligence, what you've learned, your skills, your judgment. So Tom and Patricia are really putting forward that concept mapping is one way of doing this. There are more than these eight types of concept maps, but I just wanted to give you a starting point.

And in your handout, I give references to the literature and to the PowerPoint slides by number so that you can explore each one of these and actually see examples. I want to start with a few examples from my own teaching. And here are some images taken during class projects, in-class activities, and some material that students created as part of their assignments.

And here are my smiling class on a day much like today, kind of a gray, flat day in Vancouver. I'm in the bottom left there at the front. And this course is a biology course for students who are not majoring in biology. So they don't necessarily have any biology or ecology background. And

what I want to point out to you as a concept map example is an assignment that's due at the end of the term. It's called the learning portfolio.

It's worth a fairly large chunk of the course grade. And as you can see, there are three key components, and it's the visual diversity component that has the concept map connection as well as other visual ways of explaining information.

I give the students a chance about half way through the term to hand in one page so that they can get a feeling for how they're doing, what they're doing well and they should continue to do and how they might be able to improve in their final assignment, which is eight pages long, on the last day of term.

The visual diversity component is where the challenge, so this is a three-credit course, so it started in early January, and it ended in mid-April, is to summarize that whole course in eight pages. And I encourage students and give examples in class of how to do this using different kinds of visual tools, text image, word charts, and to really choose color appropriately. Yeah, I like that, aesthetic reflection, which parallels this approach.

That's nice. Of the eight pages of the final learning portfolio, two of them need to be a concept map. And then the other examples are other visual models. And I'm going to give you a few examples as we go through the next little few sets of slides. And what I'm going to ask you is to, as we look at these, is to see if you think they're all concept maps or which ones are not and why.

This actually helps to answer the question that was posed about what's the difference between a mind map and a concept map as well and lots of other different kinds of visual tools. Okay. So here's a first one to get us started. And there's a lot of kind of words in little thought bubbles with lots of arrows and fairly long terms to describe the connection between some of the terms.

And as I said, up in the top left, in this case it says web, I would describe this type of, and I would describe this as a, most of it as a concept map, the web, because there's stuff all over the place, and it doesn't really have a clear starting point except perhaps humans, which isn't really in the center of the page.

And just to zoom in a little bit, up in the top right of that last slide, we have this little item that is describing abiotic or non-living factors. And this is a spoke. It starts with abiotic in the middle, and it branches or radiates out to the components of that, sun, soil, air, and water.

This student has not told us what the connection between abiotic and air is and maybe because in their mind it was just so obvious that air is an example of an abiotic factor, but that makes this blue subset of the overall web concept map. This part is not a concept map in my view, because it doesn't say what the connections are.

Here's another example, and the course connected to ecology and biodiversity is a big component of that, and so we have three things that leap out at us, protista, animalia, and fungi. There's lots of arrows, and I think there's almost a term on every arrow. So from that perspective, I would say this is mostly a concept map.

Here's another example where a student was describing some of the group projects in the course and the interconnections. And they were actually doing a little bit of sketching work. So there was a project on transportation, the little truck in the bottom, something to do with a golf course, and something called tree-me, which was identifying the local trees on the campus. And I'm just going to zoom in on this one.

There is a sort of a little sub-concept map rolling there in the waste management with a little image of the garbage can. And I think what they were trying to draw there was the, you know, the universal recycling symbol. It might just confuse matters a little bit.

In this example, there's, in the corner, it says other recreational activities, and I would, if the student handed this in as their check-in for their 7%, I would have said, incorporate those terms into the overall map and say how they connect. That's what I would do to suggest that this be more of a complete concept map.

Okay, folks. We're about half-way through or so, and I want to give you a chance to start your own concept map on a topic of your choice. And so the first thing we're going to do, and, again, you're going to need a blank piece of paper, the first thing we're going to do is, I'm going to show you a few different examples to give you if you need some inspiration.

You might already have an idea for a concept map you want to do, and so the area is the first thing to choose. So you might want to go totally metacognitive as the first point in this. You might want to make a concept map about this seminar about concept mapping. What are you learning in the seminar today? What are you going to do as a result? What's been your experience?

Or you might want to go with, you've got a busy day tomorrow, what's it going to look like from the minute you get up to the minute you come home? A couple of other examples may be a new project that you're

starting. You might want to think about designing an assignment to give to your learners or, one of my personal favorites, perhaps an idea for a vacation, so a kind of a brainstorming.

So what we're going to do is, as you choose a topic, and then you're next goal is to, hmm, what style will I go with? With a web where I start with a key term in the middle and go out from there? Will I start at the top and move down like a tree? How will I do this? As we go through, and you're working on your concept map on your piece of paper, I'm going to work through some more examples.

And we'll also go through some, a list of do's and don'ts and more reflective questions. And it is a little tricky to be doing your concept map while listening and looking at the slides. There are no more polls, but you can feel free to make comments.

I'm have a challenge with, or here's the topic that I've chosen to do my concept map, to type that in the chat so that everybody can pay, sort of see what you're doing and maybe be inspired. Okay. So by now, everyone should have a piece of paper and maybe be thinking of a topic and starting to think about how you're going to, what style.

If you're, if you have a little stack of sort of sticky notes in front of you, you might want to put each term on a sticky note and put it on the paper so you can move things around, but, you know, probably just a piece of paper will be fine. So as you start out, let's go through some step-by-step instructions, and these are also in your handout.

So the first thing, just like we did when we had the pets and people and dogs and cats and goldfish, is to, just on the side or in a margin or a separate piece of paper, is what are the different terms of concepts you want to include? And maybe start to think of the order. Which of those are the most important? What's the main concept?

And that would be the one that you might want to start with, and that might help you decide, does that go at the top of the page or in the middle? And the example that I would give would be if I were planning a vacation, the kinds of terms that I might come up with would be warm, ocean, swimming, Hawaii.

So, you know, and sort of as I'm starting with the terms, I might be even forming in my mind, oh, gee, I need to go to Hawaii soon. In my example, if I chose that Hawaii was the main concept, that might lead me to create a chain concept map where Hawaii is at the top. Hawaii, to me, means beach. And when I go to the beach, mainly because I burn really easily, I make sure that I go in the water.

And when I'm in the water, I like to snorkel. So one thing is leading to another, and that's an example of a chain concept map. So that's just my little Hawaii example. I'm getting kind of excited about that as I think about it. So you should be working on your concept map. You might be at different stages. You might just be writing down terms right now and thinking about, gee, hmm, what's this map going to look like?

And it might flesh out a little bit more as we go through the rest of the slides or more of the slides. More of the steps is once you've decided where you're going to put the first concept, are there clusters? So in my example, maybe beach, sand, surf all go together. Maybe lanai and martinis go together or cold, fruity beverages.

And number six is, again, to respond to the person that asked the difference between mind maps and concept maps, if you're putting a lot of terms on the paper, and you're clustering them, so up to point five and maybe point, I'm sorry, I see I've got two point fives there, my apologies, then that's a mind map, and it's very helpful, but it's number six where you're actually connecting.

What is the connection for you between beach and snorkeling? And I'm still choosing fairly simple examples, but you can have as complex a concept map and terms as you wish. Labeling the lines, adding, that might lead you to think of more concepts that you need to add.

And we're really getting ahead of ourselves, but once you've completed your concept map, it's really important that you maybe put it away and come back to it or show it to someone and see if it makes sense to them, and then you can rework it, add concepts, maybe subtract some concepts. Okay. I'm going to work through a few more examples and different types of concept maps.

And so I'm going to ask you to think about might you use this in a particular context of creating a concept map. And I'm also going to ask you to try to pay attention to the use of color. Here's an example from a student in my human ecology course, and this is very much, in my view, a visual metaphor. It's a leaf. It's pretty obvious that it's a leaf.

And so you're going to think, well, maybe the terms in there connect some way, in some way to photosynthesis or something to do with trees or at least the environment, and it does. It actually connects to sustainability where on these very intricate lines connecting one term to another and in green the student has written different ways that one could choose to be more sustainable.

Use Tupperware, recycle paper, eat less meat, and so on, so visual metaphor, a combustion engine, perhaps, a tree. I'm a biologist, so I must admit I might come up with a few more of those types of examples. This one is what I would call a center focus, and it really does stem from this learning methods of biology 345 in that blue rectangle in the middle.

And I actually describe this one also as a metaphor, because those green lines that you see connecting the different aspects of this image, which parts of it, I think, are a concept map and parts aren't really. They actually used string to make the connections, which I thought was kind of clever. They've used color quite vividly.

I'm not quite sure what the color does, if it implies something or is meant to mean something or if it's just there for visual diversity. And that leads us to think, well, could there be too much color? What purpose does it serve?

And I don't know how many of you were doing your concept map with a pen and paper or a pencil and paper or perhaps even on the computer, although that might be hard to do and watch the seminar at the same time. Are any of you using color? Are you using one of those clicky pens with different colors or ink, or as you using highlighters or anything like that? And why are you using that?

How is that helping your concept map come together? So look at this next one, which is in the form of a Venn diagram. It's quite a beautiful sort of overall image. This was one of the pages in a student's learning portfolio that they gave me permission to show, of course, and it's three interconnecting circles with human ecology, which is the title of the course, right in the middle. I'll just zoom in. This is not a concept map.

I mean, it's a lot of terms and showing some interconnections, and it very clearly shows an understanding of a fairly large number of complex topics. But it's combining art and color and imagery. It's not a concept map. Okay. Mind maps. And some of these can be visual metaphors, and we're going to see a couple coming out. There usually aren't. This is the main distinction between concept and mind maps.

Mind maps usually don't have labels on the lines or arrows, but they are really good for showing either for brainstorming or for showing how ideas connect to each other. So let's take a look. This one is about a, it's about a fairytale's plot, characters, themes, and structure. And it's quite pretty. It's a piece of art in itself.

And I guess if you knew this particular story, it might make more sense with that monster creature and the castle and everything. Let's just zoom

in for a second. So they've got a subcategory called plot, and this one, as I said, is very much a mind map, although they've drawn things kind of on the lines. The term Barbizon, which I think is a character in the story, appears in a couple of places.

And one thing that I mused on is if I ask somebody to take this mind map and turn it into a concept map, if they had the knowledge about the topics and phrases to do that, might Barbizon only appear once? And it might have a lot of lines going off from it saying how that connects. But the way it is now, it's a very pretty, almost metaphorical piece of art, but it's a mind map for sure. How about the use of black and white?

In this example, happiness, a fabulous topic, I think, this person has done a mind map with some main terms heading out from happiness, and then they've subdivided. So sunshine includes holidays and summer, etc. And just to, before we zoom in, I pointed out that this one is black and white. What if this were color? Would some color help you? What if things to do with sunshine were yellow?

What if things to do with the beach were brown? Would that help you in any way? How would you represent some of the other words like Olympics? Well, the five interlocking colors, perhaps, of the Olympic circles. It's a nice map. It kind of makes me feel happy when I look at it. And if I were creating a concept map of things that make me happy specifically, I suspect it would have a lot of these on it.

Okay. What about to generate ideas or to brainstorm or to plan? And I know that in the poll earlier, many of you said that you use concept maps in this way. I'm wondering if any of you are using the concept map that you're creating right now, if that's what you're doing. This particular one is from a diagram that was created during a teaching and learning seminar that was focused on creativity.

And I co-facilitated this with a student named Laura Super. And somebody was brainstorming the different kinds of creative research and what that entailed. This is an example of when I worked at TAG, the teaching and academic support unit at the University of British Columbia, we had a lot of people that were coming and going, working part time, not there on the same days.

And so we had a flip chart on the wall that we'd put a topic, in this case research, teaching, and learning. And people would just write things as they went by and maybe connect to what other people were saying. How about to show three different kinds of activities? This one is using something called MindManager, by the way, which is in your handout. You can take a look at how to do that online.

So what do you think of the use of color here? We have three activities, mainly, and each one is its own color. How about to summarize some kind of an analysis that you've done? This was done during a strategic planning workshop at the University of British Columbia. And we just completed what was called an inter-relational analysis.

So we had brainstormed a bunch of terms, and then we did this analysis to determine which terms were more important to us for a particular use. And we were trying to show that in this diagram. It could be the start of a concept map. It definitely has some phrases, and it has some terms, some arrows. There's nothing written on the arrows at the moment. And I see someone is jumping ahead, and I'm glad to see that.

We use the Visio program for students to generate their maps and submit electronically. Thank you. That's one that I haven't heard of. And a little bit later, I have a list of kinds of online software that you can use, and I'll be sure to add that one to it, so thanks for that. Okay. One other example, I think. How about during a seminar that you're taking part in, in this case as a participant? And note the use of clipart here.

These slides are from my colleague, Jim Hope, and he uses MindManager. This particular mind map is a spoke for sure. It starts with a center piece and radiates out to other areas. And Jim was actually creating this mind map as we went through the seminar. He was asking what about consulting? What do you need to think about? Prezi.com could be used, and it's free for students and teachers. This is great. Thanks, folks.

And one last slide using MindManager, why do consulting? And that was the topic of the seminar. And a question I have for you here, and maybe sort of look back at the concept map that you're creating right now, and that is, does color help or hinder here? What's color doing for you? Glogster.com, wonderful. Oh, this is wonderful.

There's lots of things popping up in the chat, and we'll be sure to get those all to you in one summary. That's just a zoom-in and showing some of the clipart. I like the little light bulb. I mean, there's so much clipart out there. You have to ask yourself, though, is it really helping to explain what you, in your case, your concept map is doing. And finally, how about to assess student learning?

And as I said, we're not going to focus on that in the session. There's a lot of literature in your handout and references on different ways of assessing student learning in a variety of disciplines. This is an example from my colleague, Charly Bank. He teaches earth and ocean sciences at the University of Toronto. What do you think about the use of color here?

So he's actually, this is an example where he's given the student marks for the terms that they've included and I think the different interconnections. It's also a little bit of a metaphor, because he's got a cloud there with the rain falling on a mountain and glaciers and underwater, or underground water table it looks like, heat from inside the earth. It's an interesting example of lots of things in this particular concept map.

Okay. I've just showed you a lot of examples, and I posed a few questions to you about use of color, different examples of spokes and webs and trees. Any new inspiration? Those of you who are creating a concept map right now, did that sort of adjust your thinking about it? And a related thing is which of the styles are you actually using? How do faculty evaluate student learning by concept mapping?

Yeah. Well, the example I showed of Charly in earth and ocean sciences is just one simple example. And I will respond by e-mail with a couple of key references. But, basically, I mean, you need to first of all give your students some chance to try it out in class, I think, and then go from there.

And you need to give, like you would with any kind of an assignment, you need to really show them what is it that we're going to ask you to do here, and how are we going to assess you? You know, if you, if they need to have at least ten terms, tell them that so that a student who does a concept map with four terms and someone else does ten automatically doesn't do better just because they did ten.

You need to give them a minimum number. I see a few other questions there, and I'm going to address some of these as we come up and also by e-mail. Just a quick overview, this is in your handout, of dos and don'ts. And so if you have your example concept map in front of you, take a look at it and see, have you done some of these things? Do you need to adjust? Simple is good.

Don't worry about, you can always be more complex later. Kind of like problem-based learning, simple is usually the way to start. And I suggested possibly those sticky notes so you can move around, and that's where doing things electronically can, if you get the hang of it, you can really move stuff around on the page quite easily. Color can be helpful. Concept maps might never be completely finished.

Like lots of important things in our lives, you're always working, you're always tinkering, you're always trying to make them better or make them clearer. But if you're using them in your courses, you need to stop somewhere. I think it's a mistake to have too long of a phrase on your

arrow or your line to explain your concepts. If it's too long, maybe you need to break that into multiple.

And adding too much information, a related term. And I see folks are typing questions that maybe others in the group can answer. Does anyone have specific grading criteria for concept maps in nursing education? There are a few examples from nursing and nursing education in the references that I'll encourage those of you who are interested to take a look at. Okay. We're kind of in the closing parts of our session, folks.

And I just want to take a few seconds to look out at, I see Duke has a rubric. Well, maybe Beth and Deanne can get together by e-mail, and the folks at Magna can help them out. So other kinds of visual tools. My colleague at Clemson University, Linda Nilson, has a wonderful book called *The Graphic Syllabus and the Outcomes Map*, and she shows lots of examples of these in course outlines in her book.

And so I would encourage you to take a look at that if you haven't. If you ever get a chance to take a seminar by Linda, she's fabulous. Yeah, we've got concept mapping, we have a lot of nursing interest in the group it looks like, so I see you're having some interconnections there, and, hey, that's great. E-mails are flying. A few other kinds of visual tools that are listed here.

And I also want to thank my colleague, Donna Ellis, at the University of Waterloo in Ontario who led a wonderful seminar recently on different kinds of visual tools with some of these examples, and I have websites for you to explore in the handouts. This is a word cloud, and this is from the Wordle website. The link is in your handouts.

And what I did here was I typed in the terms that were being used in this seminar on concept mapping, and you can see what comes out. This Wordle technique is very helpful for things like feedback where you have the same term over and over again. So a term that appears commonly is larger. And then you can play with it. You can choose colors, you can choose style.

It's a lot of fun if you've never used it before, and it's also a nice visual way to show sometimes a lot of information. Okay. Another chance to, as we are starting to wrap up here, is what is your experience? So do you have other visual ways that you ask your students to do any of the bulleted lists below or anything else?

So we've really obviously been focusing on concept maps with a few examples of mind maps and other things like Venn diagrams. And you just saw a list of other kinds of visual tools. There are piles of e-mails popping

up on the screen, so I hope that's helpful to you as you start sharing information. What other visual ways do you have students show they're learning? A few folks are typing.

What is a Euler diagram? You know, I'm going to encourage you to take a look at the website. Posters. VoiceThread. That's interesting. I'm not sure I know what that is, but I'm going to try to look it up. Glogster, very nice. And keep adding those as we go through here. And I now want to also ask you, do you have any new questions that you want to ask? And you've been invited to do that throughout. Use of flowcharts, YouTube, very nice.

So if you have any remaining questions, I'm going to ask you to type them into the chat. And it's looking like, unless we end up with another minute or two, I'll respond to those by e-mail. We've already been talking about kinds of online software. You saw an example of Cmap. That was the conference, mapping conference early on. Joseph Novak was involved in its design.

Inspiration is the commonest software to use to create concept maps. Yeah, I don't know. I mean, I think they're different contexts, mind maps and concept maps.

If it helps you to start the simpler way with a mind map, go for it. VUE, an acronym from Tufts University, it is not really either of those, mind map or concept map, but it's definitely a visual tool, especially for curriculum and course design and MindMap from MindManager for doing the kinds of examples you saw with the clipart. And some of you have already added other kinds of software that you use.

If you have any more, I'm going to ask you to add them to the list in the chat. And I just want to end with a very quick reference to the handout materials. So I spent a lot of time putting together what I hoped was a fairly comprehensive reference list to the literature with as many Web links as I could and also lots and lots of examples of different kinds of software.

There's two articles that I wrote or co-wrote, and there's, of course, these PowerPoint slides and the additional handout that gives the disciplines, the step-by-step instructions, and I see some other examples popping up of, OmniGraffle. I really like the idea of that name. So I'm going to take a look for that. It makes beautiful graphics. Very nice.

A few questions to leave you with as we close the session. How do concept maps appeal to the visual learner? What are you going to do now? What are you going to do that's different? Are you going to ask people to

create them for you, to show their understanding, or will you create them for them or co-create them?

Which of the models, there's been a little bit of discussion about mind maps, concept maps, does one work better in your discipline or your particular context? My plans to go to Hawaii, hmm, maybe a mind map, I don't know.

We're out of time, folks. I want to thank you for your participation, and Magna and I would very much like it if you would take a few moments to go to the SurveyMonkey Web link and tell us what you thought and how this connected to what you saw in the advertising and were hoping to get out of the seminar. Thanks, folks, and have a good day.

Rob Kelly:

Thanks, Alice, and thanks, everyone, for joining us. As Alice mentioned, there are, there will be an e-mail with answers to the questions that were sent in during the seminar that we didn't get to. And for more information about our upcoming online seminars, please go to www.magnapubs.com. Thanks, again, for joining us, and have a great day.