

Diagnostic Web-based Monitoring



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Problematic Students

- Those that think they have understood
- Those that think they know too little
- Those that do not ask for help
- ...



Remedy



- Offer short diagnostic tests on basic concepts early
- Make the tests generic to enable multiple tries
- Contact students that fail and offer assistance



Generic Question 1

After the execution of the following code:

```
a = 17
```

```
b = a
```

```
a = 42
```

What is the value of b?



Generic Question 2

After the execution of the following code:

```
x = 4711
```

```
y = x
```

```
x = 31415
```

What is the value of y?



Generic Question 3

After the execution of the following code:

```
myBirthYear = 1977
```

```
myOfficialBirthYear = myBirthYear
```

```
myBirthYear = 1962
```

What is the value of

`myOfficialBirthYear`?



Introduction to Computer Science

Summary of test 1

Students with no or more than two
attempts

Adam Sandler: 7 Failed

Britney Spears: 7 Passed



Group Evaluation

General

85% passed on their first attempt

10% passed on their second
attempt

5% needed more than two attempts



Question Evaluation

Questions

Attempts: 1 2 3 3+

Q1 45 3 2

Q2 48 2

Q3 25 3 1 21



Possible student benefits

- learning, as the tests will inspire some students to study,
- clarifying whether the student has understood or not
- teacher support



Possible teacher benefits

- Identify students to approach for support
- Identify basic concepts that needs better explanations



Possible university benefits

- Throughput of students as failures can be detected and corrected much earlier.
- Results in general as study habits improve.
- If the system is used in several courses, it could also be used to identify students that struggle in several subjects (many failures in several courses).





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The Washington Post

Williams College tops Forbes list of best schools



Usually college rankings are no big surprise -- as in, "Oh, good, Harvard is still considered the best college in the country."

But this week, Forbes came out with its third annual college rankings, which is based on "the student's point of view," and named a new champion: [Williams College in Massachusetts](#).

What, you don't know much about Williams?



Method

- Two introductory programming courses at KTH, one introductory course in Mathematical Statistics at Williams.
- 3-4 quizzes the first 3-5 weeks.
- Survey to all students.
- Interviews with all teachers and a dozen students.



38 % adjusted their self evaluation

Option	KTH Fall 09	KTH Spring 10	Williams Fall 10
Yes, more	21	16	10
Yes, less	23	21	17
No, confirmed	35	35	62
No, wrong	-	-	0
Don't know	22	28	10



More than 92% appreciated the generic features

Option	KTH Fall 09	KTH Spring 10	Williams Fall 10
Good	95	92	93
Does not matter	2	6	3
Unnecessary	3	1	3



Few found the quizzes stressful

Option	KTH Fall 09	KTH Spring 10	Williams Fall 10
Yes, very much	2	3	0
Yes, a little	30	29	10
No	68	68	90



More than 20 % claimed their study habits were affected

Option	KTH Fall 09	KTH Spring 10	Williams Fall 10
Yes, harder	25	9	10
Yes, less	2	4	3
No	60	57	72
Earlier	-	9	7
Don't know	14	20	7



Quizzes were efficient use of time

Option	KTH Fall 09	KTH Spring 10	Williams Fall 10
Yes	72	62	86
No	9	13	3
Don't know	20	26	10



Teachers should contact students

Option	KTH Fall 09	KTH Spring 10	Williams Fall 10
Good	71	59	31
No opinion	27	33	55
Not good	3	8	14



The quizzes affected students

Option	Studied harder/ earlier	No change	Study less
Confirmed my knowledge	15	71	
Knew more than expected	26	55	7

Students that reported either more or less knowledge than expected was more than twice as likely to study harder or earlier than the other students.

The probability ratio was equal to 2.70, with 95 % CI interval equal to 1.66-4.41 and a P-value < 0.0001.



References

- Bälter O. (2009): Diagnostic Web-based Monitoring in CS1. In Proceedings of Koli Calling 2009.
- Bälter, Enström, Klingenberg (submitted ?): Web quizzes with generic questions.
- Mehrens P. (2011): Det goda lärandet. Studentlitteratur (in press).

