Mathematics Education Data

- A major change we have made to our program, starting in the fall of 2014 was the inclusion of our math education candidates as apprentices in both WEITQ and MSP grants that the mathematics education faculty have been awarded over the last few years. It provides our candidates the opportunity to work side by side with in-service teachers receiving the same professional development. We had six candidates that graduated during the 2015-2016 school year that participated in 15 to 200 hours of professional development before they started their first full-time teaching position. During 2016-17 we expect to graduate four candidates that will have participated in 15 to 75 hours of professional development before graduating. In addition to receiving all of this professional development, they have also received additional practicum experience working in classrooms with these teachers providing them and their students support and assistance. By working with in-service teachers at all levels of K-12 mathematics education, it provides our candidates an opportunity to observe and appreciate the coherence and connectedness of the mathematics.

- We feel this piece alone makes our math education program very unique in our state and provides a major strength to our program. We are continuing to incorporate more candidates that will graduate in 2017-18 into this model. This is run in conjunction with our Math Block cohort (as well as pre & post from it) experience. In the past, this has provided our candidates a one and one-half to two-year rigorous development in mathematics education preparation. In the fall of 2016, we have incorporated apprentices in these projects at an earlier stage in their program. These candidates will graduate in the future having two and one-half to three years of rigorous development in mathematics education preparation. This model coincides with how they are thinking about and developing teacher candidates at Harvard University (Kay Merseth, 2015).

- In addition to assisting our current candidates, our professional development grants (MSP and WEITQ) in mathematics education are also supporting our former graduates. Thus our graduates are staying connected to the university and continuing to be life-long learners of their profession even after they graduate from our program.

- Secondary Content Knowledge
  - Since the PRAXIS II math exam changed in September of 2014, we will not compare it to the previous PRAXIS II exam.
  - Last year we reported that our PRAXIS II data would show a positive change from the previous year based on preliminary data. That was in fact the case. Year over year the average percentage of correct responses in the area of Number &
Quantity, Algebra, Functions & Calculus increased from 59% to 71%. Year over year the average percentage of correct responses in the area of Geometry, Probability & Statistics, and Discrete Mathematics increased from 54% to 70%.

- During 2015-16 our candidates scored above the state and national level in the areas of Number & Quantity, Algebra, Functions & Calculus and Geometry, Probability & Statistics, and Discrete Mathematics. We expect this to continue in 2016-17, although we expect a smaller group of candidates completing the PRAXIS II this year. Due to the smaller size, a greater fluctuation could occur.

- During 2014-15 we had a limited number of candidates that passed the PRAXIS II. As a result of this, we had department conversations so faculty were aware of this change from the past. We also started conducting study sessions for our candidates to assist them in preparing for the exam. Based on preliminary results last year, we reported that we expected to see an increase in our passing rate during 2015-16.

- The result of these conversations and preparation sessions was that in 2015-16, we saw a dramatic increase in the number of students passing PRAXIS II. Of the nine candidates that took PRAXIS II in 2015-16, seven of them passed. Many of the scores were well above the 160 passing rate, and one of our candidates received a perfect score of 200.

- We believe the observations by the cooperating teachers working with our candidates in the field is a valuable resource for examining how prepared our candidates are with their content. The results seem to indicate that cooperating teachers believe our candidates are prepared with their content when working with them during student teaching.

- We believe this is a mix between the content courses they take and the heavy emphasis of content mixed with pedagogy that is emphasized during our candidates’ math block experience. In 2012 we integrated a new assessment tool into the math block practicum that both the professors and cooperating teachers use for observing our candidates’ pedagogical content knowledge when teaching lessons. This tool has been very helpful for evaluating that knowledge. We continue to use it and receive important feedback from our cooperating teachers during the mathematics block experience.

- Based on feedback from the cooperating teachers and our current data, this is an area of strength in our program.

- **Verbal Skills**
  - The cooperating teachers acknowledge that our candidates are exhibiting appropriate verbal skills during their student teaching placements, as 3 of the 3
cooperating teachers agreed that our candidates were prepared for this during student teaching.

- Over the last eight years we have emphasized these skills and proper questioning techniques during our Math Block. Over the last four years we have focused on using questioning techniques to assist in differentiating instruction.
- Two years ago we started to integrate the 5 Practices for Orchestrating Discussion (NCTM). The candidates participate in role playing exercises and practice them with their peers and are then expected to incorporate them into lesson plans when working with K-12 students in their practicum.
- During our MSP project “Mathematical Progressions through Habits of Mind”, our apprentices have had the opportunity to showcase the 5 Practices for Orchestrating Discussion for our participants. Many of the participants have remarked that they were very impressed with the candidates’ ability to showcase these skills to in-service teachers.

- Technological skills
  - The cooperating teachers acknowledge that our candidates are exhibiting strategic use of technology during their student teaching placements. Three of the 3 cooperating teachers strongly agreed that our candidates were prepared for this during student teaching. Our teacher candidates also strongly agree that they are well prepared to use technology in their teaching.
  - This is continues to be one of our strongest areas of preparation.
  - We continue to expose candidates to various forms of technology in their content courses.
  - In 2012 we began offering a modeling course which emphasized the use of spreadsheets.
  - We believe we are doing a strong job of preparing our candidates for the use of various forms of emerging technology through their Math Block experience. During that experience they learn to use technology for visualization, communication, and assessment purposes. Each year we continue to integrate new forms of technology that school districts expect our candidates to be proficient with. This includes the use of various hardware such as SMART boards, iPads, and Chromebooks as well as the applications they would use with these devices. Each of our candidates involved in our MSP project as an apprentice receives an iPad to use. For those not involved in the project, they receive one for the semester during Math Block. In both cases, the candidates become proficient with how to use it appropriately in a teaching environment. Technology is used for assessment purposes, inquiry based activities, and
general productivity. Candidates are also exposed to using technology to create screencasts and videos which support hybrid or flipped learning.

- Variety of teaching strategies
  - The cooperating teachers acknowledge that our candidates are exhibiting various strategies during their student teaching placements. Three of the 3 cooperating teachers agreed that our candidates were prepared for this during student teaching.
  - We continue to emphasize this within our Math Block. We continually meet as an instructor cohort in the block to discuss various strategies we emphasize to our candidates before they begin student teaching. Candidates are exposed to a variety of lessons and research based methods that they use during their practice teaching and in their math block practicum. Candidates are expected to incorporate and encourage the Mathematical Practice Standards into the activities and tasks they conduct with their students.
  - In 2014-2015 we included five of our candidates in a WEITQ - Core Progressions grant, working with 35 in-service grades 3-8 math teachers in Western Wisconsin. The teacher candidates attended seminars with the teachers to learn about the practice standards and how to implement them in their classrooms. The teacher candidates participated in practicum experiences at both the elementary level and middle school level to better understand the progression of the content and strategies they would use to teach the content at these varying levels. Each of the cooperating teachers have reported positive feedback about our candidates and the additional work they are doing in these placements.
  - In 2015-16 we have included 11 of our candidates in a MSP – Mathematical Progressions through Habits of Mind grant, working in the project as apprentices. These apprentices were at the pre-Block, block, post-block, and student teaching level. Candidates attend professional development with 80 other K-12 teachers in Western Wisconsin. The apprentices also worked with their cooperating teachers through additional practicum experience. Two of our candidates that are student teaching in the Spring of 2016, spent 10 weeks working with their cooperating teacher as an apprentice in preparation for student teaching. By using this model, they were able to take over some of the courses on their first official day of student teaching. We saw the benefit of this model reflected in one of our candidate’s edTPA score.
  - In 2016-17 we have included 10 of our candidates in a MSP – Mathematical Progressions through Habits of Mind grant, working in the project as apprentices. These apprentices were at the pre-Block, block, post-block, and student teaching level. Candidates attend professional development with 80
other K-12 teachers in Western Wisconsin. The apprentices also worked with their cooperating teachers through additional practicum experience. Two of our candidates that are student teaching in Fall 2016 were able to spend quality time working with their cooperating teachers during the summer workshop of the project. This provided an opportunity for candidate and cooperating teacher to get to know one another before starting the student teaching experience, and establish expectations and norms for the experience. One of our candidates that is student teaching in the Spring of 2017, spent 12 weeks working with her cooperating teacher as an apprentice in preparation for student teaching. By using this model, she should be able to take over some of the courses on their first official day of student teaching.

- Professional work ethic
  - The cooperating teachers acknowledge that our candidates display a positive work ethic during their student teaching placements. Three of the 3 cooperating teachers agreed that our candidates were prepared for this during student teaching. All five of the teacher candidates that completed end of program surveys either agreed (1) or strongly agreed (4) that the program had prepared them for the demands of their profession.
  - Our Math Block continues to emphasize professionalism to our candidates through proper attire, punctuality, and being prepared with quality work. We continue to discuss this with area cooperating teachers during each candidate’s practicum so candidates recognize what it means to be a professional once they begin their student teaching placement.
  - By integrating our candidates into professional development experience with in-service teachers (2014-2017), it has provided them a greater insight into the professional work ethic that is needed to excel in the profession. Many of the in-service teachers involved in the project have commented on the professionalism that the apprentices portray when they interact with the participants in the grant projects.

- Implementing innovative ideas
  - The cooperating teachers acknowledge that our candidates are implementing innovative ideas during their student teaching placements. Three of the 3 cooperating teachers agreed that our candidates were prepared for this during student teaching.
  - Over the last four years in the Math Block we have introduced candidates to the art of preparing lessons through gradual stages. At the final stage we expect candidates to be able to be resourceful to integrate their own ideas into the lessons they teach. By the end of the practicum experience, candidates are
expected to construct units, and not think of them as lessons that do not connect with one another.

- Math Block candidates are exposed to a variety of mathematical learning resources. These are linked from a mindmap that we have constructed, so candidates have access to this during student teaching and beyond. Candidates have access to materials from sites such as: Mathalicious, YummyMath, IllustrativeMathematics, MARS, etc.

- Math Block candidates are exposed to using technologies such as Desmos and Geogebra to create inquiry based activities.

- Math Block candidates learn to use various representations and manipulatives to work with topics in Algebra, Ratio & Proportion, and Fractions.

- **Non-verbal communication**
  - In the past, cooperating teachers acknowledge that our candidates could use some additional work at developing non-verbal communication during their student teaching placements. This year, all three of the cooperating teachers agreed that our candidates were demonstrated the ability to communicate with students in effective non-verbal ways.
  - Within our Math Block cohort we continue to have conversations among the professors to interject various methods of better meeting this goal. Some of this can be accomplished through technology integration, while also providing candidates more opportunity to do this type of communicating within our class and in their practicum. Based on the cooperating teacher survey, the work of our professors in the Math Block is having a positive effect in this area.

- **Work on assessment**
  - In the past, this was an area that the cooperating teachers acknowledged we are doing an adequate job, but it appears we could continue to improve on it. It appeared our candidates are fairly strong with informal assessment, but could use more experience with formal assessment. This year, 3 of the 3 cooperating teachers agreed that our candidates were prepared for both formal and informal assessment during student teaching. Based on candidate feedback, all five of those completing the survey agreed that they felt prepared for both forms of assessment.
  - We believe that informal assessment is strong because of the emphasis it receives throughout our Math Block in the forms of various questioning techniques. In 2011 we introduced a lesson plan in the block that emphasized the need for students to have an understanding of how they will know students are ready to move on to the next section of the lesson, thus the need to gather informal data.
Formal assessment is difficult for candidates to fully understand before student teaching as they are often limited to the opportunities they have to conduct these types of assessments. One thing we instituted in 2012 was a mini-student teaching experience for our candidates during their Math Block practicum which allowed our candidates to teach a one week unit to a specific class. At the end of this unit they had the opportunity to create a formal assessment that was given to the students they taught. Anecdotally we have received positive feedback from the cooperating teachers about this experience and our candidates have expressed more confidence in implementing these assessments than they did a couple of years previous.

During the 2015 and 2016 math blocks, we feel we have done a better job emphasizing formal assessment through the analysis we ask our candidates to perform on the assessment in their unit plan. The structure of the unit plan is to mimic the edTPA – focusing on planning, instruction, and assessment. We also added experiences in our math block where candidates assign formal assignment to their peers and are asked to provide them with appropriate feedback to support correct and incorrect solutions on formal assessments. We believe by continuing to do this in 2017, it will strengthen our candidates’ ability to use formal assessments.

- Differentiating Instruction for disabilities and exceptionalities
  - In the past, cooperating teachers acknowledged that our candidates could use some additional experience being able to differentiate instruction for disabilities and exceptionalities during their student teaching placements. This year we saw an improvement in that area as all three of the cooperating teachers agreed that our candidates were prepared for this during student teaching.
  - This is an area where we believe further conversations need to continue between our department and the college of education on how to best meet this need for our students. This might be an area where they could use additional field experiences as they progress through the program leading to their block experience.
  - Within our Math Block courses, we continue to provide our candidates more opportunities to better prepare them for this. Many of our candidates are able to attend team meetings during their practicum to see how teachers address these needs for students. During the 2015 block practicum, we integrated a new portion into the planning phase of the Unit Plan so candidates address how they will make accommodations and differentiate their instruction for these students.
• We continue to emphasize the use of mathematical tasks that meet the needs of students at different levels. We have also incorporated a lot of the work of Jo Boaler (youcubed.org) on Growth Mindset into our Math Block experience.

• Classroom management
  o This is an area we continue to monitor. Of our three cooperating teachers responding to our survey, one slightly agreed, one agreed, and one strongly agreed that our candidates were prepared to showcase support strategies to manage a classroom.
  o A change that we have made within the last couple of years is to make one of the four Math Block courses have a sole emphasis on classroom management. We continue to have conversations within our block cohort on how to best present situations so candidates have opportunities of trying out various classroom management techniques before they get to their student teaching experience. We have begun instituting role playing scenarios, so candidates have a better understanding of what to do should they encounter some of the more extreme management issues.
  o We believe a continued focus should be placed on this area of teaching while candidates complete their practicum experience during the Math Block. Over the last few years of block, we have integrated the management portion right into our lesson plan so candidates are thinking about the management right alongside their teaching movements.
  o We continue to emphasize the use of good mathematical tasks in order to engage students and keep their focus on what they are learning, which helps to address some of the behavioral issues a candidate might encounter. In conjunction with this, we will continue to focus on the integration of techniques our candidates can use to manage their students.

• Collaboration with colleagues & parents
  o In the past, cooperating teachers acknowledged that our candidates could use some additional experience collaborating with colleagues and parents during their student teaching placements. In 2015-16 all three of the cooperating teachers agreed that our candidates collaborated well with others and were positive role models for their students.
  o We believe the improvement is based on interactions that our students have with their cooperating teachers in the Math Block practicum. We have also implemented role playing experiences for candidates on how to interact with parents and how to communicate with them, both in written and verbal forms.
  o Since 2013 we have taken candidates from our Math Block to the state math education conference in Green Lake, WI (Wisconsin Math Council). By attending,
candidates are exposed to professional development opportunities at an early stage in their career. During 2015 and 2016, all of the candidates in the Math Block attended the conference. In the past, we have had approximately half to three-quarters of the cohort attend.

- In 2015, four of our candidates were selected to give a one-hour presentation at the WMC Conference on their experiences working in a professional development grant with in-service teachers. In 2016, two of our candidates were selected to give a one-hour presentation on incorporating rich mathematical tasks in a middle school or high school classroom. After this presentation, one of the curriculum directors sitting in the audience came up to the candidates and remarked to them how he couldn’t believe the level of talk they gave considering they were at the pre-student teaching phase in their career.

- Starting in 2014, we have had our candidates participating in professional development grants alongside the in-service teachers. By doing this, the candidates are seeing the importance for professional development and learning right along-side the in-service teachers. During 2014-15 we had five candidates involved in this. During 2015-16 we had 11 candidates involved in this type of experience. During 2016-17 we have 10 candidates involved in this. These candidates are at all different levels in the program: from pre-block to student teaching. By integrating our candidates into experiences like this as apprentices it should strengthen their collaboration and outlook on professional development. Many of the participating teachers have commented on how impressed they are with how the apprentices interact with them at the workshops, as well as when they work with them in their classrooms.

- edTPA Results
  - During 2015-16 we had six candidates from the 2015 math block complete the edTPA during student teaching.
  - All six of our candidates had passing scores, based on state requirements of a 38 set during the summer of 2016. Four of the six scores were well above the state average in Secondary Mathematics (41.1). Our candidates’ scores were 54, 49, 48, 45, 39, and 38. Our candidate score of 54 would be at the high end within the state in Secondary Mathematics.
  - The following is our break down over the three areas: planning, instruction, and assessment.
    - Candidate 1: 17, 14, 18
    - Candidate 2: 18, 16, 14
    - Candidate 3: 16, 14, 15
- Candidate 4: 16, 18, 20
- Candidate 5: 13, 14, 12
- Candidate 6: 14, 13, 11

- As far as an overall average: planning was our best, instruction second, and instruction was third. When comparing our candidates’ scores to the state scores we were above average in all three areas. Planning was 13.7 (state) vs. 15.3 (UWRF). Instruction was 13.8 vs. 15.2 (UWRF). Assessment was 13.4 (state) vs. 15.0 (UWRF).

- We feel that due to our increased emphasis over the last couple of years on assessment, it resulted in our candidates having strong scores in this area. The state average in the area of assessment was 13.4, while our candidates’ average was 15.0. Two of our candidates had assessment scores of 18 and 20. Between those two candidates they had eight 4.0’s over those five rubrics being scored on assessment. Assessment was our area with the largest deviation amongst our candidates’ scores.

- When comparing individual rubrics, we are well above the state average on rubrics: 1, 8, 11, and 13. The only rubric we were below the state average on was rubric 10, by 0.1 (not necessarily a significant amount). We will continue to monitor this area and work to improve on it with future cohorts.

- Based on our six candidates we have had 90 rubrics scored (15 each). Of those 90 rubrics our candidates have had 21 of them scored at a 4.0, which is just over 23% of all rubrics scored at the 4.0 level. We have had only 16 of the 90 that have scored either a 2.0 or less (only one rubric was scored as a 1.0), which is just over 17% of all rubrics. Thus we have a greater percentage of the rubrics being scored above a 3.0 than below a 3.0. One of our candidates had none of the rubrics scored below a 3.0.

- In the last year, we have purchased two swivl devices specifically for the Mathematics Education program to assist our candidates with videotaping their lessons. Our candidates gained experience using the device (along with the iPad they were issued) during their Math Block experience and two of our candidates used them to record in Fall 2016 as part of their actual edTPA. This should assist our candidates with getting a better recording of their teaching (audio and video) to select for their edTPA submission.

- Overall we are very pleased with the results since this is the first time our candidates were required to complete the edTPA and have been officially scored by Pearson. We will continue to monitor our scores and expect our next round of candidates to stay in this range, if not improve on future edTPA assessments.
- We feel the Unit Plan we require the candidates to complete in the Math Block experience is a solid replication of the edTPA before they get to student teaching. Candidates are receiving a practice run by completing this during a one-week learning segment in their practicum experience. The unit plan mirrors all three sections (planning, instruction, and assessment) of the edTPA. By having the candidates complete this, they should continue to be well prepared for engaging with the edTPA when they do so during student teaching. During the 2016 math block, we added commentary questions to their final unit plan. This provided them more experience reflecting on their teaching and practice, so they are better able to articulate their thoughts. We will continue this practice with the 2017 cohort.

- Overall we feel the changes and updates we have made over the last six years to our Mathematics Education program have strengthened the program and prepared our candidates to be ready to join the profession as a first year teacher. We continue to gain positive feedback from teachers working with our graduates during their first year in the profession. We continue to support our graduates in the profession as they participate in professional development we conduct, as well as enrolling in our MSE – Mathematics graduate program. We currently have Math Block alumni from 2012, 2013, 2014, and 2015 enrolled in our graduate program.

- We will continue to make the updates and modifications we have discussed, and continue to look for areas of strengths and weaknesses within our program that we need to address in the future.