

Meeting Notes
NSHE E-Learning Task Force
Wednesday, November 20, 2013

Attendees: Mark Fink, Co-Chair; Erika Beck, Caroline (Carrie) Bruno, Kevin Carman, Cynthia Clark, Paul Davis, Darren Divine, Lisa Frazier, Christian Fritsen, Richard Kloes, Fred Lokken, Terry Norris, Alex Porter, Tony Scinta, Jeffrey Wong

Guests: Aaron Wong (NSC), Bill Speer (UNLV), Elaine Bunker, Ryan Stryffeler (WNC), Ted Plaggemeyer (TMCC), Sheri Sanchez (GBC), Chris Herald (UNR), Jim Matovina (CSN)
Jessica Russell (GBC)
Steve Zink, Renee Davis, Crystal Abba

1. Discussion with Campus Remedial Education Representatives

The Task Force members discussed best practices for remedial education and possible gaps that could be filled through e-learning technologies. Selected campus representatives who currently are engaged in remedial education met with the group.

Written responses from College of Southern Nevada, Great Basin College, Nevada State College, Truckee Meadows Community College, and the University of Nevada-Reno are incorporated into the meeting notes. Comments from other NSHE representatives are provided below.

Mathematics

UNLV reports that initiatives outlined in the Remedial Transformation Project final report are still ongoing, especially at the developmental course level. There is a new initiative to reexamine the transition course work in mathematics, which is expected to be implemented in the spring.

GBC teaches Math 95 and 96 online, but have experienced problems with enrollment because students cannot get financial aid and the classes also do not count toward a full load nor for housing credit. They have experienced success using embedded tutors and with a summer class that was taught all day on Fridays. GBC is also testing a grant-funded program with Elko high schools to have seniors who did not qualify for college math through Accuplacer take remedial math in their junior-senior high school years.

TMCC has experimented with stretch classes by adding a two-hour remedial lab to a 3-credit class and is reporting good retention and good pass rates. It is also experimenting with mini sessions in various pairings – offered double time in shorter sessions, two classes split into one semester. Students love it, and faculty like the immersion of it. TMCC is pursuing a Skill Center model where they assess a student at his/her current level and then take them as far as they can go at the end of a semester and see where

they place. The center is open 9am-10pm and Saturday mornings, and it serves about 650 students.

English

UNLV has turned its attention to revision of English curriculum, but initiatives mentioned in the Remedial Transformation Project remain ongoing.

GBC noted several new initiatives. It now uses WritePlacer to place students into English 95 or 101. The college went to a graded course from pass/fail, and it is looking to start a stretch course in a single semester. For student with higher Accuplacer scores, they are requiring supplemental instruction with an instructor or tutors.

At WNC, the college lowered test scores to match TMCC and GBC. The college added a flex course with lecture capture that is working well – the class session is offered in person with video embedded into the online course, with students having the choice to attend in person or not. Online students can email the instructor with questions and it shows the instructor where the student was in the video when he or she asked the question. A former WNC professor has been embedded as an online tutor in the class, and his services have been heavily used. Approximately 20% of students do attend in person but can access the video just like online-only students

Fred Lokken noted that variations of lecture capture are being used elsewhere. It helps to teach in front of a real class and results in a better video and online experience. Elaine Bunker cautioned the task force to consider that technology can sometimes be a barrier to lower socioeconomic levels, because they do not own computers and often may not have a vehicle to travel to a local library.

Sheri Sanchez noted that hybrid formats must have structure with due dates for assignments. Students who put in the time are doing well; those who don't are dropping. She uses Canvas with short topics. In-class students can use the material to review what they learned in class. She likes Aleks because of the mastery component and uses it as a practice tool/homework.

Carrie Bruno said smart pens are being used very successfully by instructors and tutors. The pens cut down on the amount of time to answer student questions; they are wireless and quickly generate a link that can be emailed to students or posted right into the webcampus class.

2. Remedial Math and English Work Groups

The Chancellor's selections for campus representatives to serve on e-learning work groups were announced. The discussion included initial tasks to be assigned to the groups and any related topics. Mark plans to meet weekly with each group through

asynchronous methods. He asked Task Force members to send any feedback about the proposed work group assignments to Nancy Flagg.

3. Canvas Communication Tool

Task Force member Fred Lokken described the new communication tool he has created for the E-Learning Task Force and its work groups to use and provided information for training users. Canvas will be used as a virtual meeting place. It will allow discussion threads to be established for the Task Force and each work group to allow for ongoing dialogue. Each work group will need to identify someone to do simple editing. Mark Fink and Nancy Flagg will have full access to monitor activity and documents. Mark thanked Fred and TMCC for creating the site. He wants to make sure it gets going without delay. Although UNLV and UNR currently do not use Canvas, representatives from CSN, NSC, and TMCC offered to help with training.

4. Campus Visits and Communications

Task Force Co-Chair Mark Fink presented a plan for communicating the Task Force's work to NSHE faculty and staff. The plan includes, but is not limited to, campus visits and periodic written communications. Communication with part-time faculty and with student groups (Nevada Student Alliance and Graduate and Professional Student Association) will be added to the document. Alex Porter is the liaison to Nevada Student Alliance. The task force also recommended that Mark Fink issue a regular brief summary on a regular basis that task force members can forward to campus mailboxes.

The Task Force agreed to have Mark visit UNR, TMCC, and WNC during the week of Dec. 2. Nancy Flagg will work with Bob Wynegar, Fred Lokken, and Kevin Carman to set up campus meetings.

5. New Business

Ed Nagelhout will replace Kendall Hartley as one of the UNLV's representatives on the Task Force.

RTP Questions – CSN Responses, but Jim Matovina, CSN Math Dept Chair

- ***What changes have occurred since the Remedial Transformation Project report was issued?***

The MATH 198 course piloted in the Summer 2012 term evolved into the Math Prep courses ran through the CSN Workforce Program. The courses are 10-week, non-credit, computerized, module-based courses ran in Pearson's MyMathLabPlus. A successful completion of at least the first 3 (out of 6) of the modules would raise the student's placement to MATH 95, and the successful completion of all 6 modules would raise the student's placement level to MATH 96 or, more importantly, MATH 120.

At CSN, MATH 91 is no longer offered. Students who perform poorly on the Accuplacer Math Placement Test (less than 89 on the Arithmetic (AR) Test) are allowed to enroll into MATH 93, study at retest in four months, enroll in MATH 104 or MATH 116, or take the Math Prep class.

The accelerated MATH 95 and 96 courses are now 8 weeks. The PeopleSoft system has a Post Enrollment Requisite Checking (PERC) feature that automatically purges students from the MATH 96 course if they do not pass the MATH 95 course.

The content in MATH 95 and 96 was rearranged so that all the "linear" material is in MATH 95, and the "non-linear" material (e.g. factoring) is in MATH 96.

The Accuplacer cut-off scores were lowered to match those recommended in the Regents Handbook.

MATH 115, Hospitality Math is no longer offered. Those AAS degrees have switch, or are in the process of switching to. MATH 104.

- ***What are the learning technologies currently used at the institutions for remedial education?***

CSN uses MyMathLabPlus for the Math Prep classes; and MyMathLab, iLearn, and Enhanced Web Assign as options in MATH 95 and 96. Some sections of MATH 95 and 96 also use Massive Online Open Consortium (MOOC) resources in Canvas, as well as instructor produced materials and videos.

- ***What has been your experience using pieces of online instruction for remedial education vs. all online?***

Many students want entirely only courses, and many other students want absolutely nothing to do with courses that incorporate any type of technology. We have also experimented with hybrid courses that had both required online components as well as in-class meetings. Typically, those hybrid sections are the last to fill, which seems to indicate students would like one approach or the other, but not a combination, therein.

- ***What is your take on hybrid formats (on-campus attendance paired with online) and flipped lectures?***

As mentioned above, students seem to avoid hybrid math courses. If they want an online course they sign up for one. If they want an in-class course, they sign up for one. They don't seem to want a combination of the two. What are "flipped lectures?"

- ***What is your overall perspective on using e-learning technologies in higher education, not just for placement but for instruction as well?***

E-Learning classes can be effective for those students who have the desire and skill set needed to succeed in them. Unfortunately, for remedial math students, not all of them fit that mold. Based on my experience, a significant percent of students enrolled in remedial online math courses lack the initiative needed to succeed. They would benefit greatly from attending lectures and completing assessments in the in-class environment.

- ***Have you had any vendor experience, and are there ones you like and/or avoid?***

The costs associated with publisher-produced online materials are skyrocketing. This is appalling. Also, I have found the Connect Plus system offered by McGraw Hill to be poorly designed and contains horribly edited materials. The MOOC materials are free, open-source, and a nice alternative.

- ***Is there a gap in remedial instruction that e-learning can address? (We couldn't identify a clear gap in the RTP report other than getting students better prepared for college math and English.)***

E-Learning definitely has a place in math remediation, but these courses MUST be offered in alternative platforms, as well.

- ***What is the known efficacy of online methodologies for remedial education? What does the research show? What data exists?***

I do not know. Many instructors have indicated the requirement of online homework is effective only if students achieve certain benchmarks before they are allowed to proceed. Unfortunately, I know of no research or data that supports this claim.

- ***What elements of math are best taught through e-learning methods?***

The requirement of online HW that mandates certain benchmarks (e.g. 80 or 90% correct) before an assessment can be taken is good. This can be accomplished in both online and traditional courses.

- ***Is your campus using some form of online homework? If yes, what program are you using, what works well about it, and what could use improvement?***

This varies from instructor to instructor. Some use MyMathLab. A couple use MOOCs. At least one instructor is planning in using Enhanced Web Assign (EWA) in the spring.

- ***Referencing P. 6 of the report – Students who enter MATH 91 or 93 can face up to four semesters of remedial instruction. What are the computer-based results mentioned in the report?***

At CSN, this is a reference to the Math Prep program. The first three (out of 6) modules mirror the content in MATH 93. Thus, a successful completion of them will raise the student's placement to MATH 95. The Math Prep program is a 10-week, computerized course. The pre- and post-tests in the modules must be done on the computer, but in the lab setting; they cannot be done at home.

- ***For the 79% success rate cited by CSN on page 10 of the final report – at what level did students actually test?***

Students took a departmentally written, computerized diagnostic test that mirrored a MATH 95 final exam. 79% of them scored at least 70% on the test and, subsequently, had their placement level raised to MATH 120.

- ***How does the College America three-track program for community colleges integrate with 4-year institutions' efforts? Can it? Should it?***

I am not familiar with the College America three-track program.

- ***Referencing P. 13 of the report – Do we know why students are withdrawing from college after completing remedial courses?***

N/A for CSN Math

- **Referencing P. 14 of the report – at UNR, what is the update/success of the online instruction in the three courses cited (100i/105/106)?**

N/A for CSN Math

- **Can the NSC representative talk about the module system used on that campus? Could this approach be used for adult learners to focus on skills they really need rather than re-teaching things they already know?**

N/A for CSN Math

- **Can the UNR and UNLV representatives talk about the co-requisite model (stretch method) that allows students to complete remedial work while they are simultaneously enrolled in the credit-class?**

N/A for CSN Math

- **What is your experience between remedial education for adult learners vs. traditional-age students? Are there differences? Would e-learning better meet the needs of one type of student over another?**

Older learners seem to be more accepting of the remediation, but, at times, more resistant to technology. Younger students, particularly those students right out of high school, are often resentful about having to take remedial courses. The placement into one of those categories is not a major factor in the successful completion of remediation. It is impossible to develop a “one size fits all” structure and platform for remediation.

- **We know one size doesn't fit all, especially in remedial education. Do you have thoughts on how the e-learning task force can develop a few options to serve different learning styles? How do we assess the best method?**

There is not, and will never be, a “best method” for remediation. I feel the key is flexibility. Some students have no problem with computerized online remedial math classes, and others have a learning style that is conducive to the traditional in-class environment. The best thing this task force can do is to ensure that options remain available.

- **What is your experience using online questionnaires?**

The response rate is minimal, and typically done by individuals who wish to lodge a complaint. Sure there are frequent aspects of praise, but I feel the responses are not reflective of the entire population.

- **Quick, rote memorization can end up being a disservice to students if they delay in taking the for-credit courses in MATH or ENG or if they transfer to another institution, because they may not retain the knowledge when they do enroll later in a credit course. Have you found any solutions to this?**

Quick, rote memorization IS a disservice, especially in remedial math courses. Unfortunately, this is the approach many learners take, and that is why they are in remedial classes. This is often the misguided approach students have developed after many years of education, and, consequently, it is difficult to address in a single class. Hopefully, the new, Smarter Balanced Curriculum being taught in the school district will lead to more conceptual understanding and the realization that mathematics cannot and should not be memorized.

- **UNLV, NSC, and CSN with CCSD have created the exam rubric, and UNLV has documented some success with ENG 101E and 101F. What ways can e-learning technology improve student outcomes for English? Are you using any e-learning methods now?**

N/A for CSN Math

Great Basin College responses to RTP Questions:

What changes have occurred since the Remedial Transformation Project report?

Statistics are based on the number of students that complete the course. Students that officially drop by the drop date are not included.

CMP90Z

- **Summer 2011 live lecture, Webassign, 2 hour lab, 10 weeks pass rate 74% (13/17)
- **Spring 2012 live lecture, ALEKS, 30 minute lab 15 weeks pass rate 75% (9/12)
- **Summer 2012 live lecture ALEKS 2 hour lab 10 weeks pass rate 70% (19/27)
- Fall 2012 live lecture ALEKS, 30 minute lab 15 weeks pass rate 54% (7/13)
- Spring 2013 online ALEKS 15 weeks pass rate 100% (3/3) with 4 early withdrawals
- **Summer 2013 live lecture ALEKS 2 hour lab 10 weeks pass rate 88% (14/16)

A noticeable trend is evident, especially for the summer classes, when a lab time is available for students to work on assignments shortly after lecture where I am able to work with students one on one as they work to master the module topics.

Limitations for offering during the regular semester have appeared. These limiting factors are the self-pay and not being for credit, which effects credit load used for housing, scholarships and loans. The effect on the course has been decreased enrollment causing me to pull the course during the regular semester.

Math 95

- Fall 2011 live lecture ALEKS 15 weeks pass rate 67% (8/12)
- Fall 2012 live lecture ALEKS 15 weeks pass rate 71% (15/21)
- **Winter 2012 online ALEKS 5 weeks pass rate 76% (16/21)
- **Summer 2013 online ALEKS 6 weeks pass rate 83% (15/18)

These shortened online courses have been very successful. My thoughts are that a more confident disciplined student registers and stays with the shortened course. Also, the student may only be taking the one course with a total immersion in the topic.

Math 96

- **Winter 2012 online ALEKS 5 weeks pass rate 78% (29/37)
- Spring 2013 live lecture ALEKS 15 weeks pass rate 92% (11/12)
- **Summer 2013 online ALEKS 6 weeks pass rate 71% (12/17)

- Fall 2013 live lecture ALEKS 15 weeks current standings 95% (21/22)

This is the third year I have used ALEKS and have spent time developing an effective use of the tool for my courses.

All of my courses utilize CANVAS whether they are taught live, IAV, or online. I post multiple types of resources for the students to utilize. I have created lecture capture videos by topic that I post on CANVAS with the SMARTBOARD slides or Power Point slides that accompany the video for students to print, follow along, and take notes while they watch the video. I develop various word documents that I also post on CANVAS for students to review (i.e. vocabulary, topic highlights and trouble spots, solutions to commonly missed problems). For my live classes, I will post the weekly lecture slides for students to print, bring to class and take their notes on.

Currently GBC is working on a grant project with the Elko County School District offering the seniors that took the Accuplacer as a junior and did not place into college math (or English). This program is just in its infancy and 3 weeks into a 7 week course. The program offers students that placed into Math 96, to take it online while they are in high school enabling them to meet the requirements to enter college math their first semester. I truly believe this is a great program and will follow through with the grant and apply for future resources. This can give us an opportunity to improve and continue a program that will allow high school students to remediate during their senior year so they are prepared for college level courses their first semester.

I will again be offering the Math 95 and Math 96 online 5 week courses over this winter break. These courses will utilize embedded tutors that have volunteered their time. They will answer student questions from assignments that the student will post on the Coffee House area of CANVAS. I will review the site and insert any needed detail and answer course procedure questions.

What are the learning technologies currently used at the institutions for remedial education?

- ALEKS for Math 91, 95 and 96 for live, IAV and online courses.
- We are moving to MyMathLab for Math 95 and 96 spring semester.
- CANVAS can be used for all formats: live, IAV and online
- Lecture capture videos created in our studio/classrooms

- Most classrooms have SMARTBOARDS. Lectures can be enhanced by SMARTBOARD slides or Power Point slides and other presentations.
- Smart pens are being used by instructors and ASC tutors to record and post solutions to CANVAS or email.
- The tutoring center is utilizing Skype technology to enable distance tutoring.
- Instructors have various resources for chat and live interaction sessions online.

What has been your experience using pieces of online instruction for remedial education vs. all online?

I teach a variety of formats: live, IAV and completely on line. I have developed my courses to be similar in any format with the only difference being the in person time for live and IAV lectures. I create CANVAS courses with all of my developed resources and use third party programs and their resources. I have found the combination to benefit the students. Every course has various learning types within it. When students are offered multiple resources they can find the type that works best for their learning style. In the classroom I am able to show students various approaches to solving the same problem, but I still may not have found the way a quiet learner needs. When an online study resource is used students that cannot directly ask me to explain a solution or the shy student can view multiple options where they are comfortable and at the time they are studying to aid with the solution. This timely self-help also starts to move the student from a directed learner to a self-learner.

On that line of self-help, the third party technologies offer instant feedback at all times of the day to all students that a live instructor is not able to do. There are times that a student still will struggle with a solution but they are able to email me that question from within the program so that I can help when I am able to. I have found a strong instructor presence for online courses keeps students motivated and accountable to an authority. They see someone interacting and monitoring them and so maybe they do not feel alone and left out there with just their computer. I use both corrective and positive feedback during communications to let the student know their progress and my expectations. In my experience using online resources in any format with a strong instructor presence is beneficial.

What is your take on hybrid formats (on-campus attendance paired with online) and flipped lectures?

From my response above, I strongly believe that any format of course using an online tool is beneficial to the student. Now I mean the online study program is a tool not the course.

I am going to further the use of lab time after lecture during spring semester to observed the effect on student learning. I would hope the lab time will be as beneficial as it has been with my summer course. I have approached the ASC in Elko about providing an hour of time a week for each of my courses. During this time the students can come into the tutoring center and work on their assignments with a designated tutor for the class. I plan on spending available time with the class also.

One of our professors is utilizing flipped lectures with their pre-calculus course and having success. More data needs to be available before we can truly make a recommendation.

What is your overall perspective on using e-learning technologies in higher education, not just for placement but for instruction as well?

I am much in favor of e-learning with a strong instructor presence for instruction. Technology is evolving every day. Our younger students have grown up using it and our older students need the ability to use it to compete in the workforce.

I do strongly believe that all exams must be proctored to maintain the accreditation of the courses.

Have you had any vendor experience, and are there ones you like/or avoid?

I have worked with Mathzone, Connect, ALEKS, Webassign and just went through training to use MyMathLab this spring. Right off, avoid Webassign. It has not kept up with the competition. It offers limited practice problems, pre-assessments and is only a homework site. The instructor assigns the available homework problems from the textbook. The site does offer help in the form of hints and an improving video library. Mathzone is phased out and Connect is a smaller version of ALEKS.

My preference at the moment is ALEKS. This is a massive program with many implementation options. The instructor needs to read through the options, ask questions and then pick and choose what best fits their style and get started. My students like ALEKS for the practice until you get it. They may not tell me that during the class, but I have students in college level classes wishing they could use ALEKS again. The study starts with an initial assessment to determine the student's current abilities of prerequisite and course topics. The topics mastered during the assessment are counted as mastered for the course. Meaning if a student can perform operations with integers, they do not have to practice again. They move to

the topics they are ready to study within the sequence of the course. ALEKS has various assessment, practice, worksheet and review options. Again, instructor's style determines what is utilized.

I have not used MyMathLab in a course yet. From training I see some differences from ALEKS. Instead of an initial course assessment, students will take a pre-assessment for each module or chapter, however the course is structured. Similar, the student will not have to practice concepts mastered on the pre-assessment. Unlike ALEKS's topic assignment with unlimited questions of the same type, MyMathLab assigns available questions from the textbook. Now a student has multiple attempts at the question with different numbers generated by an algorithm. Once the student is successful, they move on. With ALEKS, a student must answer 2 to 3 similar questions in a row without using help to show mastery of the concept and be able to move on. I feel MyMathLab more limiting. We shall see. Students are able to email individual problems to the instructor for assistance, but the instructor is not able to view the progress during the assignment. I am able to do this with ALEKS and Webassign so I can see any problem areas and review in class.

Is there a gap in remedial instruction that e-learning can address?

Yes: Given the time to build learning tools for different learning styles, an e-learning environment can meet the needs of more students than a single teacher is able to in the limited lecture time.

- Effective tool for multiple learning styles
- Unlimited practice with homework platforms
- Instant feedback
- Less time constraints in scheduling

What is the known efficacy of online methodologies for remedial education? What does the research show? What data exist?

Both ALEKS and MyMathLab have research data and multiple end user reviews showing improved student success. I have not thoroughly researched outside sources.

What elements of math are best taught through e-learning methods?

Any and all with effective course design. The unlimited practice with instant feedback and the tutorial resources are invaluable. A teacher using a textbook cannot provide this unlimited practice and immediate feedback for every student in a class.

Ease of scheduling for students not able to attend live courses.

A less stressful environment for students who are intimidated in the classroom.

Is your campus using some form of online homework?

Yes.

- We have used Mathzone – thankfully being phased out.
- Currently using Webassign, ALEKS and moving to MyMathLab.

Webassign is very limited in the available problems to assign. Do offer section videos with hints.

MyMathLab assigns available problems from the test with the student able to answer a problem (algorithm driven) until they get the correct answer. Pre-assessment for each assignment with the student only having to work the problems they missed for the assignment.

ALEKS is a true mastery program. Topics are assigned with in the course of study. The student shows mastery by answering 2 -3 problems without any help before the topic is considered mastered. An initial assessment is used to determine the student's pre-requisite and current course knowledge.

What is your experience between remedial education for adult learners vs. traditional-age students? Are there differences? Would e-learning better meet the needs of one type of student over another?

There can be huge differences in the learners:

- Traditional learners have had recent experience with classrooms and the topic.
- Adult learners may not have been exposed to a classroom or the topic in decades.
- Traditional learners have grown up with technology and tend to be more comfortable. Their limiting factor may be motivation and discipline.
- Adult learners tend to favor hard copy text and face to face instruction.
- With a good orientation to online resources both groups can benefit from e-learning.

We know one size doesn't fit all, especially in remedial education. Do you have thoughts on how the e-learning task force can develop a few options to serve different learning styles? How do we assess the best method?

E-learning gives us much more flexibility:

- In scheduling: no classrooms, no set meeting times, flexible start times and course length.
- Able to present content in various styles within each course.
- Various completion speeds suitable to the students' ability.
 - Must have a minimum schedule for completion
 - Also be able to be completed faster
- Assessment
 - Student enrollment numbers
 - Student withdrawal numbers
 - Student completion numbers
 - Pass/Fail statistics
 - Cost effectiveness for the institution

What is your experience using online questionnaires?

Limited to answering the ones used by the college to gather employee data.

I do not have knowledge on return and effectiveness rates.

Quick, rote memorization can end up being a disservice to students if they delay in taking the for- credit courses in MATH or ENG or if they transfer to another institution, because they may not retain the knowledge when they do enroll later. Have you found any solutions to this?

I encourage and strongly recommend that my student continue their math semester after semester until the requirements are met.

All advisors need to be trained/reminded/made aware of the need for sequential math study.

Possible solution to knowledge loss is to offer a mini refresher online before the semester starts.

Nevada State College Responses to RTP Questions:

What changes have occurred since the Remedial Transformation Project report was issued?

- At the beginning of this semester (Fall 2013), we hired a dual position coordinator/academic advisor to help us to develop intervention strategies for the struggling students in order to be more responsive to student struggles. She has started to develop module-specific workshops through the SAC.
- We transitioned into new textbooks which are better aligned with the modules. Each course (Math 093/095/096) has its own internally developed textbook. The presentation is more consistent across all courses and the price point has dropped considerably from the textbook we were using before.
- We successfully transitioned into the Canvas course shell from the Blackboard course shell. All 6 modules have lecture notes, practice exams, and practice exam solutions available online to all of the students.
- At the NV-ACT Symposium at UNR in 2/2013, I presented the following data (I have not run any data since that presentation):
 - Math 093 Comparison:
 - Historic average: 70% pass
 - Modularized Fall 2012: 85% pass (100/118)
 - Math 095/096/097 Comparison
 - Historic Math 097: 55% pass
 - Modularized Math 095 Fall 2013: 65% pass (42/65)
 - Modularized Math 096 Fall 2013: 66% pass (31/47)
- We are still in the process of developing online videos for the various sections. Because we changed the textbooks, we have to rebuild the videos to create a proper alignment of content and presentation.

What are the learning technologies currently used at the institutions for remedial education?

- Currently, we are using Canvas to structure the online availability of the materials as well as for bookkeeping and tracking. We are developing lecture videos using Prezi, Camtasia, and lecture capture hardware.
- We have a longer-term aspiration to use WebWork for online graded homework. It's a free program developed by the Mathematical Association of America and is free from the costs and constraints of commercial vendors.

What has been your experience using pieces of online instruction for remedial education vs. all online?

- We currently do not offer remedial math online. The anecdotal evidence is that the way it's generally done isn't particularly strong, and that in-person or hybrid approaches are probably better for most students.
- The online homework system WebWork is proving to be effective at higher levels, and we believe it will also be effective at lower levels. We use this as a supplement to in-person classes, not as a fully online or hybrid program. Proper implementation for other classes will require time and resources, and we're not there yet.

What is your take on hybrid formats (on-campus attendance paired with online) and flipped lectures?

- Flipped lectures can be very effective if properly structured. If done poorly, it is no better and often worse for students because more is expected of them without providing them any additional structures to support them through the learning process.
- Hybrid formats can work, but we need to be careful that the online component is done effectively. It's not enough to simply put up a commercial online homework system and pretend that it fixes all of the problems.

What is your overall perspective on using e-learning technologies in higher education, not just for placement but for instruction as well?

- It's all about implementation. It can be good or it can be awful.

Have you had any vendor experience, and are there ones you like and/or avoid?

- After hearing a lot of build-up and excitement about ALEKS, I thought the program itself was a letdown. It seemed rather mediocre. I would not want to go to ALEKS system-wide because of that. (I had no problems with the vendors themselves.)

Is there a gap in remedial instruction that e-learning can address? (We couldn't identify a clear gap in the RTP report other than getting students better prepared for college math and English.)

- The primary benefit would be increased access for students who are either remote or have other problems with access. But aside from access, I do not see a "gap" whose only solution are e-learning systems. The application of e-learning could potentially enhance certain aspects of the delivery of content, but if implemented poorly can also be a detriment. Again, it's all about how the technology is implemented.

What is the known efficacy of online methodologies for remedial education? What does the research show? What data exists?

- There are some people who are touting strong success rates, but I would be wary of survivorship bias. Nobody wants to put out a press release when they find their online program flops. Instead, they just quietly bury them.

What elements of math are best taught through e-learning methods?

- I think the main benefit to e-learning is to give students instantaneous feedback on their mechanical processes. It's less effective at helping students make meaningful conceptual connections, unless the program is specifically structured towards that outcome (which they generally are not).

Is your campus using some form of online homework? If yes, what program are you using, what works well about it, and what could use improvement?

- One of our instructors is using WebWork for online homework in Math 126/127 and maybe Math 181. Overall, we're pleased with the results. The primary issue is that this isn't a commercial program where someone else does all the work of developing problems and you can just plug it in and go. But once it's put together, it's relatively easy to use, and it is more robust in terms of recognizing answers than most commercial programs.
- There are some databases that have some problems tailored to specific textbooks, and the number of such databases is slowly growing. We expect this will become a larger player in the online arena in the next decade or so as these things become more available and functionality continues to expand.

How does the College America three-track program for community colleges integrate with 4-year institutions' efforts? Can it? Should it?

- I think the statway/quantway/STEMway idea has some merits. (I also think that STEMway is no longer being used by the Carnegie Foundation.) There are certainly some topics of "traditional remediation" that probably can be exchanged for other topics. However, we need to be sure that such exchanges do not create a larger detriment for students.
- Currently, such a program does not align with our efforts at NSC because nothing we offer would benefit in particular from a specialization in either statistics or quantitative literacy. If other disciplines start to push towards stronger statistics/quantitative reasoning offerings, we will begin to consider the switch more seriously.
- Anecdote: I attended a CCA conference in which one of the presenters was talking about statway, and in the middle of her presentation, she said something like "Yes, some of these students couldn't add fractions, but they understood statistics!" That really made me wonder whether the statistics course was really a college-level course. It left the impression that something was getting swept under the rug, but I wasn't able to ascertain what that was.

Can the NSC representative talk about the module system used on that campus? Could this approach be used for adult learners to focus on skills they really need rather than re-teaching things they already know?

- We have a fairly substantial population of adult learners, and we believe that the modularized approach is effective for them because it is helping them to make conceptual connections where there weren't any before, and we have anecdotally heard that the adult learners appreciate that as it helps them to step through a lot of their emotional baggage associated with math because they feel like the "finally" understand things. If anything, the 18-20 year old demographic is the group that loses because they get by on mechanical proficiency alone and completely miss the conceptual development.
- Yes-and-no would be my answer to whether we can focus on "the skills they really need." One of the problems with an overly-modularized approach to math is that it fails to treat math as a coherent mode of thought and instead treats it as a collection of completely disjoint mechanical skills. When people say things like "They can do the math, they've just forgotten some of the more basic things, like fractions," I just shake my head. That's like saying "They can read, they've just forgotten a few of the letters of the alphabet."

- There are ways that we can shift the modularization a bit to make it more efficient so that we don't excessively teach things that students don't need to be re-taught, but it would require the development of a significant amount of infrastructure. The current modularization shift benefits primarily from the fact that students who fall behind do not waste the entire semester, but can be recaptured and put in a position to keep moving forward. I was asked by Dr. Erika Beck how I might structure the modularized approach for an e-learning environment. The basic structure would be that every student must pass every module, but that students can pass a module in as little as a single test if they can demonstrate proficiency up front. This approach is more robust and comprehensive than giving students a (relatively short) diagnostic at the beginning and trying to identify all of the areas of weakness at once. It also helps to develop and maintain a sense of continuity in the material, allowing students to make the meaningful conceptual connections that we are hoping for.
- I can provide more details of the structure of the modularized approach to an e-learning environment, if desired.

What is your experience between remedial education for adult learners vs. traditional-age students? Are there differences? Would e-learning better meet the needs of one type of student over another?

- There are significant differences between the populations. Adult learners tend to have more emotional baggage in their approach to math, but are also more open to understanding things in a new way. Traditional age students tend to be very focused on the mechanics of algebraic manipulation, and have little desire to make conceptual connections. I do not know whether one or the other would be better addressed by e-learning.

We know one size doesn't fit all, especially in remedial education. Do you have thoughts on how the e-learning task force can develop a few options to serve different learning styles? How do we assess the best method?

- Just don't try to make a single system-wide-uber-remediation-program that will try to do everything for everyone. If you want to develop an e-learning system, then develop an e-learning system that focuses on being effective for e-learners. Don't try to make it something that it's not supposed to be, like a replacement for other traditional remediation approaches.

What is your experience using online questionnaires?

- I have none, but I hear that feedback rates are generally low.

Quick, rote memorization can end up being a disservice to students if they delay in taking the for-credit courses in MATH or ENG or if they transfer to another institution, because they may not retain the knowledge when they do enroll later in a credit course. Have you found any solutions to this?

- Academic advising should push students hard to take their math classes in sequence with no gaps.

TMCC response to RTP Questions

Ted Plaggemeyer, Dean of Sciences

- What changes have occurred since the Remedial Transformation Project report was issued?

TMCC has continued to expand efforts to shorten the remedial pathway to college level mathematics. Additional courses have been scheduled following the mini-session format. The mini-session format allows students to complete two developmental math courses in one semester by scheduling combinations of math in a block format. Math 095 and Math 096, Math 096 and Math 120, Math 096 and Math 126 are paired together creating a 6 credit semester sequence. The English department is also exploring doing mini-sessions with the Eng95/Read95 and Eng 98 courses for Fall 14. This “immersion” has proven very popular for students and for faculty.

TMCC has piloted the use of stretch classes for Math 120 and Math 126. These two classes are paired with a Math lab requirement which seeks to fill in gaps in the student’s knowledge of remedial concepts. Students qualify for the stretch version of Math 120 and 126 by scoring in the top 1/3 of the placement cut scores in Math 096. Now in its second semester, results are encouraging with a high level of completion.

The Math Skills Center is currently serving approximately 650 students per semester. It utilizes a combination of online assessment with one on one instruction as well a group “topic” seminars. Students are assessed in ALEKS then assigned a customized development plan. ALEKS is used for student practice and assessment. Upon completion of the development plan, students are retested in Accuplacer for placement into higher levels of math courses. Almost as many place into Math 096 as into Math 095. A few students place all the way into college level courses, Math 120 and 126.

- What are the learning technologies currently used at the institutions for remedial education?

Faculty use a variety of platforms including CANVAS, ALEKS, MyMathLab,

- What has been your experience using pieces of online instruction for remedial education vs. all online?

The primary advantage of using online instruction for support for instruction rather than as a replacement is the immediate feedback that students can receive.

- What is your take on hybrid formats (on-campus attendance paired with online) and flipped lectures?

TMCC is expanding the use of hybrid formats because it brings out the best of both platforms, in class access to faculty and flexible scheduling for students. When the online component is focused on delivering content, the in class portion can focus on solving the questions of application and provide time for class interactions and discussion.

- What is your overall perspective on using e-learning technologies in higher education, not just for placement but for instruction as well?

There is definitely a place for a variety of learning delivery models.

- Have you had any vendor experience, and are there ones you like and/or avoid?

- Is there a gap in remedial instruction that e-learning can address? (We couldn’t identify a clear gap in the RTP report other than getting students better prepared for college math and English.)

The gap which e-learning can fill is the lack of access to off campus sites and convenience of scheduling. It also can act as another “facility” when classroom space is at a premium.

Further, it can be very productive for a student who knew the material at one time but has lost the detail. Providing a fast track back into the regular class sequence can potentially save this type of student significant time.

- What is the known efficacy of online methodologies for remedial education? What does the research show? What data exists?

TMCC's data indicates that online remedial education in math is 15 percentage points below that of in class students. Remediation for English is around 10 percentage points.

Since success rates for remedial math classes offered online averages lower than in class instruction, we are continuously testing different strategies to improve success. We are temporarily, if not permanently, phasing out Math 95 online and are strongly focusing on improving the pass rates for Math 96. We moved from 12 online developmental sections for Fall 2011 (which includes some Math 95 sections) to five online section in the Fall of 2012 (all Math 96). We are also only allowing full time faculty to teach remedial mathematics online because the college can more easily provide professional development training through its WebCollege for those faculty.

As of Spring 2012, stringent requirements are now imposed on remedial math students. These requirements are:

1. The student has not dropped or failed the class before, or the student has a minimum GPA of 3.0.
2. The student has a grade of A or B in the prerequisite class, or a qualifying ACCUPLACER math, ACT math or SAT math score, taken within the past two years.
3. The student has a minimum ACCUPLACER Reading score of 86 and a minimum ACCUPLACER Essay Sample score of 5 (or a minimum score of 440 on both the SAT Reading and Writing tests, or a minimum score of 18 on both the ACT Reading and Writing tests), of a C or higher in English 98R, taken within the past two years.

Currently we do provide English 98 online BUT ONLY to higher scorers in that cohort as we found that the success rate for students below that level was horrible. Success meaning a "C" or above which is needed to get into 101. Since implementing those new scores for online our retention in those courses went up and the success of those students in 101 also went up.

In the lower scoring groups we have found computer literacy issues and so in our English Skills Center one day each week (students are in class 4 days/week) is spent on computer literacy skills. The lack of computer literacy skills makes implementing anything totally online impossible. In our ENG 95/READ 95 and 98 classes we also address various computer literacy issues as well.

- What elements of math are best taught through e-learning methods?

Topic review and practice are excellent examples.

- Is your campus using some form of online homework? If yes, what program are you using, what works well about it, and what could use improvement?

Yes, faculty are using ALEKS and MyMathLab. Both programs can be unforgiving to students when questions are answered incorrectly. This is due to the adaptive nature of the software. When a mistake is noted, the software often remediates the student by repeating previous work.

- Referencing P. 6 of the report – Students who enter MATH 91 or 93 can face up to four semesters of remedial instruction. What are the computer-based results mentioned in the report?

The report cited is a 2009 report prepared by the NSHE system office which tracked students in the sequence of Math 091, 093, 095, and 096 through completion of their first college level course. Results varied by college but indicated that for the vast majority of students beginning in 091 had a completion rate below 5% and in 093 less than 10%. For TMCC the rates were 3% for Math 91 students and 6% for Math 93.

A report by the Community College Research Center at Columbia University (<http://ccrc.tc.columbia.edu/media/k2/attachments/referral-enrollment-completion-developmental.pdf>) reports the success rates for students placing one level below college in math to be 27%, two levels below at 20%, and three levels below at 10%.

- For the 79% success rate cited by CSN on page 10 of the final report – at what level did students actually test?
- How does the College America three-track program for community colleges integrate with 4-year institutions' efforts? Can it? Should it?

It is an interesting idea. It would require that the four year institutions accept the STATWAY path as meeting the general education requirements at those institutions for certain disciplines.

- Referencing P. 13 of the report – Do we know why students are withdrawing from college after completing remedial courses?

The same report by the Community College Research Center at Columbia University cited earlier indicated that students enrolled in remediation “accumulate debt, spend time and money, and bear the opportunity cost of lost earnings. In some states, they deplete their eligibility for financial aid. Moreover, many students referred to developmental classes, most of whom are high school graduates, are surprised and discouraged when they learn that they must delay their college education and in effect return to high school.”

- Referencing P. 14 of the report – at UNR, what is the update/success of the online instruction in the three courses cited (100i/105/106)?
- Can the NSC representative talk about the module system used on that campus? Could this approach be used for adult learners to focus on skills they really need rather than re-teaching things they already know?
- Can the UNR and UNLV representatives talk about the co-requisite model (stretch method) that allows students to complete remedial work while they are simultaneously enrolled in the credit-class?
- What is your experience between remedial education for adult learners vs. traditional-age students? Are there differences? Would e-learning better meet the needs of one type of student over another?

It is my experience that the adult learner who is returning to college typically has a high level of understanding of the need for continuing their education. This is offset by a decline in academic skills. The traditional age student may not yet know where they want to go as far as a career, but has recent academic skills to fall back on.

- We know one size doesn't fit all, especially in remedial education. Do you have thoughts on how the e-learning task force can develop a few options to serve different learning styles? How do we assess the best method?

The primary issue with remedial education online is that it does not match up well with the needs of the remedial student. Remedial students tend to require a high level of reinforcement from faculty, lack a certain level of structure in their study habits, and have already faced a sense of failure in their academic pursuits. These characteristics do not work well in an environment that requires a high level of self-motivation. As mentioned earlier, we have to be very careful that students are advised properly on how to be successful in an online class and are computer literate.

- What is your experience using online questionnaires?

None.

- Quick, rote memorization can end up being a disservice to students if they delay in taking the for-credit courses in MATH or ENG or if they transfer to another institution, because they may not retain the knowledge when they do enroll later in a credit course. Have you found any solutions to this?

The key is for students to learn in context. When they understand the application or context in which the subject is taught, knowledge retention is much higher. The sciences along with career and technology programs do an excellent job of this through their use of lab work. The hybrid course is an excellent solution.

- UNLV, NSC, and CSN with CCSN have created the exam rubric, and UNLV has documented some success with ENG 101E and 101F. What ways can e-learning technology improve student outcomes for English? Are you using any e-learning methods now?

UNLV answers to RTP questions

From Bill Speer, Director, UNLV Mathematics Learning Center

1. What changes have occurred at UNLV since the Remedial Transformation Project report was issued?

The changes suggested by the UNLV contributors to the Remedial Transformation Project Report have been implemented and will not be repeated here.

The most recent new development is the establishment of the Mathematics Learning Center – an initiative begun in July of 2013 by the UNLV President and under the direction of the Provost and Vice Provost for Academic Affairs. The MLC is to deal with a variety of issues relative to mathematics coursework offerings at the pre-calculus levels and below. These issues include, but are not limited to, matters related to developmental education as they appear in Math 95 and Math 96 as well as issues with introductory courses in Math 120, 124, 126, and 127, and “special” courses in Math 121, Math 122, and Math 123.

Regarding developmental concerns, the following changes have been put into effect:

- The MLC has been “staffed” with a Director, a new Faculty in Residence position, and a GA appointment. Beginning in spring of 2014, the MLC team will be enriched by the assignment of Dr. Carryn Bellomo. In the fall of 2014, two more Faculty in Residence will be hired and three more graduate assistantships will be added to the MLC – making a total staff of eight. It is expected that this will grow in number in each of the next four academic years.
- This present skeleton crew works with the individuals in the Mathematics Department to address and implement changes in the logistics and operation of Math 95 and 96 on a day-to-day (and semester to semester) basis. The MLC also works with other Departments in the Science and Departments in other colleges to construct appropriate modifications/variations of required introductory 100 level mathematics courses (e.g., in the spring, we are running a pilot section of Math 126 for Engineering students only).

For Math 95/96, in spring semester of 2014 we are:

- (1) completely reorganizing the selection of assigned online homework problems to better match the Undergraduate Learning Outcomes and stated objectives.

- (2) initiating a set of written assignments to expand on what is asked of students by the current online homework system (Hawkes Learning System).
- (3) restructuring the exams to better match the Undergraduate Learning Outcomes and stated course objectives.
- (4) developing a well-defined scoring rubric to be used during group grading of exams by cohort teams of PTIs and Gas.
- (5) engaging PTIs and Gas in regularly scheduled “training” and “support” seminars
- (6) adjusting the grading scales and percentages to better balanced the significant elements of the courses used to determine the final grades.

Other adjustments already under way or under immediate consideration include:

- A redesign of the UNLV Placement Exam to an online format with a broader focus than computation and algebra skills to include algebraic reasoning, mathematics as a way of thinking, and data analysis. The intent is to also embed adaptive testing algorithms for branching items. Students would be encouraged to take this during the admissions process, if possible, but certainly before enrolled in their first mathematics experience at the university. Currently, students can simply not take the placement exam and allow their ACT or SAT scores to dictate placement – this means that we have students who do not need remedial mathematics that end up taking it and wasting both their time and money (and university resources).
- A stretch Math 124 has been created and will be offered for the first time in the fall semester of 2014. Stretch Math 124 sections will be a two-semester offering with a developmental co-requisite Math 96 included.
- Efforts have begun to rethink how Math 120 is presently structured at UNLV to better address the needs of those colleges that tend to use Math 120 as a terminal math requirement. This may also take the form of a stretch course. NB: Students who start in Math 95 presently still take Math 96 to prepare for regular sections of Math 120 or Math 124.

2. What are the learning technologies currently used at UNLV for remedial education?

UNLV uses the Hawkes Learning System for Math 95 and Math 96. WebAssign is used for Math 126 and 127 and MyMathLab is used for 132.

3. What has been your experience using pieces of online instruction for remedial education vs. all online?

One of the biggest concerns is the “usability” of the online support system adopted. During the fall semester, we had several “crashes” in both Hawkes and WebAssign that caused some angst that was not easily calmed. For the most part, students have come to expect (although not always appreciate) the online homework element and seem to prefer to have recitation sections or options for interaction. While there is still a tendency to want to have someone “just tell me how to do it,” there is a general appreciation of “self-pacing” and “independence” on the part of students that are better prepared. Students do not value the textbook in 95/96 – it seems deficient in many ways and will be the subject of a search for improvements during the spring of 2014.

As was the case for UNR, the UNLV Mathematics Department did experiment, briefly, with ALEKS. ALEKS uses adaptive questioning to diagnose student strengths and weaknesses (although it appears to do better identifying weaknesses). It essentially uses a “diagnose – teach – test – reteach” model that doesn’t fully take advantage of what actually takes place between the first assessment and the second assessment. It “basically” incorporates a model that relies on the theory of “if you didn’t get it the first time, let’s repeat it and see if things work out better now.” One thing to its credit – ALEKS does not make use of traditional multiple-choice format in assessments. As to the SPECIFIC reasons that the UNLV Mathematics Department elected to not use ALEKS at the time, I am not prepared to comment.

As is the case for UNR, UNLV has adopted the model where students have unlimited practice opportunities and immediate feedback on homework (although the degree of assistance provided by the feedback is sometimes faulty based on the limitations of the system to interpret – or be understanding of the nature of - student responses).

4. What is your take on hybrid formats (on-campus attendance paired with online) and flipped lectures?

I do think there is something to be said for a student’s tendency to choose traditional OR online, rather than hybrid. I’m not certain if that is an actual conscious decision that is influenced by deep thought or if it is one that is bound by more simple scheduling issues. I think hybrid courses can be valuable options for students but I’m not certain if that is as true for the developmental level as it may be elsewhere. The students in developmental classes are TYPICALLY placed there for good reasons – lack of success at mathematical skill building in previous experiences. This does not exactly nurture a feeling of self-confidence and a strong spirit of persistence and determination. These students often are lacking intrinsic motivation and, sometimes, are not even responsive to extrinsic techniques. There is

not a natural tendency to seek help (although an appreciation of direct instruction is common). Success in understanding one lesson does not breed confidence for new material.

As far as flipped classrooms, I'm a fan – IF they are done correctly and follow the principles under which they are established. For example, I've been present at too many demonstrations where the focus was not placed on advanced organizers for material to come. If the focus of a flipped classroom is ONLY on motivation, then great opportunities are lost.

Regarding on-campus attendance - We have initiated a Friday "lab coaching" session. Students that have not completed their weekly homework assignment are required to attend. If they have successfully completed the homework (as reflected in the Hawkes Learning System) then they are excused. Some students attend anyway – to get a jump on things in a structured but open environment, I suppose. Most do not. A fair number of students seem to purposefully not complete the homework ahead of time to also take advantage of a form of dedicated work time. In general, this program has been a success in its limited scope – greater focus and "tinkering" needs to take place in the spring for this to be considered a valuable component.

5. *What is your overall perspective on using e-learning technologies in higher education, not just for placement but for instruction as well?*

Personal views don't always match with those of others (or with the existing research base). Personal experiences (and the lack of personal experiences) with technology can easily sway opinions. With that caveat, I would have to say that certain elements of e-learning in higher education have the potential of living up to the hype and billing that it has received in some quarters. I am particularly intrigued by adaptive technologies that may lead to greater attention on diagnosis and "prescription" in assessment and take the focus off of "weighing the pig" – one positive exemplar being the branching assessments in the Calculus MOOC at Ohio State. Unfortunately, there seems to be more credit given to the simplistic tasks (such as electronic generation of homework and "immediate feedback." This can naturally lead into the dangerous trap of "machine-based instruction" that quickly degenerates into "do what the example shows and you, too, can be a great mathematician."

Having said this, there is still a point to be made for the patience and persistence of a system that is capable of delivering unending practice. Practice is an important element in success, but students don't learn by doing – they learn by thinking about what they are doing, by thinking about what they have done, and by thinking about what they are going to do next. So, in general, e-learning is not a panacea – it is one of many ways to reach out to individuals to provide a vehicle that leads to understanding.

6. *Have you had any vendor experience, and are there ones you like and/or avoid?*

I have had very positive interactions with the people marketing and supporting the Hawkes Learning System. They have been VERY responsive to questions and concerns and have made modifications to meet specifications requested. They are proactive in their outreach (which can be a problem) but not too bothersome.

I have not had very much experience with Pearson in terms of their online learning options, but I have had experience with their textbook division – it has a reputation of being non-responsive and dogmatic in operation.

7. *What is the known efficacy of online methodologies for remedial education? What does the research show? What data exists?*

UNLV has offered online Math 95 and 96 for several years. The courses were designed and taught by the same instructors that teach traditional face-to-face sections. It is my understanding that these sections were developed in consultation with the online education office. These courses use Hawkes Learning Systems online homework and the embedded learning aids. While these sections run every semester, there are fewer because there is generally small demand for these courses with enrollment usually not exceeding 40 students, whereas traditional face-to-face sections have enrollments of 40-60 per semester. I do not have current data on success rates for these sections.

8. *What elements of math are best taught through e-learning methods?*

Depending on the individual student, the answer here may vary considerably. For most students, I would say that the immediate benefit APPEARS to be in practice and feedback through an online environment. For special populations, such as physically disabled, online may be the only option that provides both access and freedom to explore – in fact, it may enhance a sense of mobility and self-esteem for those with certain physical disabilities. For the more independent learner, the online environment may offer immediate and confidential feedback. Online learning may present scenarios that are more manageable and may allow more concentration on concept while also allowing for visual representations that are otherwise difficult to produce. For the learner that requires extrinsic motivation, flipped classrooms may just give the impetus to learn the boost that it needs.

9. *Is your campus using some form of online homework? If yes, what program are you using, what works well about it, and what could use improvement?*

WebAssign seems to be working fairly well for the desired purposes. In Math 95/96, the Hawkes Learning System software, itself, has limitations that are being discovered on a regular basis. Most visible are the issues that center on data entry. A

student that has correctly solved a problem may have difficulty entering the response in the format that the system requires – it is not always forgiving in terms of alternative notation. Some of the instruction models do little more than offer a “follow me” method of explanation.

10. Referencing P. 6 of the report – Students who enter MATH 91 or 93 can face up to four semesters of remedial instruction. What are the computer-based results mentioned in the report?

UNLV does not offer Math 91 or 93.

11. For the 79% success rate cited by CSN on page 10 of the final report – at what level did students actually test?

Not applicable for the UNLV response.

12. How does the College America three-track program for community colleges integrate with 4-year institutions' efforts? Can it? Should it?

I am not as familiar with the issues that would need to be considered here as I would like to be. I do, of course, know of the Complete College America initiatives and, in general, I am in support of CCA. But, I do not have enough information to comment on the transition from community college to 4-year institutions. It is my understanding that community college curricula matches well with transfer to 4-year programs. I am aware that UNLV has a fully staffed transfer office on the CSN campus to assist students in that regard.

13. Referencing P. 13 of the report – Do we know why students are withdrawing from college after completing remedial courses?

It would seem to be no more puzzling than the drain the additional time and expense may have played on both the students' (and, parents') psyche. I suspect, but have no data to support, that the trials and rigors of subsequent coursework in their chosen majors are, for this group of students, perhaps more taxing than they might have been expecting. I do not believe that it has to do with poor advising.

14. Referencing P. 14 of the report – at UNR, what is the update/success of the online instruction in the three courses cited (100i/105/106)?

Not applicable for the UNLV response.

15. Can the NSC representative talk about the module system used on that campus? Could this approach be used for adult learners to focus on skills they really need rather than re-teaching things they already know?

Not applicable for the UNLV response.

16. Can the UNR and UNLV representatives talk about the co-requisite model (stretch method) that allows students to complete remedial work while they are simultaneously enrolled in the credit-class?

As previously mentioned in this report, a stretch Math 124 has been created and will be offered for the first time in the fall semester of 2014. Stretch Math 124 sections will be a two-semester offering with a developmental co-requisite Math 96 included during the first semester. As is the case with UNR, UNLV stretch courses have both the credit-bearing and the remedial portions taught by the same instructor.

It is our intent to use placement information in a more diagnostic manner – the hope is to rethink the UNLV placement exam to incorporate an adaptive online component.

Efforts have begun to rethink how Math 120 is presently structured at UNLV to better address the needs of those colleges that tend to use Math 120 as a terminal math requirement. This may also take the form of a stretch course. UNLV currently has no plans to offer stretch 126.

Students who start in Math 95 presently still take Math 96 to prepare for regular sections of Math 120 or Math 124.

17. What is your experience between remedial education for adult learners vs. traditional-age students? Are there differences? Would e-learning better meet the needs of one type of student over another?

I have been interested in one form or another of “remedial” education since 1969. In 1973, as one of 21 colleagues from 19 universities attending the first National Conference on Remedial Mathematics, I helped establish the Research Council on Diagnostic and Prescriptive Mathematics. That organization lives on today renamed as the Research Council on Mathematics Learning. The organization’s mission continues to be to stimulate, generate, coordinate, and disseminate research efforts designed to understand and/or influence factors that affect mathematics learning. One cornerstone of the research agenda has been to consider learning deficiencies of various populations, especially adult learners as compared to secondary and post-secondary students. It is important to note, however, that clinical diagnosis was the focus of attention – not e-learning.

It probably comes as no surprise that the students that tend to have better success with e-learning are those that:

- prefer immediate feedback and reward,
- are motivated (intrinsically OR extrinsically),
- are determined and persistent, and
- are goal-oriented

18. We know one size doesn't fit all, especially in remedial education. Do you have thoughts on how the e-learning task force can develop a few options to serve different learning styles? How do we assess the best method?

I certainly hope that our collective attention to this is the outcome of this task force. I do not have the “one way – the right way” but see promise in blended learning, flipped classrooms, hybrid offerings, “at your own pace” packages, various models of coaching programs, etc. – each as a potential solution for a subset of students. I do think that OPTIONS are a fundamental element here.

19. What is your experience using online questionnaires?

I have not had any experience beyond the use of rather simple survey instruments as part of several different research projects (and frequent doodle surveys to set up committee meetings).

20. Quick, rote memorization can end up being a disservice to students if they delay in taking the for-credit courses in MATH or ENG or if they transfer to another institution, because they may not retain the knowledge when they do enroll later in a credit course. Have you found any solutions to this?

Quick, rote memorization can end up being a disservice to any student – not just those delaying for-credit courses. Of course, there are elements that demand memorization, but memorization without an anchor in understanding or in context, is not transferable. It will lead to the disastrous condition in mathematics known as “hitting the wall.” It is fairly safe to say that some of the students that end up in developmental mathematics are there due, in large measure, to a steady diet of rote memorization.

UNLV has implemented a block scheduling system and a system of tracking student enrollment in order to deter the postponement of required mathematics coursework for all majors. The attention to retention, progression and completion has taken on new focus.

21. UNLV, NSC, and CSN with CCSD have created the exam rubric, and UNLV has documented some success with ENG 101E and 101F. What ways can e-learning technology improve student outcomes for English? Are you using any e-learning methods now?

I am not familiar with UNLV's experience in ENG 101E and 101F and any e-learning methods currently being used in English.

UNLV works very closely with CCSD in considering 12th grade transition offerings in mathematics. We are presently serving as consultants in the development of a 12th

grade experience for students that pass Algebra II but that are not deemed “college-ready” by new standards on 11th grade assessment.

While NOT exactly relevant to the stem of this item, it should be noted that the MLC addresses matters of transition for all levels of students. Math 283 is about to be offered to students in the AMSAT program at Clark Magnet High School who have completed the appropriate prerequisites and have scored 5 on the AP Calculus exam. This is a collaborative offering of the Mathematics Department, the MLC, and CCSD to support transition efforts for advanced students.

UNR Answers to RTP Questions

From Chris Herald, Core Mathematics Director, UNR

1. Changes in Math Curriculum Since Remedial Transformation Project Report

In the Remedial Transformation Project Report, UNR outlined a proposed set of changes to its remedial and 100-level math courses, and these have all been implemented. Specifically, the following changes have been put into effect:

- Math 95 is now the starting point for students who do not have either an ACT Math of at least 19, SAT Math of at least 470, Accuplacer EA score of at least 76, or a High School Core GPA¹ at least 3.5 or Cumulative High School GPA at time of graduation at least 3.5.²
- Stretch Math 120 is now offered for all qualified students. Each section of Stretch Math 120 has the form of a special small-sized Math 120 class with a 1-credit remedial co-requisite Math 96A. Prerequisites for this class are ACT Math 19, SAT Math 470, Accuplacer EA 76, or grade of S in Math 95.
- Stretch Math 126 is now offered for all qualified students. Each Stretch Math 126 section has the form of a special small-sized Math 126 class with a 2-credit remedial co-requisite Math 96D. Prerequisites for this class are ACT Math 20, SAT Math 480, or Accuplacer EA 80 + CLM 30.
- Note that Stretch Math 126 starts at a higher level than Math 96, so students who start in Math 95 still take Math 96 to prepare for Math 126. (During piloting, we tried letting motivated students from Math 95 go directly into Stretch Math 126, but it was not successful.)

2. Learning Technologies Employed in UNR Remedial Math Education/UNR's Experience with Different Vendors/Strengths and Weaknesses

UNR has been using Pearson's MyMathLab in many of its math classes, including Math 96, for the last 5.5 years. MyMathLab features online homework, online learning aids like "Show Me An Example" or "Help Me Work This Problem" feature, unlimited tries (with algorithmically generated problems that are similar, but not identical), "Ask My Instructor" button, Study Plan, and other course management features. MyMathLab also includes Test Generation capabilities, which would in principle allow computerized testing, but we have found these to be inferior both in their ability to assess multistep problems requiring more critical thinking (which

¹ "High School Core GPA" refers to the NSHE Core GPA used to determine admissions to the NSHE 4-year institutions.

² UNR data shows that either of these HS GPA criteria provide as good of a predictor of success in Math 96 without taking Math 95 first as the standardized test scores normally used for placement into Math 96 at NSHE institutions.

are essential to prepare for applying the math concepts in more advanced courses), and also in the accuracy of the problem generation and the multiple choice answers.

UNR has not tried Pearson's MyFoundationsLab as a platform. It is somewhat similar to MyMathLab, but without being tied to (or providing) a particular textbook. It does not provide the full set of learning aids that MyMathLab provides, and when we examined it, it did not seem to provide enough content to help remedial math students achieve mastery of the material (though it might provide a basis or a quick "Boot Camp" sort of review of some remedial material). Washoe County School District used it once for a set of courses that began with Accuplacer Diagnostic testing, which fed into MyFoundationsLab to provide students with customized remedial curricula based on their strengths and weaknesses (similar to what ALEKS or KNEWTON promise). At the end of these courses, 0% of the students reached college readiness cutoffs in the subsequent placement testing, and the average improvement on the Accuplacer test from pre- to post-testing was around 6 points (10% of the point gain needed to advance to the next class).

We have also experimented with ALEKS-based Math 96 taught in a computer lab. (From the ALEKS website, "Assessment and Learning in Knowledge Spaces is a Web-based, artificially intelligent assessment and learning system. ALEKS uses adaptive questioning to quickly and accurately determine exactly what a student knows and doesn't know in a course. ALEKS then instructs the student on the topics she is most ready to learn. As a student works through a course, ALEKS periodically reassesses the student to ensure that topics learned are also retained. ALEKS courses are very complete in their topic coverage and ALEKS avoids multiple-choice questions. A student who shows a high level of mastery of an ALEKS course will be successful in the actual course she is taking.") We abandoned this pilot after 3 semesters because (1) the very ability of the software and class format to allow students to work at their own pace appears to cause the students to slow down, so it has a lower rate of successful completion, and (2) the computerized testing (repeatable, until the material is mastered) did not assess preparedness for Math 126 as well as our more traditional class format, and ALEKS-taught students performed significantly below the students coming through the traditional Math 96 class, when they attempted the next class.

We have used WebAssign for some classes. It offers similar functionality to MyMathLab, and we have opted for this platform for Math 176 and Math 181 simply because there is (in our view) a better textbook available with this package than any of the Pearson texts.

We have used another platform called Wiley Plus, which attempts to provide the same functionality as MyMathLab, but we found it to be terribly buggy, so we have quit using it.

At this point, all face-to-face math classes from Math 95 up through Math 283 Calculus III use MyMathLab or Webassign for homework and practice. In the

remedial classes, we also insist on some “written homework and quizzes,” since the questions available in the online homework are not sufficiently broad to practice multi-step problem solving, working systematically, and explaining the steps in their work. The online testing is even less useful, for similar reasons.

UNR has offered online Math 96, 120, 126, 127, 176 for 5 years. The courses were designed and taught by regular instructors (who teach our face to face courses), in consultation with the online education specialists at the College of Extended Studies to design them in accordance with current best practices. These courses also use MyMathLab online homework and learning aids, require online discussions, and offer lecture notes, and animations (note taking reproduced letter by letter, with a voice over in synch). We find there is fairly small demand for these courses; they run every semester, but usually do not exceed 50 students per course, whereas our face to face courses draw 300-1500 per semester. Generally speaking, the success rates are 15-20% lower than the face-to-face courses, and worse in Math 96 (for this reason, we have not created an online Math 95 class). We also have not tried creating online Stretch Math 120 or Stretch Math 126 courses, since the success of these courses seems to hinge on group work in class and even more intense interactions with the instructor and other students than in our normal classes.

3. Pieces of Online Instruction Versus Fully Online

As indicated above, we have gone over completely to a model where students have unlimited practice opportunities and instant feedback on homework through the online systems (MyMathLab and WebAssign). In our experience, putting the lectures online decreases the effectiveness and the level of engagement, especially in remedial classes, but even in higher-level courses, where the class may be taught in a large lecture. Remedial students are terribly insecure about their own mathematical abilities, and it takes continual coaxing of a live instructor in a small class situation to get them over their fears of talking with one another, asking questions, and practicing problems in class. Each new topic brings with it another round of fear and confusion, which needs this face-to-face interaction to get them over their blocks. Thus, I cannot identify any part of the remedial curriculum (other than practicing after reviewing techniques in class) that is best handled online.

4. Overall View of Learning Technologies in Higher Education

Many of these technology products attempt to provide very promising-sounding features. What could be negative about affording the students infinite numbers of tries on homework, instant feedback when they attempt a problem, “Show Me A Worked Example” tutorials, Computerized Testing (which promises the ability, given enough lab space, of testing as many times as needed for mastery learning), or diagnostic-assessment-based individualized study plans? Each of these features, however, can be the complete downfall of a course design using the technology.

Unlimited tries on homework gives students the option of flipping through many examples until they pick up what the “pattern is,” such as “If there is a 7 in front of the x in the problem, then the answer is 49. If there is a 4 in front of the x , then the

answer is 16.” At which point, the student asks for a new problem, sees that this problem has a 5 in front of the x , and guesses 25. Since the student didn’t read the whole problem, or make any attempt to work it out, no learning has taken place. We have turned off the “infinite tries” feature, based on the high number of students perfect scoring the homework who cannot do identical problems in a test situation.

Similarly, Show Me A Worked Example features are great for the struggling student who is earnestly trying to master the subject, but this is often abused by students who left the homework until the last minute and look for patterns and similarities, instead of trying to master concepts. We have had to limit its use to improve student success.

Computerized testing requires “randomization of the problems,” so that students taking the exam at different times don’t simply share lists of answers and student near one another in the lab do not share answers. Coding of the algorithmically varied problems is still somewhat weak—and does not effectively test the deeper critical thinking that remedial courses need to foster in students. We have not found that this “benefit” of technology made for effective assessment of student learning.

Diagnostic-assessments that inform customized course curricula based on student strengths make it very challenging to set firm, sensible deadlines for all the students, or have meaningful group activities, once students embark on their differentiated study plans. The result, in our experience, is that the flexibility built in so that students could spend time they need on their weakest areas is perceived as “flexibility for self-pacing” and students procrastinate and do not put in the seat-time needed to succeed.

In short, we have found the online learning aids helpful to allow students practice outside of class, and give them instant feedback, but they are a far cry from the silver bullet to solve all problems with remedial math education, as proponents (and vendors) like to portray them.

5. Is There a Gap in Remedial Education That E-Learning Can Address?

I don’t know of a significant gap in remedial education at UNR for which e-learning offers significant promise. Among UNR students in remedial math, a very small number (under 10 per semester) cannot take face to face classes at any of the times we offer them (we offer numerous daytime and evening time slots, as well as late start, wintermester, and summer classes). Unfortunately, while online may be the only format that meets these students’ schedule constraints, they typically do terribly in these classes, and they really need face to face interaction not afforded by online coursework, so the online option may be the only option but it is not a *good option*.

We already offer online courses that cover this small group of students.

For the remainder of our remedial math students, most of whom select face-to-face courses over online, I do not see that e-learning provides a helpful option, beyond the uses of e-learning technology outlined in my response #4 above.

BYU has a well-established online education presence, and I have known 5 UNR students who have enrolled in online BYU remedial math or pre-calculus courses instead of our face-to-face courses. (They contact me so they can enroll in the subsequent class, pending completion of their online course.) I have never seen one pass the online class—they all ended up retaking the class on our campus. While BYU established themselves early as an e-learning player, their remedial and first year math courses are a good business model but not a productive educational model for most students.

6. What Elements of Math Are Best Taught Through E-Learning Methods?

By this question, I presume you mean what elements of *remedial math* are best taught through e-learning? In short, I do not know of any elements of remedial mathematics that are best taught that way.

E-learning technology is often advertised as “providing the opportunity for students to skip ahead past material they already know, and spend time on the topics they need to master,” but we have not found that remedial students save any significant time when provided this opportunity. I have also spoken to various other institutions that have a modularized curriculum with “flexibility” built in, and it seems to very only an insignificant number of students that capitalize on the opportunity to speed ahead by accelerating their progress. That is not to say that highly structured accelerated classes, with 5 or 6 credits of mathematics being completed in a semester, are not effective—UNR’s Stretch Math 120 and Stretch Math 126 are working well, and from what I hear TMCC’s Math 95/96 sequence in one semester and CSN’s modularized curriculum minimize time lost due to students failing to master a unit. But these work from intense face-to-face interaction and a high level of engagement, which are not easy to accomplish in an online course. And the benefit is avoiding students losing a whole semester when they fall behind, not anyone shooting ahead by working faster than the rest of the class.

I have outlined in #4 certain ways in which online features can augment more traditional courses, but I don’t believe there are areas of the curriculum that are better taught through e-learning methods without the traditional face-to-face component.

7. How does Complete College America’s 3-track curriculum for community colleges integrate with 4-year institutions? Can it? Should it?

I have attended several workshops held by CCA, and one of my greatest concerns with NSHE’s enthusiasm for CCA recommendations is precisely that CCA policy experts have not done any analysis of how their community college recommended curricula fit together with the needs and goals of 4-year institutions. CCA speakers have generally been very up front about this, and do not purport to know anything

about 4-year institutions and the math requirements. It is unclear to me why NSHE is so keen to adopt a carefully considered solution to “community college problems” which seems to run contrary to another recent focus in NSHE, on making sure that the community college curriculum integrates well with the universities.

At UNR, 80% of students deciding which Core Math class to take are either undecided or in majors that require precalculus I (Math 126). Majors requiring Math 126 include not only STEM disciplines, but also all College of Business majors and Elementary Teaching (now that Common Core State Standards are pushing more rigorous mathematics into the lower grades); Nursing also recommends Math 126, since it prepares students significantly better for the required chemistry courses.

It would be very detrimental to the progress toward timely graduation if significant numbers of remedial TMCC students were tracked into the Quantway or Statway paths (shortened remedial pathways to an intro stat or Math 120-style math class), since then many would still have further remediation necessary before attempting the Math 126. CCA’s advocacy for the Quantway/Statway paths is based on the fact that a high percentage of community college students are in programs (either AA degrees or technical certificate programs) that do not require higher mathematics, so CCA curriculum models focus on solutions aimed at this curricular goal.

Implementation of this path at NSHE community colleges would tend to undo progress that has been made in the last few years insuring that 60 credits at the community college gets a student “half way through the 4 year curriculum,” aimed at reducing the time to graduation for transfer students.

UNR’s Math 95→Stretch Math 120 sequence is a 1-year sequence to completion of Core Mathematics for liberal arts majors and the handful of other majors that accept Math 120 for Core Mathematics. I do not believe that this sequence involves “superfluous algebra hurdles,” but rather reinforces common every day algebra skills needed to be a functioning citizen and worker capable of quantitative reasoning, using a calculator effectively, and understanding quantitative relationships. Around 20% of the students who take Stretch Math 120 then change their major and must then complete Math 126, and our Stretch Math 126 offers a way to make that transition in one further semester.

The key benefit of this curriculum, compared with Quantway or Statway, is that Math 95 is a thorough Elementary Algebra course, laying the foundation for either route. Quantway and Statway shortcut past more of elementary school and middle school mathematics (the content of Math 91 and 93) and high school Algebra I (Math 95) to try to accelerate students towards the ability to pass a stat class or a finite math class.

The designers of Quantway and Statway have not yet designed alternative “cross-over routes” from these paths into the STEM disciplines (or, at UNR, the NON-

LIBERAL ARTS disciplines, since many more disciplines require more algebra skills), but Quantway and Statway would leave students far from ready to transition effectively into more algebra-based courses. I have heard one of the developers of Statway state at a workshop that “this path needs to get students ready for a ‘transferrable’ quantitative reasoning class; the definition of transferrable is simply that I say ‘the prerequisites are 2 years of high school algebra.’ “ Thus, these curricula seem to be a shortcut to getting students to meet the letter of the definition of “transferrable,” but not the spirit.

8. UNR Corequisite Model Courses (Stretch Math 120 & Stretch Math 126)

The Stretch Math 120 and Stretch Math 126 courses at UNR are examples of a curricular design commonly referred to as Corequisite Model math classes. At the heart of the design is the observation that about the first third of Math 96 Intermediate Algebra is essential for Math 120, and the rest of Math 96 is essential for Math 126 and higher courses, but not particularly important for Math 120.

For a student who places into the curriculum at the Math 96 level (or places lower, but completes Math 95 to achieve this level of algebra proficiency), Stretch Math 120 consists of a special section of Math 120 with 1-credit corequisite remedial course (Math 96A), which covers that first third of the Math 96 material, taught along with the content of Math 120.

The Stretch courses have both the credit-bearing and the remedial portions taught by the same instructor, allowing flexibility in the timing so some remedial content can be provided “just in time” when needed to support the introduction of Math 120/126 content.

For students who either complete Stretch Math 120, or place a little higher than barely making the cutoffs for Math 96, we offer Stretch Math 126, which is a special version of Math 126 with a 2-credit remedial corequisite Math 96D that covers the later two thirds of Math 96, along with the content of Math 126, in a single semester, 5-credit experience.

Both these stretch classes were piloted last year, and achieved a higher success rate for these weaker students who did not meet the prerequisites for Math 120 and Math 126 than the regular cohort of student placing into our regular Math 120/Math 126 classes. This year, we rolled out Stretch Math 120 and Stretch Math 126 for all eligible students (200 in Stretch Math 126 and 125 in Stretch Math 120 this fall). We do not yet have data on the success rate of Stretch Math 126 students as they proceed up into higher math courses.

9. Adult Learners versus Traditional Age Learners

I do not have access to age-related data on UNR’s remedial students, so I have never been able to examine this other than on an anecdotal basis based on advising students on remedial and Core Math course options. I can certainly say that both types of learners have their share of struggles with remedial math. Among adult

learners are many people who have avoided and been terrified of mathematics for decades, for whom the remedial math battle is as much overcoming deep fears as it is mastering content. Among the traditional age students are also many students who have struggled with math their entire lives, and the mastering mathematics requires building confidence as well as content mastery.

Generally, the students who have the confidence and study skills to work successfully in an online learning environment are not in remedial math—they learned high school math while in high school.

10. Quick, rote memorization can end up being a disservice to students if they delay in taking the for-credit courses in Math and English or if they transfer to another institution, because they may not retain the knowledge when they do enroll later in a credit course. Have you found any solutions to this?

UNR has implemented a system in PeopleSoft for flagging all students that have not completed their Core Math requirement but are not enrolled in a math class leading toward progression toward that requirement. Students not in compliance with the policy requiring continuous enrollment in mathematics until Core Math is satisfied are flagged; this allows us to run a report and identify the students, and the information is disseminated to advisors for follow up. Flagged students also receive an advising hold, insuring an opportunity for advisors to discuss their math requirements and the need to get started on the math requirements.