

*Engaging students through the
use of the online homework
system WeBWork.*


By Anneke Bart

Saint Louis University


WeBWork

- Freeware supported by the MAA
<http://webwork.maa.org/>
- Quote: “*WeBWork is an open source Perl-based system for delivering individualized homework problems over the web*”.
- User friendly system allows any instructor to create homework assignments using the national problem library.

Screenshot

 **WebWork**

Main Menu

- Courses
- Homework Sets
- Password/Email
- Grades
- Instructor Tools
 - Classlist Editor
 - Hmwk Sets Editor
 - Library Browser
 - Statistics
 - Student Progress
 - Scoring Tools
 - Email
 - File Manager
 - Course Configuration
- Help 
- Report bugs

WebWork → FL10-MATH-143-01

FL10-MATH-143-01

<u>Sel.</u>	<u>Name</u>	<u>Status</u>
<input type="checkbox"/>	Chapter8Section4	closed, answers available
<input type="checkbox"/>	WebWorkIntro	closed, answers available
<input type="checkbox"/>	Chapter7Section1	closed, answers available
<input type="checkbox"/>	Chapter7Section2	closed, answers available
<input type="checkbox"/>	Prerequisite-Test	closed, answers available
<input type="checkbox"/>	Chapter7Section4	closed, answers available
<input type="checkbox"/>	Chapter7Section5	closed, answers available
<input type="checkbox"/>	Chapter7Section7	closed, answers available
<input type="checkbox"/>	Chapter7Section8	closed, answers available
<input type="checkbox"/>	Chapter8Section1	closed, answers available
<input type="checkbox"/>	Chapter8Section2	closed, answers available
<input type="checkbox"/>	Chapter8Section3	closed, answers available
<input type="checkbox"/>	Chapter8Section5	closed, answers available
<input type="checkbox"/>	Chapter8Section7	closed, answers available

WeBWork has been used at Saint Louis University by several faculty members for almost 2 years.

Courses include:

- Calculus I
- Calculus II
- Calculus III
- Differential Equations.

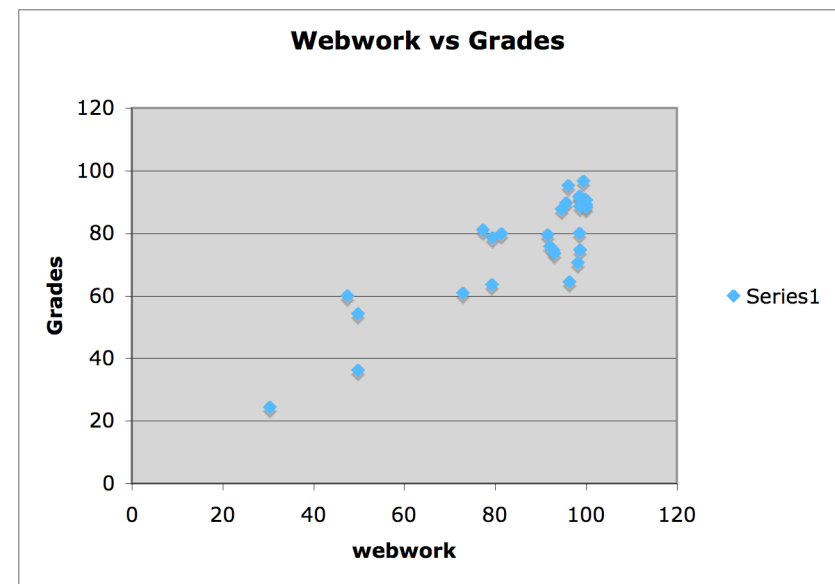
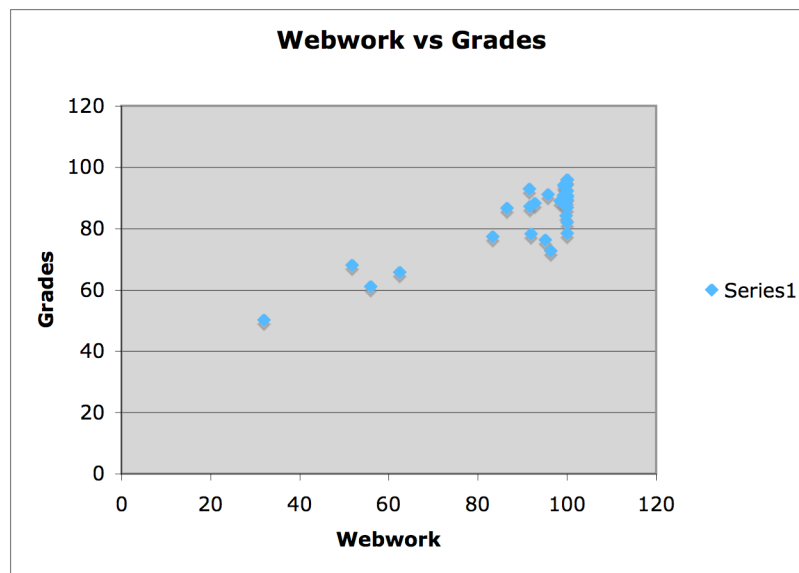
In this talk: Calculus II (Integral Calculus)

- WeBWork was assigned in 3 sections of Calculus II.
- The grade in WeBWork was worth 8% of the total grade.
- One would of course expect some effect on the overall grade, but the results were stronger than that.

Correlation coefficient for WeBWork grades and overall course grades

Semester	#students	Correlation
Spring 2010	26	.80
Fall 2010-01	29	.86
Fall 2010-02	28	.86

Scatter plot for the Fall semesters



- The correlation coefficient is .86 for each.
- A score below ca 80% on WeBWork usually results in a failing grade.

Some observations:

- WeBWork gives immediate feedback and students know when they are doing something wrong.
- They cannot get the full points until the problem is completely correct.
- This leads to increased interaction with students through email and office hours
- Students ask more focused questions.
- Scoring tools give the instructor insight into which exercises are causing the most problems

Exercise example

WeBWork → FL10-MATH-143-01 → Chapter8Section5 → 2

Chapter8Section5: Problem 2

This set is visible to students.

◀ Previous ▲ Prob. List Next ▶

(1 pt) [Library/Michigan/Chap8Sec5/Q05.pg](#)

How much work is required to lift a 600-kg satellite to an altitude of $3 \cdot 10^6$ m above the surface of the earth? The gravitational force is $F = GMm/r^2$, where M is the mass of the earth, m is the mass of the satellite, and r is the distance between them. The radius of the earth is $6.4 \cdot 10^6$ m, its mass is $6 \cdot 10^{24}$ kg, and in these units the gravitational constant, G , is $6.67 \cdot 10^{-11}$.

Work =

(include [units](#))

[Edit this problem](#)

Show correct answers Show Solutions

You have attempted this problem 0 times.

This homework set is closed.

This set is visible to students.

Features to consider:

Show correct answers Show Solutions

Preview Answers

Check Answers

You have attempted this problem 0 times.
This homework set is closed.

Show Past Answers

Email instructor

- Show correct answers/ solutions with check answer saves a lot of time. (Instructor)
- Show past answers helps us look at what students have tried.
- *Email instructor* sends a link of the student page to the instructor.

Great tool, but not the only component in the class:

- Students also have to turn in some clearly written solutions to selected problems. This helps prepare them for writing out complete solutions on the exams.
- After an initial lecture we do some group work in class.

Tools WeBWork provides

- Student Progress: shows how any individual is doing on his or her assignments
- Statistics for each assignment: how long does it take them to do problems? What are the scores on each problem for a certain assignment?
- Grading: The grades can be exported to a spreadsheet.

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[Homework Sets](#)

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[Statistics](#)

[rmcnulty](#)

[Student Progress](#)

[rmcnulty](#)

[Scoring Tools](#)

[Email](#)

[File Manager](#)

[Course Configuration](#)

[Help](#) 

[Report bugs](#)

Grades

R:

Set	Score	Out Of	Ind	Problems
Chapter10Section1	6.50	7	15	C C C 50 C C C 2 10 2 6 6 5 2
Chapter10Section2	2.00	5	4	C 0 50 0 50 5 1 8 1 3
Chapter11Section1	0.00	3	0	• • • 0 0 0
Chapter11Section2	0.00	2	0	• • 0 0
Chapter11Section4	0.00	10	0	• • • • • • • • • • 0 0 0 0 0 0 0 0 0 0
Chapter7Section1	1.00	14	0	• • • • • C • • • • • • 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Chapter7Section2	5.67	10	8	C C 0 C 0 0 0 C C 67 2 1 5 0 8 7 0 5 1 5
Chapter7Section4	4.00	5	18	C C C C 0 7 1 2 0 4

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Student Progress for FL10-MATH-143-01 set Chapter8Section5. Due 10/25/2010 at 10:00pm CDT

A period (.) indicates a problem has not been attempted, a "C" indicates a problem has been answered 100% correctly, and a number indicates the number of incorrect attempts. The success indicator, *Ind*, for each student is calculated as $100 * (\text{totalNumberOfCorrectProblems} / \text{totalNumberOfProblems})^2 / (\text{AvgNumberOfAttemptsPerProblem})$ or 0 if there are no attempts.

Click on student's name to see the student's version of the homework set. Click heading to sort table.

Name	Score	Out Of	Ind	Problems	Section	Recitation	Login Name
First Last Email				1 2 3 4 5 6 7 8			
Administrator	0.00	8	0			admin
Anneke Bart barta@slu.edu	0.00	8	0			barta
Dr Anneke Bart barta@slu.edu	0.00	8	0			DrBart
Yo ybu	8.00	8	12	C C C C C C C C 2 9 11 2 4 13 12 6	01		y
Ni nbi	8.00	8	19	C C C C C C C C 7 5 5 2 2 3 8 2	01		n
Ch cci	8.00	8	11	C C C C C C C C 5 11 6 1 0 26 14 2	01		c
Bri bce	6.67	8	6	C C C C C C C C 11 20 6 4 7 6 25 3	01		b
Kr kcd	1.00	8	1	C . 0 9 0 6 0 0 0 0 0	01		k
Ka kei	8.00	8	5	C C C C C C C C 4 2 42 22 8 4 59 8	01		k
Gr gei	8.00	8	50	C C C C C C C C 3 1 0 0 1 2 1 0	01		g

Student Progress

- Chapter10Section1
- Chapter10Section2
- Chapter11Section1
- Chapter11Section2
- Chapter11Section4
- Chapter7Section1
- Chapter7Section2
- Chapter7Section4
- Chapter7Section5
- Chapter7Section7
- Chapter7Section8
- Chapter8Section1
- Chapter8Section2
- Chapter8Section3
- Chapter8Section4
- Chapter8Section5