NCTM Assessment #3: Planning

a. A brief description of the assessment and its use in the program

All secondary teacher candidates in mathematics are required to take our math methods course EDUC 451 Teaching Mathematics in the Middle School and High School. Nearly all teacher candidates take this course fall semester senior year prior to student teaching. The course is designed to discuss current developments in contemporary mathematics, identify and apply principles of learning mathematical concepts and use a variety of methods in teaching mathematics at the secondary level. In addition to the course, teacher candidates are expected to be in a field placement 5 hours a week. Students in EDUC 451 are placed into secondary math classrooms.

This assessment is a unit plan designed, created, and implemented by the teacher candidates. Teacher candidates falling below standard on this unit plan are expected to use the feedback given by the instructor so they can submit a unit plan that meets standards in their education portfolio. Failure to bring the unit plan up to standard for the portfolio may result in the teacher candidate not graduating.

b. A description of how this assessment specifically aligns with the standards it is cited for in Section III.

NCTM standards and elements 3a, 3b, 3c, 3d, 3e, 3f, 3g, 4a, 4b, 4c, 4d and 4e are addressed by this assessment. To be proficient on this assessment, teacher candidates must include and demonstrate an understanding of K12 state standards in math in their units (NCTM 3a). Teacher candidates are also expected to consider research in planning using articles discussed in class (NCTM 3b). The ability to differentiate instruction (NCTM 3c), make cross-curricular connections (NCTM 3d), and employ both formative and summative assessments (NCTM 3f and NCTM 3g) must be demonstrated at the proficient level. Teaching units are evaluated on how well the unit was sequentially constructed as well as whether activities were challenging (NCTM 4b) and took into account adolescent learning and development (NCTM 4a). Teacher candidates must address relevant cultural and language issues that may exists in the classroom (NCTM 4c and NCTM 4d) and include the use of technology, manipulatives, or exploratory learning (NCTM 4e) in their unit.

c. A brief analysis of the data findings.

Both teacher candidates demonstrated proficiency or above on all **NCTM standards** and *NCTM standard elements* measured by this assessment. Both teachers were rated outstanding on standard elements 3c.1, 3c.2, 4b.1, 4b.2, 4d.1, and 5b.1. NCTM standard elements 3c.1 and 3c.2 were rated outstanding as both teacher candidates differentiated their unit plan using various strategies that uniquely met the needs of all the students in the classroom and supported these strategies with novel ways of using technology. Teacher candidates scored at the outstanding level on NCTM standard elements 4b.1 and 4b.2 demonstrating their skills at planning sequential learning opportunities that are relevant and grounded in mathematics education

research. Both teacher candidates cited the research supporting their strategies and clearly had knowledge of their students when connecting new information to student prior knowledge. The differentiated strategies included in the unit plan for specific students were designed to hold all students to individual standards based on their ability level. This level of complexity scores the teacher candidates abilities above the proficient level on NCTM standard element 4d.1. NCTM standard element 5b.1 required teacher candidates to design a unit plan that engaged students in developmentally appropriate mathematical activities that require active engagement in building new knowledge. Both teacher candidates were rated as outstanding on this element as they designed unit plans that would incorporate technology, differentiated research-based strategies and a various activities to actively engage students using novel and innovated methods. Compared to NCTM standard 3 and NCTM standard 5 average scores (3.50), NCTM standard 4 average score for both candidates was a 3.00. While three of the NCTM standard elements were rated, on average, as outstanding, teacher candidate performances on NCTM standard elements 4a.1, 4c, and 4e.2 were scored as proficient. All the assessments will need to be reviewed to determine if these are areas of concern.

d. An interpretation of how that data provides evidence for meeting standards, indicating the specific SPA standards by number, title, and/or standard wording:

This assessment was directly aligned to NCTM standards and 15 standard elements were broken down into 24 criteria to measure the performance of our teacher candidates. Considering that 19 out of the 24 NCTM standard elements measured included at least one score at the outstanding level and all NCTM standards were scored at least at the proficient score, our teacher candidates are demonstrating that they met NCTM standard 3, NCTM standard 4, and NCTM standard 5.

e. The assessment tool itself or a rich description of the assessment (often the directions given to candidates):

EDUC 451 Fall 2013
Instructor: Maryellyn Knight

Requirements for Teaching Unit

The format of the lesson plan is up for you to choose but it should be 'ready to teach' in that anyone (with reasonable math background) could walk in and teach from the plan. I want you to try implementing the different ideas we have talked about in class as well as consider how you will effectively implement them.

Requirements for units

a) Include a unit overview which should state how it fits in the previous and future curriculum (What my students know and where are they going) as well as a description of goals. 4b
b) Each lesson and perhaps a unit overview must include reference in Objectives to NCTM Standards addressed by the unit (Content and Process) OR CCSSI standards. 3a & 4a
c) Consider research in planning for student's mathematical learning, including the articles we discuss in class. 3b
d) Unit should contain Connections included in *at least 2 of four following categories*: within unit, within overall mathematics curriculum, to other subjects or to life outside school. 3d
e) Include *at least one of the following*: technology, manipulatives, or exploratory learning. 4e
f) *At least one cooperative learning activity* including strategies you will implement to create effective environment for all students.
g) Be sure to include *differentiated instructional* techniques to maximize different learning styles. 3c
h) Include at least 3 examples of items you would consider 'worthwhile tasks' that you will be asking students to do (and how they will accomplish these- individual in class, groups, homework, etc.). 3e
i) Address how you would incorporate cultural and language diversity that exists in a classroom and how you would motivate the "reluctant learner". 4c & 4d
j) Assessments, both formative and summative, for the unit, including alternative assessments if any. Also, be sure that there is a plan for reteaching and reassessing, if needed. 3f & 3g
k) Inclusion of discourse strategy/questioning techniques as well questions in the lessons. 3e
l) Comments in each lesson how might make 'on the fly' modifications, what do you see as the most troublesome spots for students (AND HOW TO EXTEND FOR MORE ADVANCED STUDENTS). 3e & 4e
m) Be cognizant of your adolescent audience where behavior and learning are concerned. 4a

Before you submit the lesson you will be asked to self-assess your unit. The goal is to have you come up with a well formed plan and run it by at least one person first (ideally more people).

f. The scoring guide for the assessment:

SAINT MARY'S COLLEGE
Teacher Education Program
NCTM Planning Assessment

Teacher Candidate Name		Teacher Candidate ID#	
Date		Instructor	

Please indicate the "Level" (Beginning = 1, Developing = 2, Proficient = 3, or Outstanding* = 4) which best describes teacher candidate's performance in each row by placing an "X" in the corresponding column or the numeric value in the "Score" column**. To score at the Proficient Level for the NCTM Standard Performance Level, the teacher candidate must be Proficient (3) or higher in each row.** (Please see page 4 of rubric for Overall description of NCTE standards 3, 4, and 5)
*To score a teacher candidate as "Outstanding", a rationale with specific examples must be given to show that the unit/lesson plan demonstrates a performance greater than "Proficient".

	Beginning	Developing	Proficient	Outstanding/Rationale	Score
SMC #3 NCTM **3a**	Planning does not demonstrate knowledge of the curriculum standards.	Planning demonstrates knowledge of the curriculum standards.	Planning demonstrates knowledge of the curriculum standards for secondary mathematics and their relationship to student learning within and across mathematical domains.		
SMC #4 NCTM 3b	Planning does not reflect consideration of the mathematical learning experiences.	Planning reflects consideration of the mathematical learning experiences.	Planning reflects careful analysis and consideration of research in planning for and leading students in rich mathematical learning experiences.		
SMC #4 NCTM **3c.1**	Planned lessons and units do not include alternate strategies to address high or low ability students.	Planned lessons and units include an alternate strategy to address a group of high or low ability students.	Planned lessons and units incorporate a variety of strategies to differentiate instruction for diverse populations.		
SMC #7 NCTM **3c.2**	Planned lessons and unit do not include consideration of instructional technology.	Planned lessons and unit includes consideration of instructional technology.	Planned lessons and units incorporate mathematics-specific and instructional technologies to build all students' conceptual understanding and procedural proficiency.		
SMC #4 NCTM 3d	Planning does not include opportunities for students to communicate about mathematics and/or make connections among mathematics.	Planning includes an opportunity for students to communicate about mathematics and/or make connections among mathematics.	Planning includes provisions for students to have several opportunities to communicate about mathematics and make connections among mathematics, other content areas, everyday life, and the workplace.		
SMC #3 NCTM 3e	Planning does not include techniques to engage students at the beginning of the unit.	Planning includes at least one technique to engage students at the beginning of the unit.	Planning includes the use of techniques to foster student engagement and communication (i.e., selecting high quality tasks, guiding mathematical discussions, identifying key mathematical ideas, identifying and addressing student misconceptions, and employing a range of questioning strategies).		
SMC #4 NCTM **3f**	Planning does not include assessments used to determine whether students met the objectives of the lesson/unit.	Planning includes summative assessments used to determine whether students met the objectives of the lesson/unit.	Planning includes formative and summative assessments utilized to inform instruction by reflecting on mathematical proficiencies essential for all students.		
SMC #4 NCTM 3g	Planning does not include assessments used to determine students' mathematical understanding and ability.	Planning includes summative assessments used to determine students' mathematical understanding and ability.	Planning includes provisions to monitor students' progress and measure students' mathematical understanding and ability using formative and summative assessments.		
			Overall NCTM Standard 3: Content Pedagogy Performance Level		

Unit Planning

	Beginning	Developing	Proficient	Outstanding/Rationale	Score
SMC #2 NCTM 4a.1	Planned learning activities do not demonstrate knowledge of developmentally appropriate content.	Planned learning activities demonstrate teacher candidate's knowledge of developmentally appropriate content.	Planned learning activities demonstrate teacher candidate's knowledge of adolescent learning, development, and behavior.		
SMC #2 NCTM 4a.2	Planning does not demonstrate a positive disposition toward mathematical processes.	Planning demonstrates a mostly positive disposition toward mathematical processes by the teacher candidate.	Planning demonstrates teacher's candidate's positive disposition toward mathematical processes and learning.		
SMC #3 NCTM **4b.1**	Planning does not include learning opportunities in which new learning is connected to prior knowledge and/or experience.	Planning includes learning opportunities in which new learning is loosely connected to prior knowledge and experience.	Planning includes sequential learning opportunities in which new learning is clearly and relevantly connected to prior knowledge and experience.		
SMC #3 NCTM **4b.2**	Planning does not include learning opportunities designed to actively engage students in building new knowledge.	Planning includes learning opportunities grounded in mathematics education research designed to actively engage most students in building new knowledge.	Planning includes a sequence of developmentally appropriate and challenging learning opportunities grounded in mathematics education research to actively engage all students in building new knowledge.		
SMC #1 NCTM 4c.1	Planning does not incorporate knowledge of developmental differences and /or diversity that exists within classrooms.	Planning incorporates knowledge of developmental differences and diversity that exists within classrooms.	Planning incorporates knowledge of individual differences and the cultural and language diversity that exists within classrooms.		
SMC #1 NCTM 4c.2	Planning does not include efforts to motivate and engage students.	Planning includes efforts to motivate and engage students.	Planning includes culturally relevant perspectives as means to motivate and engage students.		
SMC #5 NCTM **4d**	Planned learning experiences may lead to inequitable treatment of students and/or low expectations.	Planned learning experiences demonstrate equitable and ethical treatment of all students.	Planned learning experiences demonstrate equitable and ethical treatment of, and high expectations for, all students.		
SMC #3 NCTM **4e.1**	Planning does not demonstrate a basic ability to apply mathematical content and/or pedagogical knowledge to use instructional tools.	Planning demonstrates a basic ability to apply mathematical content and pedagogical knowledge to use instructional tools such as manipulatives and physical models, drawings, virtual environments, spreadsheets, presentation tools, and mathematics-specific technologies	Planning demonstrates an advanced ability to apply mathematical content and pedagogical knowledge to use instructional tools such as manipulatives and physical models, drawings, virtual environments, spreadsheets, presentation tools, and mathematics-specific technologies (e.g., graphing tools, interactive geometry software, computer algebra systems, and statistical packages).		
SMC #3 NCTM **4e.2**	Planning does not demonstrate a basic ability to apply mathematical content and/or pedagogical knowledge to make sound decisions about when selecting instructional tools.	Planning demonstrates a basic ability to apply mathematical content and pedagogical knowledge to make sound decisions about when instructional tools enhance teaching and learning, recognizing both the insights to be gained and possible limitations of selecting such tools.	Planning demonstrates an advanced ability to apply mathematical content and pedagogical knowledge to make sound decisions about when instructional tools enhance teaching and learning, recognizing both the insights to be gained and possible limitations of selecting such tools.		
Overall NCTM Standard 4: Mathematical Learning Environment Performance Level					

	Beginning	Developing	Proficient	Outstanding/Rationale	Score
SMC #4 NCTM 5a.1	Planning does not include opportunities to monitor students demonstrating conceptual understanding.	Planning includes assessments that attempt to measure students' ability to employ conceptual understanding but assessments lack validity.	Planning includes assessments that will verify students' demonstration of conceptual understanding.		
SMC #4 NCTM 5a.2	Planning does not include opportunities to monitor students demonstrating procedural fluency.	Planning includes assessments that attempt to measure students' ability to be procedurally fluent but assessments lack validity.	Planning includes assessments that will verify students' demonstration of procedural fluency.		
SMC #4 NCTM 5a.3	Planning does not include opportunities to monitor students as they formulate, represent, and/or solve problems.	Planning includes assessments that attempt to measure students' ability to formulate, represent, and solve problems but some assessments lack validity.	Planning includes assessments that will verify students' demonstration of the ability to formulate, represent, and solve problems.		
SMC #4 NCTM 5a.4	Planning does not include opportunities to monitor students as they employ logical reasoning and/or continuous reflection on that reasoning.	Planning includes assessments that attempt to measure students' ability to employ logical reasoning and continuous reflection on that reasoning but some assessments lack validity.	Planning includes provisions to verify students' demonstration of logical reasoning and continuous reflection on that reasoning.		
SMC #4 NCTM 5a.5	Planning does not include provisions to monitor students' productive dispositions toward mathematics.	Planning includes provisions to monitor students' productive dispositions toward mathematics.	Planning includes assessments that will verify students' demonstration of productive dispositions toward mathematics.		
SMC #5 NCTM 5b.1	Planning does not include opportunities for students to engage in developmentally appropriate mathematical activities and/or investigations.	Planning includes provisions to engage students in mathematical activities and investigations. Some activities may not be developmentally appropriate or actively engage students in building new knowledge.	Planning includes provisions to engage students in developmentally appropriate mathematical activities and investigations that require active engagement in building new knowledge.		
SMC #5 NCTM 5b.2	Planning does not include opportunities for students to engage in developmentally appropriate mathematical activities and/or investigations.	Planning includes provisions to engage students in mathematical activities and investigations. Some activities may not be developmentally appropriate or include mathematics-specific technology in building new knowledge.	Planning includes provisions to engage students in developmentally appropriate mathematical activities and investigations that include mathematics-specific technology in building new knowledge.		
SMC #4 NCTM **5c**	Planning does not include summative assessments used to determine whether students met the objectives of the lesson/unit.	Planning includes summative assessments used to determine whether students met the objectives of the lesson/unit.	Planning includes provisions to use diagnostic, formative, and summative assessment evidence to determine the extent to which students' mathematical proficiencies have increased as a result of instruction.		
Overall NCTM Standard 5: Impact on Student Learning Performance Level					

Comments and/or Outstanding Rationale:

Note to Students: NCTM standards that apply to this assignment are described below. The information below along with the scores given for each NCTM element will be used to score your "Overall Score" for each NCTM standard.

Standard 3: Content Pedagogy
Effective teachers of secondary mathematics apply knowledge of curriculum standards for mathematics and their relationship to student learning within and across mathematical domains. They incorporate research-based mathematical experiences and include multiple instructional strategies and mathematics-specific technological tools in their teaching to develop all students' mathematical understanding and proficiency. They provide students with opportunities to do mathematics – talking about it and connecting it to both theoretical and real-world contexts. They plan, select, implement, interpret, and use formative and summative assessments for monitoring student learning, measuring student mathematical understanding, and informing practice.

Standard 4: Mathematical Learning Environment
Effective teachers of secondary mathematics exhibit knowledge of adolescent learning, development, and behavior. They use this knowledge to plan and create sequential learning opportunities grounded in mathematics education research where students are actively engaged in the mathematics they are learning and building from prior knowledge and skills. They demonstrate a positive disposition toward mathematical practices and learning, include culturally relevant perspectives in teaching, and demonstrate equitable and ethical treatment of and high expectations for all students. They use instructional tools such as manipulatives, digital tools, and virtual resources to enhance learning while recognizing the possible limitations of such tools.

Standard 5: Impact on Student Learning
Effective teachers of secondary mathematics provide evidence demonstrating that as a result of their instruction, secondary students' conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and application of major mathematics concepts in varied contexts have increased. These teachers support the continual development of a productive disposition toward mathematics. They show that new student mathematical knowledge has been created as a consequence of their ability to engage students in mathematical experiences that are developmentally appropriate, require active engagement, and include mathematics-specific technology in building new knowledge.

g. Charts that provide candidate data derived from the assessment:

2013 Teacher Candidate Performance on Assessment 3: Unit Planning

NCTM Standard	Total N	Beginning		Developing		Proficient		Outstanding		Avg. Rating
		n	%	n	%	n	%	n	%	
3a	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50
3b	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50
3c.1	[redacted]	0	0%	0	0%	0	0%	[redacted]	100%	4.00
3c.2	[redacted]	0	0%	0	0%	0	0%	[redacted]	100%	4.00
3d	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50
3e	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50
3f	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50
3g	[redacted]	0	0%	0	0%	[redacted]	100%	0	0%	3.00
Stand 3	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50
4a.1	[redacted]	0	0%	0	0%	[redacted]	100%	0	0%	3.00
4a.2	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50
4b.1	[redacted]	0	0%	0	0%	0	0%	[redacted]	100%	4.00
4b.2	[redacted]	0	0%	0	0%	0	0%	[redacted]	100%	4.00
4c	[redacted]	0	0%	0	0%	[redacted]	100%	0	0%	3.00
4d	[redacted]	0	0%	0	0%	0	0%	[redacted]	100%	4.00
4e.1	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50
4e.2	[redacted]	0	0%	0	0%	[redacted]	100%	0	0%	3.00
Stand 4	[redacted]	0	0%	0	0%	[redacted]	100%	0	0%	3.00
5a.1	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50
5a.2	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50
5a.3	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50
5a.4	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50
5a.5	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50
5b.1	[redacted]	0	0%	0	0%	0	0%	[redacted]	100%	4.00
5b.2	[redacted]	0	0%	0	0%	[redacted]	100%	0	0%	3.00
5c	[redacted]	0	0%	0	0%	[redacted]	100%	0	0%	3.00
Stand 5	[redacted]	0	0%	0	0%	[redacted]	50%	[redacted]	50%	3.50

2014 Teacher Candidate Performance on Assessment 3: Unit Planning

NCTM Standard	Total N	Beginning		Developing		Proficient		Outstanding		Avg. Rating
		n	%	n	%	n	%	n	%	
3a		0	0%	0	0%	0	0%	0	0%	
3b		0	0%	0	0%	0	0%	0	0%	
3c.1		0	0%	0	0%	0	0%	0	0%	
3c.2		0	0%	0	0%	0	0%	0	0%	
3d		0	0%	0	0%	0	0%	0	0%	
3e		0	0%	0	0%	0	0%	0	0%	
3f		0	0%	0	0%	0	0%	0	0%	
3g		0	0%	0	0%	0	0%	0	0%	
Stand 3		0	0%	0	0%	0	0%	0	0%	
4a.1		0	0%	0	0%	0	0%	0	0%	
4a.2		0	0%	0	0%	0	0%	0	0%	
4b.1		0	0%	0	0%	0	0%	0	0%	
4b.2		0	0%	0	0%	0	0%	0	0%	
4c		0	0%	0	0%	0	0%	0	0%	
4d		0	0%	0	0%	0	0%	0	0%	
4e.1		0	0%	0	0%	0	0%	0	0%	
4e.2		0	0%	0	0%	0	0%	0	0%	
Stand 4		0	0%	0	0%	0	0%	0	0%	
5a.1		0	0%	0	0%	0	0%	0	0%	
5a.2		0	0%	0	0%	0	0%	0	0%	
5a.3		0	0%	0	0%	0	0%	0	0%	
5a.4		0	0%	0	0%	0	0%	0	0%	
5a.5		0	0%	0	0%	0	0%	0	0%	
5b.1		0	0%	0	0%	0	0%	0	0%	
5b.2		0	0%	0	0%	0	0%	0	0%	
5c		0	0%	0	0%	0	0%	0	0%	
Stand 5		0	0%	0	0%	0	0%	0	0%	