Tracking Student Participation in Large Classes

Task Analysis

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1) Six Tasks:

A. A student wishes to communicate to the instructor that he or she wishes to a) ask a question of the instructor, or b) respond to a question posed by the instructor. (Easy)

Method:
1) Raise your hand.
2) If you can't raise your hand, raise your voice.

Objects and Communications:
1) Hand or voice
2) Act of raising hand or voice

Environment:
    When the student is performing this task, he or she is sitting in a classroom or lecture hall amongst other students. The student is most likely listening to the instructor's lecture, and at most is otherwise taking notes on the lecture. The student would perform this task when he or she is looking for clarification or is wishing to make a contribution to a class discussion.

B. The instructor needs to see when one or more students wish to speak, either to ask a question or to respond to the instructor's question, and acknowledge the student's wishes. (Medium)

Method:
1) Look at student body.
2) Choose a student from one or several candidates who has raised his hand.
3) Verbally address or gesture towards chosen student.

Objects and Communications:
1) Students wishing to participate.
2) Act of acknowledging the student which has been chosen, either verbally or through gesture.

Environment:
    The instructor is completing this task while he or she is on a lecture stage or clear area, possibly near or behind a podium. The group of students being taught is in front of the instructor.

C. The instructor wishes to record that a student has participated, as well as recording the quality of that student's participation. (Hard)

Method:
      1) Consider the student's contribution to the class, whether it be a question or a response to your question.
      2) Grade the quality of the student's contribution.
      3) Write down student's name and contribution grade.
      4) If using digital spreadsheet, copy handwritten data into spreadsheet.

Objects and Communications:
      1) Paper
      2) Writing utensil
      3) Student's verbal contribution

Environment:
      The instructor is completing this task while he or she is on a lecture stage or clear area, possibly near or behind a podium. The group of students being taught is in front of the instructor.

D. The instructor needs to see raw participation data, including number and quality of students' contributions. (Medium)
Method:
      1) Turn on computer.
      2) Load application that displays spreadsheets (e.g. Microsoft Excel).
      3) Open spreadsheet file containing students' grades.
Objects and Communications:
      1) Computer
      2) Monitor
      3) Keyboard and/or digital mouse
      4) Application capable of displaying spreadsheets
      5) Digital spreadsheet containing your students' grades.
Environment:
      Instructor is usually in his or her office or home, or some other quiet setting where he or she often works and expects to not be disturbed. Instructor is most likely sitting comfortably at a table, with the computer in front of him or her.

E. Instructor needs to modify raw participation data, including number and quality of students' contributions. (Easy)

Method:
1) Turn on computer.
2) Load application that displays spreadsheets (e.g. Microsoft Excel).
3) Open spreadsheet file containing students' grades.
4) Use keyboard or mouse to modify values contained within spreadsheet.

Objects and Communications:
1) Computer
2) Monitor
3) Keyboard and/or digital mouse
4) Application capable of displaying spreadsheets
5) Digital spreadsheet containing your students' grades.

Environment:
Instructor is usually in his or her office or home, or some other quiet setting where he or she often works and expects to not be disturbed. Instructor is most likely sitting comfortably at a table, with the computer in front of him or her.

F. The instructor wants to see reports (e.g. statistical analyses or models) of participation data, including number and quality of students' contributions. (Hard)

Method:
1) Turn on computer.
2) Load application that displays spreadsheets (e.g. Microsoft Excel).
3) Open spreadsheet file containing students' grades.
4) Specify which portion of the data is to be encoded into a report.
5) Finalize decisions to display report through the application.

Objects and Communications:
1) Computer
2) Monitor
3) Keyboard and/or digital mouse
4) Application capable of displaying spreadsheets
5) Digital spreadsheet containing your students' grades.

Environment:
Instructor is usually in his or her office or home, or some other quiet setting where he or she often works and expects to not be disturbed. Instructor is most likely sitting comfortably at a table, with the computer in front of him or her.

2) Contextual Inquiry Plan:

Project Introduction

We are currently developing a system that can be used to track student participation in a classroom setting. Since you are an instructor, we were hoping to get input from you on what you would like from such a system. We have some quick questions on how you have previously handled participation and what you would want from a new system. If it is not too much trouble, we were hoping we could meet with you and take an hour of your time. Thank you very much in advance for your participation.

Proposed Wrap-Up

Thank you very much for spending your time with us. We will use this data to try to customize our participation to the needs you described. You really did answer several questions we needed answers to, and brought up several new ideas we hadn't yet though of. Thanks again.

Proposed Questions for Instructors

Personal Interview
1) How/do you currently grade participation? If not, why? And if you do, what system do you use? Have you ever heard and considered using the remote control system?
2) How much time do you spend on keeping track of participation and when do you spend time doing it? (Directly after class, end of the day, once a week etc.)
3) What kinds of participation is graded? Web(class newsgroups), students asking/answering questions?
4) Do you generally have a

                                        Office   Classroom
   a) Desktop
   b) Laptop
   c) Internet connection (wireless or not)
   d) Cell phone
   e) PDA
   f) T.A.
5) What OS do you run or interact with on the computers?
6) If you could have anything that would make participation grading easier, what would you want it to do and how would you want it to work? (desktop, handheld)
7) Where do you grade/keep/think about participation?
8) Do you want the data to be public, private to the student?
9) What would you do if the system failed (desktop crashed, power outage etc.)
10) What software or other methods do you use to keep track of participation? (paper, chalkboard etc.)
11) Do you see yourself using the software or have someone else (T.A.) use it?

12) Do you mind if we observe your lectures?
13) What is your usual class size?

Contextual Inquiry (Observed in class. No explicit Questions Asked)
1) How much does the Instructor move around? Anchored to one spot?
2) How much participation do they really ask for? Do they ask questions of themselves?
3) What kind of desks are used for both the teachers and the students?
4) Do the students and Instructors arrive on time?
5) Is the computer powered on before class? Is it used in class for other things?
6) What tasks do users perform now?
7) Are all students visible?
8) Is the T.A. there?
9) Anything Extra we think of during lecture?

Proposed Questions for Student

Personal
1) Are you currently enrolled in a class that tracks participation?
2) How is the participation tracked? What types of participation is tracked?
3) How many people are in the class?
4) How do you prefer being graded on class participation (volunteering, answering in class), attendance, web participation?
5) How comfortable are you in using new electronics?
6) How much do you mind paying for a device necessary for class if it costs $1, $5, $10, $15?
7) Would you prefer to purchase the device only once at higher cost, or pay less up front with semesterly payments?
8) Does size matter in terms of losing the device and/or carrying it around?
9) How would you feel about having a class set of devices or would you prefer to have your own?
10) If available would you use software to track your own participation grade?
11) If available would you prefer web based software?

3) The Analysis:

Interview Session With Dan Garcia
Email: ddgarcia@cs.berkeley.edu

Questions:
1) Currently, Professor Garcia tracks attendance using his CPS system by eInstruction. In any class where a student electronically answers a question, he is recorded as having attended that class. A curve is determined at the end of the semester.
2) He would like to be able to ask group survey type questions and true/false questions. Students should be able to see their past answers and results. They should also be able to enter or leave the classroom at any time, and be able to participate.
3) The tasks performed by students should be intuitively learned, single button responses. Only the tracking software used by the professor should require any learning. There should be explicit documentation that accompanies the tracking software.
4) Currently, voting and class participation occur only in the classroom lecture, not in discussion sections. Tracking of participation happens in Professor Garcia's classroom; his current system can print out or display single-student histories.
5) Students can see all of their own data, but no other students'. The professor can see every student's data, and their entire history. Students can track their own answers to see whether they were right or wrong, and learn from any mistakes.
6) Every student has a handheld 12 button remote control. The professor uses software that can install on any system he uses.
7) There is little communication between students using the software. All communication comes from the printed out results of every student's aggregate answers. The whole class can see a histogram of the class's answers.
8) Class participation happens every class period, several times a week. The professor only actually looks at his results at the end of a semester, to determine a class curve of attendance and grade.
9) The students can only vote within thirty seconds of a question being asked. The professor can look back on his data any time after it has been entered into the system.
10) When the system stops accepting input from remote controls, the professor needs to unplug and then plug back in his receivers. This reboots the system and allows it to take input again. The database itself has never had a problem.

Points of Note and Synthesis:
Priority for a tracking system would be, in large majority, ease of setup and use. It should be easy and intuitive to setup, ask questions, author questions, and grade. It should take very little time to teach to someone else. There should be no set period to "join" the class and no need to synch when he returns to his office. There should be a way to print out reports that include every student.

Things to think about adding:

A poll/survey feature.

A way to rate confidence about an answer

Overall aggregate reports of answers to a question

The professor would like to use the participation tracking system also handle the "raising of hands" function and be able to handle simple question answering.

SIMPLICITY IS KEY.

Interview Session With Marcial Gonzalez
Email: Marcial@berkeley.edu

Questions:
1) Currently, the professor does not track participation. One of the main reasons being that he finds it unreasonable to keep track of participation in a large group. Furthermore, he finds that keeping track of participation in a large group may be unfair to those who rarely participate.
2) The professor would like to be able to track participation via the web (newsgroups, e-mails). He would like the to be able to keep track of participation in small groups.
3) The professor would prefer most of the responsibility of tracking participation to be on the professor. Currently there is nothing to be learned since he does not track participation.
4) The professor suggested he would perform the tasks in small discussion groups that would meet on days separate that of lecture where students could be more involved.
5) Currently there is no data. However the professor would prefer the participation data to be accessible by the student.
6) Besides a laptop, the professor has no other tools he would use to keep track of participation.
7) There are currently no attempt to complete the tasks.
8) As of right now the tasks are not performed, but the professor would like to only spend 10% of his grading time to track participation.
9) He said he would have no time constraints to track participation besides his personal willingness to spend time.
10) He would revert to using paper and pencil to track participation.

Points of Note and Synthesis:
The participation software cannot occupy the entire laptop since Professor uses the laptop to guide lecture. When questions were asked, they did not even attempt to answer. This could either be due to lack of attention or the fact that participation wasn't being recorded. The T.A. seemed to not be doing much. Having the T.A. interact with the participation software might be useful.

Overall it seems that the system will have to be very adaptable to various environments (lecture halls, small class rooms, home). The system should be easy enough so that basic participation could be graded as well as involved types of participation.

Interview Session With Jason Lu
Email: gjasonlu@hotmail.com

Questions:
1) Currently, the user tries to participate in class by just speaking up during class and wants to have the participation graded
2) The desired tasks are ways to participate in class and get credit for it and does not interrupt the flow of the class setting
3) The task is learned intuitively
4) The task is generally performed in a classroom setting during class time, but sometimes it is done after class on a web based system.
5) In the current system, only the instructor has access to the data, the only means for the user to access the data is through the permission of the instructor.
6) Currently, the only thing the user is doing is to speak up for class participation, so there are no addition tools user need to complete the task.
7) The user does not generally communicate with other users in terms of the task, it is done individually.
8) The task is performed in every class setting.
9) The time constraint on the task is during class time only, because the user does not wish to spend more time on class participation after the class is over, it is simply not desirable.
10) In the current system, there are no ways to recover when a class participation is lost or ignored, it is not recoverable.

Points of Note and Synthesis:
The class participation should be tracked in a simple and less time consuming way, so a way such as news group which tracks class participation after the class is done is not desired. And it is very important to keep the class flow, because ideas sometimes come and go very fast, sometimes by doing some extra actions might make one shift his/her focus on the idea and forget about it, so it is desired to have a way to track participations without much interruptions.

4) Observation Notes:

<u>Personal Inquiry</u>
<u>Instructor: Dan Garcia</u>
<u>Done on: October 3, 2005</u>

1) How/do you currently grade participation? If not, why? And if you do what system
do you use? Have you ever heard and considered using the remote control system?

     Currently, Instructor Garcia uses the CPS system made by eInstruction. In this system, each student has a remote control. The Instructor asks multiple choice or true/false questions, and each student can cast a vote for an answer. Answers are then aggregated and displayed on a screen. Receivers and software are free for Instructors. Remote controls cost $15 as a first payment with an additional fee to reregister the remote control each semester. Each remote control has a unique identification number. Any costs are paid by the students.

     In a previous system, remotes were paid for only once. They never needed registration. There was only the one-time payment. In this system, students could then sell their remote to another student when they were done with it.

2) How much time do you spend on keeping track of participation and when do you
spend time doing it? (Directly after class, end of the day, once a week etc.)

     At this time, the Instructor spends very little time tracking participation out of class. Nothing is done on paper. The Instructor simply connects his computer to an internet connection and the system synchs its database up to an online database. Data can also be outputted to a text file to display either ID number by name, or answer by student. These files can be cross-referenced. No real time is spent on tracking.

     At the end of the semester, the system outputs an aggregate report on how many times each student has participated. The Instructor then finds a curve with this data and decides where grades will be placed.

3) What kinds of participation is graded? Web (class newsgroups), students
asking/answering questions?

     Instructor Garcia principally tracks just whether a student attends each class. In each class, the Instructor asks one or more multiple choice or survey questions. If a student responds to one of these questions during a class, they are recorded. Whether the student's answer is right or wrong, the student is counted as having attending that class.

     In addition, Instructor Garcia uses a more informal system. If, at the end of the semester, he or any of his TAs can recognize a student by name, that student receives a participation point. A further point can be gained if one has simply been noticed to participate a lot, ask many questions, or frequent the newsgroup and post a lot.

4) Do you generally have a

a) Desktop	Yes, at the office and at home.
b) Laptop	Yes, he brings it Everywhere
c) Internet connection (wireless or not) across campus	Yes, available at his office, classroom, home, and
d) Cell phone	Yes, at all times
e) PDA	No
f) T.A.	Yes, for every class.

5) What OS do you run or interact with on the computers?
    Mac OSX 10.4.2 on his laptop. Linux in the office, and Windows at home.

6) If you could have anything that would make participation grading easier, what would you want it do and how would you want it to work? (desktop, handheld, etc)
    Right now, a student must be present at the beginning of class to press a button during the "join" portion of class. Students can only be registered to volunteer during a class at this one juncture. If they miss this, they cannot activate or use their remote for the rest of the class. The Instructor would rather do away with this step and let students participate at any time, even if they arrive late.
    Also, right now, the Instructor can only pull up histograms for the more recently asked question. He would like to be able also to see older histograms, to compare them to more recent questions.
    Finally, the current system has no way to pull up a full class report on participation. It has no graphical or written way to report on every student's participation on one page. He would like a way to be able to see everyone's numbers on one page.

7) Where do you grade/keep/think about participation?
    All tracking is done automatically by the system. The attendance counting is done implicitly by participation in the survey questions. The only active attention to the system comes when the Instructor finally counts his class's results. Then, final totals and grades are assigned.

8) Do you want the data to be public, private to the student?
    Data should be private to the student. In this system, participation points are all extra credit, to be rewards for exemplary participation. The Instructor would prefer that students did not know their place in the curve, for grading. This way, people do not participate or compete only for the extra credit. They are more unaware of their points, and can behave more naturally.
    One thing of note however, in the current system, students can see their past participation history. They can see the questions they have answered, and whether they are right or wrong. This, the Instructor sees as a good learning tool.

9) What would you do if the system failed (desktop crashed, power outage etc.)
    Twice the receivers for this system have stopped working. Input for those class periods was lost entirely. Now, to make sure this doesn't happen, the Instructor checks one fake question himself at the start of each class, to make sure input is being received.

10) What software or other methods do you use to keep track of participation? (paper, chalkboard etc.)

The eInstruction system manages 100% of Instructor Garcia's tracking needs. There is no physical writing or tracking. He does, however, take mental note of students' volunteering and newsgroup posts. If he can recall any of note when the semester ends, that can be worth extra points.

11) Do you see yourself using the software or have someone else (T.A.) use it?

Right now, Instructor Garcia uses the tracking system all himself. In majority, however, this is because the system is too complex and poorly documented to teach someone else easily. In his own words, it would take just as long to teach someone the system as for them him to use the system himself.

With a simpler system, however, Instructor Garcia would gladly delegate participation point tracking to another person, or TA.

12) What is your usual class size?

Between 300 and 150 people. The size is shrinking now, and is usually 150 people.

Contextual Inquiry
Instructor: Dan Garcia
Done on: October 3, 2005

1) How much does the Instructor move around? Anchored to one spot?
Instructor has a seat. Uses a laser pointer during lecture.

2) How much participation do they really ask for? Do they ask questions of themselves?
Instructor randomly asks questions. Picks on students for responses. Allows for students to ask questions at any point during lecture. Sometimes asks questions that require the students to respond (looks for general class response).

3) What kind of desks are used for both the teachers and the students?
Instructor uses regular Ikea desk to place his apple computer (acts also as his seat)

4) Do the students and Instructors arrive on time?
Yes. Class is webcasted!

5) Is the computer powered on before class? Is it used in class for other things?
Yes. It is used in class for lecture.

6) What tasks do the users perform now?
a. Instructor – records the students participation via remote control.
b. Students – use remote controls to participate in lecture questions. They bring their own control to class. Most of students are actually paying attention.

7) Are all students visible?
Yes.

8) Is the T.A. there?
Not sure. Cannot tell.

9) Anything extra we think of during lecture?
Is there a way for webcasters at home to participate?
Instructor remembered some of the students names.

<u>Personal Inquiry</u>
<u>Instructor: Marcial Gonzalez</u>
<u>Done on: September 29, 2005</u>

1) How/do you currently grade participation? If not, why? And if you do, what system do you use? Have you ever heard and considered using the remote control system?
160 students. Instructor feels it is unfair for some students if he were to keep track of participation I large groups. He feels there are only a few who are active participants, and that some naturally just don't like to speak up. He would not base participation on comments made in class. He would prefer tracking web based participation.

2) How much time do you spend on keeping track of participation and when do you spend time doing it? (Directly after class, end of the day, once a week etc.)
He would spend 10% of the time he spends grading on participation. He usually has graduate students help him grade. 5-6 hours / 1 hour lecture.

3) What kinds of participation are graded? Web (class newsgroups), students asking/answering questions, etc.
Web

4) Do you generally have a

	Office	Classroom
a) Desktop	Yes	No
b) Laptop	No	Yes
c) Internet connection (wireless or not)	Yes	Yes
d) Cell phone	No	No
e) PDA	No	No
f) T.A.	No	Yes

5) What OS do you run or interact with on the computers?
Windows XP

6) If you could have anything that would make participation grading easier, what would you want it to do and how would you want it to work? (desktop, handheld, genie)
He would like direct communication with students. Be able to break up into sections. If that is not possible he would turn to some sort of technological system.

7) Where do you grade/keep/think about participation?
Subjective. By the end of the class he usually knows the active participants by name. He wouldn't want to be jotting notes down during class.

8) Do you want the data to be public, private to the student?
He is for the idea of making it public.

9) What would you do if the system failed (desktop crashed, power outage etc.)
He would just not record participation for the day.

10) What software or other methods do you use to keep track of participation? (paper, chalkboard etc.)
N/A

11) Do you see yourself using the software or have someone else (T.A.) use it?
T.A.

12) Do you mind if we observer your lectures?
No

13) What is your usual class size?
160

Contextual Inquiry
Instructor: Marcial Gonzalez
Done on: September 29, 2005

1) How much does the Instructor move around? Anchored to one spot?
   Anchored to podium.

2) How much participation do they really ask for? Do they ask questions of themselves?
   Students never participated on their own will. Instructor asked questions randomly during lecture, however many times the students did not respond and the Instructor had to answer himself.

3) What kind of desks are used for both the teachers and the students?
   Teacher is standing the entire time in front of a podium. The students are in a standard, stadium style desk.

4) Do the students and Instructors arrive on time?
   Yes.

5) Is the computer powered on before class? Is it used in class for other things?
   The Instructor was using a Dell Laptop and it was powered on before class. It is used in class for Microsoft PowerPoint slides that compliment the lecture.

6) What tasks do users perform now?
   None related to tracking participation.

7) Are all students visible?
   Yes.

8) Is the T.A. there?
   The T.A. was present and taking notes.

9) Anything Extra we thin of during lecture?
   The Instructor read off hand written notes. The laptop was far away from him. To move along the sides he used a mouse.

Personal Inquiry
Student: Jason Lu
School: California College of Art
Major: Architecture
Done on: October 2, 2005

1) Are you currently enrolled in a class that tracks participation?
   Yes.

2) How is the participation tracked? What types of participation is tracked?
   Speaking up. Professor notices who pays participation .

3) How many people are in the class?
   20 - 30

4) What would you prefer being graded for (volunteering, answering in class, attendance, web participation)?
   The quality of criticism and analysis on other's people work. Volunteering helpful comments to others in class.

5) How comfortable are you in using new electronics?
   Ok. The only devices he's been used in cell phones and laptops.

6) How much do you mind paying for a device necessary for class if it costs $1, $5, $10, $15?
   $10 is the limit.

7) Would you prefer to purchase the device only once at higher cost, or pay less up front with semesterly payments (registration)?
   Would prefer to pay upon using it. No fee upfront.

8) Does size matter in terms of losing the device and/or carrying it around?
   Yes. A good should be not bigger no than a cell phone and no smaller than an pencil eraser.

9) How would you feel about having a class set of devices or would you prefer to have your own?
   Prefer to have a class set.

10) If available would you use software to track your own participation grade?
   Yes. It would help further his willingness to participate if he saw that his grade was actually being influenced.

11) Would you mind having to make note of having participated after class has done.
   Yes, it would be too troublesome having to do any extra work outside of class for participation grade. Only if participation was a really big part of the grade (20%+) would he not mind.

<u>Contextual Inquiry</u>
<u>Student: Jason Lu</u>
<u>School: California College of Art</u>
<u>Major: Architecture</u>
<u>Done on: N/A</u>

Note: A contextual inquiry of the student's role cannot be obtained without disturbing an ongoing lecture. Disturbing any ongoing lecture would be inappropriate, both professionally and personally, and so no such contextual inquiry will be made. Instead, we will be forced to rely on the personal inquiry that we conduct.