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Assessment for Learning Improvement: Comparing Two Universities’ Approaches to Reveal Key Principles and Strategies

Tuesday, June 4, 2019

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>> Welcome everyone to today’s ELI Webinar: Assessment for Learning Improvement: Comparing Two Universities' Approaches to Reveal Key Principles and Strategies. This is Malcolm Brown, Director of EDUCAUSE Learning Initiative and I’ll be your Moderator for today. EDUCAUSE is pleased to welcome today’s speakers: Chad Hershock, S. Jeanne Horst, And Marsha Lovett. Before we begin, first let me give a brief orientation on our Session’s learning environment. The online room is subdivided into several windows. Our presenter’s slides are now Showing in the presentation window, which is the largest portion of the screen. The tall Window on the left is the chat window, serving as the open chat area for all of us. Feel Free to use the chat space to submit comments, share resources, or to pose questions to Our presenters. We will hold Q&A until the end of the presentation; but we encourage You to type your questions into the chat throughout the webinar. If you have any audio issues or other technical questions at any time, you can direct a Private message to “Technical Help” for support. Click the top right corner of the chat Window to open the drop-down menu, select “Start Chat With” and select “Hosts.” You Can also click on the link in the lower left-hand corner of the screen for quick technical Troubleshooting steps. And now, let’s turn to today’s presentation. A collaboration between programs at Carnegie Mellon and James Madison led our presenters to identify commonalities That underlie their two contexts. The designs and tools employed in the course meet the course as articulated in the learning objectives, which tools designed did well and which did not. And if we look across our courses can we discern which were effective. How can we base our practice in evidence? While these are traditional questions, they can still be a challenge to answer. We are delighted to be joined by: Chad Hershock, Director of Faculty and Graduate Student Programs of the Eberly Center at Carnegie Mellon University S. Jeanne Horst, Associate Assessment Specialist; CARS Associate Professor Of the Department of Graduate Psychology at James Madison University; And Marsha Lovett, Associate Vice Provost for Educational Innovation and Learning Analytics; Director of the Eberly Center at Carnegie Mellon University.   
  
>> Hello. We're lucky to have gene and her colleagues who contributed to this presentation, Sarah finny and Justin are part of our collaboration and we're having a blast. You've heard a little bit about who we are. What we wanted to know before we begin is who is participating in the webinar. You can see onscreen the options that we made available. Hopefully one or more of these fits with your professional identity and we'll see what kinds of participation we have. So far instructional designers winning the day. Maintaining its percentage. With also faculty members and a few IT or other administrators seeing what the other is in the chat. It looks like we have institutional research, folks from the libraries, director of student learning assessment. Well that's quite relevant. This is great. We have at least one participant from each of the categories we thought of and varieties of other professionals seeking to join in this conversation. We're delighted you are all here and we hope that you see some messages from today's webinar to takeaway. Let's get right to it. We wanted to start by giving a little background of the story of how Carnegie Mellon University and James Madison got together to give this webinar. It turns out that a little more than a year ago I was at a meeting and James Madison colleagues were there as well. We did not know each other and yet we were brought together at this meeting in a way that some have described as like peanut butter and chocolate and I like to think of that as we're each sweet and tasty on our own but even better together and that's the theme for today. The institutions and the centers that we represent at our two universities are actually rather different. But the commonality of our purpose and most importantly for our webinar for today the commonality for assessment strategies and the principles underlying those strategies we see as important as underlined principles that could apply in a lot of areas in particular course design, program design, Edtech tool design and more. We'll get right to it and give you a sense of how we are approaching this topic. We'll start off by identifying and acknowledging the importance of assessment for learning improvement and its centrality in higher education. We'll then talk about a little more the centers and institutions that are represented on the webinar and how we're different. Maybe some of our features overlap with the features of your institution or the unit where you are working. Despite those differences we'll move into the main body of the session where we'll go through several principles and our approach to assessment is quite the same and illustrate that approach with examples from our respective institutions.   
  
>> Thanks. We really want to emphasize that assessment for learning improvement is central to higher education. We all work within institutions of higher education and we know that many of you are doing other roles, instructional designers, developers of technology and we realize that the principles we like to talk about today not only apply to what we're doing but to what you are doing as well. We have many reasons for doing assessment here. One is accountability. We need to report out to federal and state governments on how our programs are doing, how our students are learning. We also have programs that need to undergo ACCREDITATION, so they need to meet standards and they do assessment to help show evidence of having met those standards but underlying everything is the desire to impact students and particularly student learning. An example within technology enhanced learning would be if you are talking to a Chief Information Officer about an Edtech tool. One of the most interesting points or convincing points or piece of information would be evidence of improved student learning and how that tool could promotor enhance student learning above and beyond other potential tools. So regardless of our setting, if we're engaging in assessment underlying everything is this desire to impact students learning and growth and development. The second point we'd like to emphasize is how we differ and yet as it was explained with chocolate and peanut butter example we may look different on the outside and I love how you said that, we're sweet and tasty on the outside but then together we're better. Let's first start out by talking and explaining how we differ. I and my colleagues work at James Madison university. You are not familiar with us we're a public university in the Shenandoah Valley of Virginia. We live in a valley between two mountain ranges and we're two and a half hours Southwest of Washington D.C... we have twenty-three thousand students. Primarily our programs are undergraduate, but we have masters and Ph.D. programs which is the program that I work in, a Ph.D. program in assessment and measurement. James Madison has five big broad areas of general education and what you would typically think of, domains within general education or liberal arts we have categorized within clusters. We have five big broad areas of general ed. We have eleven student affairs or curricular programs and programs focused on student learning growth development. We work within the center for assessment and research assessment, or cars as Malcolm referred to it. What our center does is help JMU programs do their assessment and all of those programs that I mentioned previously; we help each of them conduct their student learning outcomes assessment. We have ten faculty within our center. We all teach within the assessment and measurement Ph.D. program and we do that part-time and then our role is split. We do assessment consultation the other part of the time. Our vision for CA RS or the center for assessment and research studies is to inspire our faculty and staff to use evidence, to make evidence-based decisions to enhance their student learning and development. That's our goal and a little bit about who we are.   
  
>> Thanks. I'll pick it up from here and tell a little bit about Carnegie Mellon University in Pittsburgh Pennsylvania. I wish it was always as sunny as it appeared in that picture there. Carnegie Mellon University is a private global university with our main campus in Pittsburgh and a few other campuses around the world. We have fifteen thousand students that are split approximately evenly between undergraduates and graduate students with about seven thousand being undergraduates and then about eight thousand graduate students being predominantly master students and a significant portion of doctoral students as well. We have seven different colleges at the university and some of those involve professional schools like engineering, architecture, public policy and so forth. We have many academic degree programs at the undergraduate and graduate level. As was mentioned, programs have a big interest in ensuring and improving the student’s outcomes from those studies so that gives a lot of context for assessment work. The center where Chad and I work is called the Eberly Center for teaching excellence and educational innovation and the picture here depicts a cycle that has no beginning and no end. We like to talk about data informed improvement and picking arbitrarily theories of learning from the research literature as one place to begin going through this cycle. We like to help the Carnegie Mellon educators design instruction based on what we already know from learning science and from there provide students with innovative educational experiences. Of course, in implementing those innovative educational experiences students are interacting with instructional activities, assignments, online resources and other tools and as a result are producing data, data on their learning and performance and that's the other half of this cycle. We can use those data to both improve our understanding of learning and to improve on our learning designs. At the center of this cycle there's an icon representing the learner. The Eberly Centers mission and core approach is to support a community of educators who innovate in their teaching, apply learning science, develop new technologies and use data to enhance teaching and learning and to accomplish this at the Eberly Center we have several teams. We have a team of teaching consultants who focus on supporting educators, faculty and graduating instructors in the design of learning experiences. And educational technologists who help faculty members who are developing new technologies or incorporating technology judiciously into their courses and an assessment team that is helping to support this data informed cycle. And with that, I'll say a little bit more about the common things that one could use to compare the Carnegie Mellon’s Eberly Center and James Madison universes CA RS. At Carnegie Mellon our goal in working with faculty is really helping to reevaluate and apply scholarly research so that we can reveal and understand better the affective methods for teaching and learning. This is both to improve instructional approaches but also to discover new pedagogies and new instructional technologies that may help us better support student learning. Our focus is on the application of research and the discovery of new effective methods. And maybe you could talk about the goal at James Madison.   
  
>> Our goal at James Madison is at the program level to help already established programs usually to map their programming to student learning outcomes. And then we help them design or identify high-quality outcome measures and then use appropriate mythologies to draw inferences about student learning and then use that data to make program adjustments. Most of our work is the goal in helping programs discover, document their student learning. Go ahead.   
  
>> If we turn to the focus of our work at Carnegie Mellon’s Eberly Center for the longest time we solely worked in supporting evidence-based practices in course level designs. We do a lot of that work still. In addition, we do some program level work and so in that regard we have an emphasis on the classroom side of things and dip into more and more what I understand the CA RS focus to be. Is that right?   
  
>> That's right. We typically work at helping programs collect evidence about their students learning at the program level and then more and more assessment is going into course embedded and so we are starting to dip into the classroom where you are dipping into the program, but typically or historically we have worked at the program level. Those areas, general education, academic degree programs and student affairs that I mentioned earlier, we work with each of those program areas.   
  
>> Great. And another interesting contrast is what motivates folks to do this work. As Malcolm said in the introduction, these are long held desires and aspirations for higher education but that doesn't mean that the work is simple or easy. At Carnegie Mellon the motivation for folks to engage in this work is mostly what we call bottom-up, that is faculty members voluntarily come to work with us. Maybe they are trying a new approach in their teaching and they want to assess how and where it's working so they can improve it or maybe it's a group of faculty members who are running a program and they want to understand student outcomes as a result of that program in order to make adjustments. But we do like to emphasize that at Carnegie Mellon Eberly Center all the folks coming to work with us do so on a voluntary basis so that's our side of the motivation story.   
  
>> Unlike that we have a more top-down assessment infrastructure because of our ACCREDITATION, our university ACCREDITATION our assessment infrastructure is top-down. All programs are required to do assessment particularly the academic programs. The cocurricular programs do assessment more from a bottom-up perspective. The top-down assessment infrastructure has been interesting because it does bring along some of the motivational challenges that can be when you are told to do something. However, we're finding more and more we have developed an assessment culture and so we're finding more people who are engaged in assessment and are coming from the bottom-up and once they see the benefits of doing assessment on their program improvement, their students learning improvement, they become engaged and excited about it but traditionally we have been a top-down structure in terms of motivation. So, we've talked a bit about our differences on the surface. But what we've come to realize the more that we've been working together and collaborating together is that we really share these underlying principles that we have in common across both of our emphasis and our context and our consulting motivation. We'd like to emphasize too that this process is pertinent to anyone doing evidence-based practice regardless of what your context is. We'd encourage you to look for ways in which it can also apply to what you are doing regardless of your context. The graphic that you see here is a cycle of outcomes assessment and I want to say as we begin that we're using outcomes and objectives terminology interchangeably and I know that can potentially be confusing but as I've been looking at these slides I realize that we use both of them. Even though there may be nuance differences in how we would with use those terms whenever I say outcomes or objectives, I'm referring to student learning objectives. I wanted to clarify that. What you see here is a graphic one that we use here at CA RS but in working with Chad we realized that we share underlying principles regardless of what cycle we'd use it would apply to either of us. For today's presentation we're going to use this particular one. If you Google assessment cycles, you'll find variance, but they are all trying to get at this same underlying concept even if you are familiar with the PD A concept it's getting at a similar thing. I'd like to point your attention to this top box that says specify student learning objectives. That is the very basis of what we're going to be doing today. Typically, when we embark on assessment with people, we ask them what is it really at the end that you want your students to be able to know, think and do? We can think of this almost as a backwards design kind of idea that we're starting from the outcome. What is it that we want as an outcome for that student as a result of what we're doing? Linda who is prominent in the world of assessment summarized this cycle in one long sentence that you see there at the right side of your screen, but she describes this cycle as an ongoing process in which we measure clear outcomes of student learning. That's the box that you see at the top there. Then we give students sufficient opportunities to achieve those outcomes through creating and mapping evidence-based or theory-based programming to those student learning outcomes. Then we go through a process of systematically gathering and analyzing and interpreting evidence so we can see how well with students learning matches what we set out to do or what our expectations were. And then we use the resulting information to help us understand. We can improve our programs and ultimately with the goal of improving student learning.   
  
>> Alright. What we're going to do is go through several steps of the cycle and highlight some of the key principles that we share along with some short examples of how they've played out in different projects. And so as was mentioned the first step is all about specifying and focusing on the student outcomes. Starting with the end in mind, what is the ultimate goal for students? What do you want them to be able to do or to know? Then designing your course, your program or your technology tool to support student achievement of that goal. It's also really helpful at this stage to carefully think about stating those outcomes in a measurable way so that you know how it's observable in a direct fashion and this will help with future steps when identifying data sources. As I mentioned in an ideal world this would be the first step where you design and identify your outcomes at the get go before you design the intervention. When you do it the other way around it can be the tail wagging the dog and make it more challenging. I'll give you one example of that, how this process was helpful at Carnegie Mellon. So, at Carnegie Mellon there has been significant effort and money invested in developing virtual reality or VR experiences and resources to augment educational programs or courses. Including the design and implementation of a new facility to house those VR assets. The Eberly Center was asked to help the key stakeholders campus design a way to assess these VR experiences that were being created. Are they working? And how do you go about even assessing a technology asset like this? And so when we engaged with this project, the learning objectives for these VR assets, there were half a dozen developed at the time this project started were vaguely defined and so my first question was, are we assessing the design of the VR asset itself based on some set of multi-media design principles or are we assessing the VR experiences impact on student learning? It turned out that the major interest was on the ladder and so what is the desired learning out for the student strapping on the headset and having this experience? Why is she interacting with this VR head set to begin with? What are the attitudes she is intended to develop as part of this experience? In this case, in the project the key objective was developing cultural competency. What does that mean specifically? The next step is we had to articulate what are the components of cultural competency based on what these projects were articulating and then measure them. This conversation with stakeholders was key to this process. It narrowed the scope of what we were trying to do specifically, and it also really focused the assessment process on the students rather than the technology tool itself. What are the students supposed to get out of this experience? It also really telegraphed for us where should we search for appropriate instructions and data resources? What should the metrics be regarding cultural competency? We'll look at a parallel example from JMU.   
  
>> That's really cool, Chad. At JMU I'm going to take the example of information literacy throughout the examples that I bring today, and I was excited to see that we have some librarians out there. This is something that we work very closely with the librarians and the faculty teaching in the general education program. JMU has a goal for all students to graduate from our university to be information literate. As Chad mentioned with the virtual reality what does cultural competence mean? We had to ask the same question, what does information literacy mean? We needed to define specific measurable student learning outcomes so we could provide the basis then for teaching our students how to become information literate. So, we worked closely with the librarians and the faculty and those of you who are librarians out there you'll notice that these are not the current ones that are aligned with the A C R L frames if you are familiar with that. So just a side note to the librarians. These are the learning outcomes that we used before we were in the process of switching over. Just a side note. But what we did was work with the librarians and the faculty through a process of really carefully defining what we mean by information literacy. And what they decided at that point was one, we want our students to be able to evaluate the quality of information, they need to be able to use information effectively for a purpose, recognize that information is available in a variety of forms, be able to use information ethically, legally, employ technologies to create an information based product and determine when information is needed and find it effectively. This is the outcome that we want to see our graduates to be able to do and this is going to provide the basis upon which everything else that we're going to be describing is built as we move forward. I'll turn it back to you, Chad.   
  
>> Okay. Thanks. We move on to the next step and this is really all about aligning evidence-based instruction with the learning objectives, whether you are in a course, a program or developing a technology tool. Both, this is an area where we have a lot in common across our institutions. Both JMU and CMU employ an evidence-based practice in two ways. We leverage existing research literature on how learning works to inform the starting point of our assessment and in the educational innovations. Our goal is to distill this research into practical strategies aligned with the learning outcomes. The second way we do this is we collect data on student outcomes to refine the educational programming or intervention that was selected and implemented and one thing that we have in common is that we see program directors and instructors of courses struggle to build theory or research based curriculum or programming. At both institutions we're actively involved with consulting with them one-on-one to help identify their goals. We scan the literature for different instructions and metrics, and we use them to support different projects so that our clients don't have to reinvent the wheel. As byproduct of this, the stakeholders can get indoctrinated into that literature to see what kind of interventions people have studied, what interventions tend to move the needle on those measurements. So, what I'd like to do now similar to before is give you an example of what this looked like in a course level consultation at our center. This is the story of Sarah Christian who is a faculty member in civil and environmental engineering and she teaches courses on material properties and she has three main units that look at building materials and when she first came to talk to us she was frustrated because students weren't transferring and applying the learning in the lab to the questions on the exam. They weren't performing as well as she expected them to and her intuition when she came to us is that students need more discovery. They need to be put in a position in these labs to think like engineers rather than following a series of instructions, doing a series of tests and writing a lab report. She looked at what a possible improvement might be but didn't know how to articulate that or do it. We worked with her together to identify from the literature an evidence based strategy that would with align with this perceived need and we settled on inquiry based learning and there's stem disciplined on learning and we leveraged this to come up with ways to replace the recipe cookbook labs with labs to think through situations like an engineer would. There are all kinds of variance of this which vary in terms of how open-ended it was, and we had to further narrow the implementation of learning. What did this look like in her course? At the Eberly Center our mantra is start small and build from there. It's one of our mantras anyway and so the original labs, we picked one. We said let's start with one and how can we transform this lab? The old version was they came into lab and teams of students were handed a masonry unit and they ran five or six tests on the physical properties of this and wrote a lab report. As a change, instead Sarah presented them with an authentic program. She gave them two sketches, building plans for a garage and then handed them the masonry unit and said, okay is it feasible to follow this plan and build this garage with this set of masonry units that I've just handed to you? What students had to do was sort through their toolkit of tests and materials properties concepts that they had learned earlier in the semester and figured out what is it we have to measure and then go about measuring it and then decide what's the answer to the question. It turns out for this particular example that the key materials property is absorption of water. When it rains, how much of that water is going to get absorbed from these masonry units? Is the garage going to collapse under its weight or not? Later in the presentation we'll cycle back to this information and I'll tell you the data we discovered. We're going to shift now back to JMU.   
  
>> Thanks, Chad. The literacy example forward I should explain that this competency is required for everyone. All graduates. You can walk across the stage, but you cannot get your diploma unless you have passed this test. The test that I'm going to be describing to you in a few minutes, the score will go on your diploma. This is something that students are motivated to learn. It's a high stakes student learning outcome, set of student learning outcomes that we expect of them. So how do we go about using evidence-based practices to teach them the skill? Well, one is we embed the skill within the human communication course even though there's no specific information literacy course tied to it. But we have a course that is required of all first-year students. It helps hook substantive content on to the information literacy and how we go about teaching the skill is we have students take an online tutorial that's created. They can take the tutorial anytime they want. They can take it as often as they want and use distributive practice to learn these skills. The online tutorial is directly mapped to the student learning objectives, so those six that I talked about earlier, there are modules for each of those outcomes. Students can take them and go back and focus in on any of the learning objectives they care to at any time. Within those modules are quizzes. So, another evidence-based practice that we employed is frequent quizzing, student directed that gives them feedback. Through these processes we hope that students are learning this material. The important point being that it is all mapped directly to those student learning outcomes that we talked about earlier. So, Chad is going to tell us about another underlying shared principle between us.   
  
>> I'm actually going to step in going for the third step and this one is near and dear to my heart. We've emphasized the importance of starting with learning objectives and mapping the programming, designing it through a backward design but really the assessment data that you collect will be as informative as they are high-quality. You want to make sure that you select and design instruments so that you get data sources that accurately reflect what you want to measure. An example of this could be like gene was talking about, the quiz where students actually have to perform information literacy tasks or the example that Chad gave, the practice there was going through and analyzing the masonry unit. All of those examples are really high-quality examples because they are direct measures of students performing the skill, showing what they know. We really prioritize direct measures in our work in assessment for learning because they are the most accurate and they are going to be the best representations of what you want to measure in students’ outcomes. Sometimes it's tempting to use self-report measures, maybe asking students what they think they learned or how they think they can perform a task or to look at data that automatically come from the learning analytics of your system that might reveal something about how many times students clicked on a certain page or how long they watched a video. It's important to note that a student's self-report is not necessarily going to be the same as their actual ability to do a task and students amount of time or number of clicks on a certain site are not necessarily an accurate representation of what they can perform or what they learned. For this reason, we really emphasize looking at direct measures and I'm going to give you an example of how even when you have direct measures it's important to look at them from a learning perspective. This example is in a tech example where we were working with a faculty member who wanted to build and was already building an online module to teach students about academics and this instructor knew that an appropriate thing to do at the end of the module would be to give students a quiz on academic integrity and in the 2015 version of this module you can see here on the posttest students scored more than 90% correct and I think for several moments the faculty member was really excited about that and thought students had really learned a lot. What we realized and we pointed out was that posttest alone shows student's assessment items, but it doesn't show learning until you've shown a difference between PRE and post. What we did for 2016 was we added the same test for a pretest and low and bow hold as you can see from this display found that students taking the test without feedback before the module performed almost as well. They scored higher than 85% correct and at that same time the posttest performed 90% correct on the post test. What this suggested was that our initial estimate of students’ performance even though it was a direct assessment and showed they could perform 90% on that assessment was not showing us their learning until we had the pretest in place. Apparently, our tests had been designed to be too easy. So what we did next was we actually revised the test and so then the next year we administered newly revised tests at PRE and post making the items more nuanced and challenging more realistic to students scenario and found that at pretests students didn't do as well and yet at posttests we could show that the online modules were making a difference on these more challenging assessment instruments. Here we'll go back to information literacy.   
  
>> I love that example. That's great. For information literacy I mentioned that all students need to be competent by the time they graduate and so we have a test that we developed here and actually the librarians developed as well as the general education faculty. This test is a course embedded competency test. It has fifty-five items and when the librarians write the items, they write them directly mapped to those student learning outcomes. All the entire population of JMU students take this test. We need to have for security purposes and for reasons that they take the test multiple times we need to have multiple forms of the tests. We have forms with a shared subset of items and students may take the test once a day until they pass. And so, if someone passes a test, they get a score report that you see on the right that's considered summative. If they don't pass the test, they also get the same score report but in that case we have it structured so that they get formative feedback on the test. This formative feedback is going to be structured in terms of the six student learning outcomes and you see there are some stars there. Instead of saying you got a five or a six or some number we just put stars there so that they can compare across and say, oh, on the one first objective I scored four stars. On that third objective I really only got three stars. That objective is to evaluate the quality of information. And then what we have are the skills required so we with try to think through what are the skills that map to that objective and then because we have the tutorial tightly aligned to the objectives as well we can use that information or the students can use that information to go back and study again, focus in on the areas they need to focus on and then retake the test. We have it set up that they get feedback that can either be summative or formative for them and we can only do that because this is tightly aligned to those objectives.   
  
>> Okay. Well I'm going to try to bring us to a rapid conclusion here so that we with can have some time answering your questions. We're going to fast forward to the last step of the cycle which is certainly worth talking about because the final step is actually not an ending. Ideally the cycle continues as stakeholders use the data and that's the other mantra of the Eberly Center is assess, intervene, reassess and the cycle of data informed teaching continues. I promised I would cycle back to Sarah Christians story and I want to talk about this relative to this last step of using results for program related decisions. So, what you are looking at here is the data from here exam after the intervention. On the Y axis of this graph is the mean percent correct of students on exam questions and what you are looking at is the blue bar there we mapped the exam questions to the different conditions. So the blue bar represents the exam questions that were covered by the inquiry based lab on masonry and the orange bar represents mean performance on the questions that map to wood or concrete, the two labs that remained in their original cookbook form and then there are error bars that are 95% confidence intervals. What we found was a significant 10% on average difference between material that was learned through an inquiry based method through cookbook method and affect size take into account variability and the data and sample size and those metrics indicate a strong signal and based on this data Sarah was inspired to invest her resources in revising the other two labs in the course. And she just finished teaching that version this semester and so hopefully by the end of the summer we'll have an answer. Our prediction is that performance in those other two labs should come up about 10% if we get a consistent result.   
  
>> We have one other quick example of this from Carnegie Mellon. It's an online modules example where students were coming in as first years with diverse preparation in math and we wanted to narrow that gap and help them prepare better for their first college level math courses and the online courses were built in the learning initiatives in the summer of 2016, we saw that the test scores at this point were pretty good. In fact, we did do a PRE post but for simplicity I'll look at the posttest here but still we wanted to help make the modules better based on the posttest results. We looked at those data to glean information into insight and then take action and adjust the modules. We did that in a few targeted areas and in the following summer students came in with similar pretest scores but as you can see from this graph their posttest scores had increased some more but we weren't satisfied. There was room for improvement to get them strong this their math preparations. This time we made more significant refinements and in our last summer’s deployment showed that the posttest scores were even more strong. This is an example of going through that cycle multiple times and using the data to make targeted adjustments to the modules.   
  
>> Similarly, because our information literacy test, the MREST is so tightly aligned to the student learning outcomes and aligned to the tutorial content when we look at data from our students, we can organization it by student learning outcome. You'll notice that students were scoring least well on the objective determine when information is needed find it effectively. We can share that with communication instructors because the information literacy is embedded within that course, but we also use it to modify our tutorial content and to see where we may need to change our instruction. Because we have ongoing assessments each year mapped to those student learning outcomes, we can see whether or not our intervention was successful. Then one quick final example is a hypothetical example of a time in which you might have PRE and post data. If you have your everything tightly mapped to those learning outcomes you can tell by the pattern of results where you may wish to put your resources. So, if you look at the top learning outcome where students are starting high and ending high on PRE and post you may ask, well do we either need to put resources into that area? Maybe we just continue to monitor how students are doing. If you look at the black box in the middle you'll see students started out at about sixty but at posttest they score about ninety and if this is the case we can look back to our activities and see well, maybe we put seven activities aligned to that objective. And in that case, we're probably investing our resources well, our time and energy. Look at the bottom learning objective, however. Notice that students start out at about fifty and on posttests they score a little less than sixty. This maybe an area where we realize we have work to do and may want to invest our resources. That's a quick way in which you can use your pattern of results in order to know where to tighten up your programming or invest resources in programming. So, we've shared some core assessment principles with you. At the basic, we need to be able to define what students should be able to know, think or do and then once we've done that, we need to align evidence-based instruction with those objectives. You need to ensure that the data sources are accurately measuring the outcomes. We always aspire to have one or more direct measures of those outcomes to inform our refinement. Taking from these principles that are at the core of our practice we hope that they can guide your data assessment efforts as well.   
  
>> Thank you for patiently listening to us and we're happy to take questions.   
  
>> Thank you very much. This is Malcolm coming back in. We have a question here from Francis. Are either of your institutions using or exploring digital curriculum application? Anyone want to take that one?   
  
>> If I'm understanding you correctly, we have not yet been doing digital curriculum application, but we do leverage a lot of online tools to support this data collection process.   
  
>> And I'm not familiar with digital curriculum application so it looks like I have some things to learn. I'm not aware that we are unless I'm just not aware of it.   
  
>> Many of our projects do focus on hybrid courses or components of face-to-face courses that are online or completely online courses if that's what you are referring to.   
  
>> Unfortunately, we're almost out of time but Jessica brings up an interesting question. You mentioned earlier in the session that you want to use direct measurements whenever possible and not rely on proxies and a lot of generation one analytics are proxy no click time, stuff like that. Looking at her question, do you see now or perhaps in the immediate future any use of analytics to help you do these types of measurement of learning gain?   
  
>> I'll jump in with one response to that. In particular I think online learning tools can make it easier to collect the direct performance measures so that's a real plus and we definitely leverage that either a closed form or open-ended questions where students are solving problems. In addition, I think the analytics that speak more to the time students spent or their engagement can be used in looking to identify whether there's a dose response effect. That is students who use the tool more, are they learning more? Alone the engagement analytics are not necessarily a measure of learning and so we don't really use them very much alone as measures of learning but they can be useful in assessing the degree to which the more students use a certain set of activities or online tools, the more they are learning that's suggestive that those on lines tools are productive. One way we use it is as a measure of motivation. On online testing if students are clicking through really quickly, we use a method called response time effort and filter out response time effort as long as it's not correlated with other measures of aptitude or ability. We have to be careful in doing that but that's one way we've used that information.   
  
>> Okay. Unfortunately, we're right up on time so at this point I would say on behalf of EDUCAUSE, thank you very much.   
  
>> Thank you.   
  
>> Thanks for having us.   
  
>> Okay and for all of the participants here, before you do sign off, please click on the session evaluation link there on the screen. Your comments are important to us. The survey is very short. And if you could do it now while the session is still very fresh in your mind so much the better and thank you again in advance for doing so. Today's session and recording and presentation slides will be posted to the webinar website later today. Please feel free to share it with your colleagues. On behalf of the EDUCAUSE, thank you for joining us. This is Malcolm Brown and have a great rest of your week

**[End of Webinar]**