

SRI Final Report for the ALASKA Project

P16542

This final report consists of the following four sections:

1. A summary of SRI's activities over the duration of the project
2. A report on the Formative Interaction and Engagement Study (the primary activity since the submission of the 2007 Annual Report).
3. The 2007 Annual Report
4. The 2006 Annual Report

Summary of SRI Activities over the duration of the project.

Throughout the project SRI participated in weekly meetings to advance the design of the ALASKA system, as well as suggest research directions for the project. SRI was also intimately involved in the project management aspects of the task, helping the PI to track budgets and prioritize activities based on the available time and funding.

SRI completed the following tasks during this project:

1. A user test, conducted at SRI with SRI employees, on a preliminary version of the ALASKA software.
2. A series of user tests conducted at SRI with pre-calculus students from a local community college.
3. Contributed to the technological capabilities of the ALASKA system.
4. Created designs for potential implementations of ALASKA representations.
5. Advised on, and helping to organize, a set of AgileViz workshops conducted at AIED and CSCL.
6. Analyzed video to explore where the ALASKA system could be used to improve teacher and student performance.
7. Advised on a formative interaction and engagement study.
8. Aided in the creation of designs for the formative interaction and engagement study.
9. Was a key partner in carrying out the formative interaction and engagement study.
10. Submission of a report on the formative interaction and engagement study (below).

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13. ABSTRACT (Maximum 200 Words)

SRI completed the following during this project:

1. A user test on a preliminary version of the ALASKA software.
2. A series of user tests conducted at SRI with pre-calculus students from a local community college.
3. Contributed to the technological capabilities of the ALASKA system.
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5. Advised on, and helping to organize, a set of AgileViz workshops conducted at AIED and CSCL.
6. Analyzed video to explore where the ALASKA system could be used to improve teacher and student performance.
7. Advised on a formative interaction and engagement study.
8. Aided in the creation of designs for the formative interaction and engagement study.
9. Was a key partner in carrying out the formative interaction and engagement study.
10. Submission of a report on the formative interaction and engagement study.

Findings from task 10: Teachers were unanimous in their concern about using technology that might interfere with face-to-face interactions with students. All the teachers agreed that some of the information that can only be presented via technology would be valuable in real-time as they are teaching. Teachers suggested a large projected screen at the back or side of the room.

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Report on the Formative Interaction and Engagement Study

By Phil Vahey, SRI International
For the ALASKA Project, P16542

Background:

At the request of the Principle Investigator, Eric Hamilton, SRI International recruited a set of four High School Mathematics teachers to participate in the Formative Interaction and Engagement Study.

These four teachers represented a cross-section of Bay Area schools, and had a variety of technology backgrounds.

These teachers each participated in two video conference sessions. Each session was 90 minutes long, and was held at SRI International, with Eric Hamilton and Andy Hurford on the videoconference line. The two sessions were held approximately one month apart, to give the ALASKA team time to react to the teacher comments in preparing for the second session.

The teachers were told to consider what teaching may be like in a few years, when every student has a tablet computer. They were asked what types of information, and what types of representations of this information, they may find valuable.

At the beginning of the first session the teachers told us that the main information they currently get about student understanding is found through student hand-raising, the questions students ask, the answers students provide to teacher questions, and student facial expression. Of course, while well-known, researchers have also reported these techniques to be suboptimal, as many students become very good at avoiding these types of detection by teachers. Such students are those that may easily “slip through the cracks”.

Three General Findings

Three related findings were striking. The first is that the teachers were unanimous in their concern about using any technology if it had the potential to interfere with their face-to-face interactions with students. For instance, while lecturing, they felt that they would not have time to look down at a screen to view students’ real-time questions. They also felt that they would usually not want to employ such a screen while students were doing seatwork, as walking around, looking at student work, and being physically, intellectually, and emotionally proximate to the students is perceived by teachers and students alike as being high value. Taken alone, this finding does not bode well for the use of technology the ALASKA project is investigating.

The second finding, however, is that all the teachers agreed that some of the information that can only be presented via technology would be valuable in real-time as they are teaching. Teachers generally agreed on the utility of some type of learning state indicator, thumbnails of student screens (assuming all students are using tablet computers), access to full student computer screens, and a student “question bucket” where students could put questions they have. There is clearly tension between this finding and finding 1.

The third finding is a way to resolve the tension: the teachers suggested a large projected screen at the back or side of the room. While this screen raises some issues around student privacy (e.g. will students be willing to indicate confusion if all students could glance over and see the screen) as well as utility (if we show student work, will all students look over to the screen to try to copy), the teachers felt that there were two reasons why the screens would still be valuable. The first is that enough of the information discussed would be valuable even taking these considerations into account. The second is that, once the novelty wore off, students would likely stop paying attention to the screen, especially if it was in the back of the room where it would be obvious when students look at it. The teachers also felt that such a screen may increase the utility of a teacher tablet computer. The projected screen would provide always-on access to some amount of digital information, and then in the times that it was not important that they be interacting with students they could use their tablet in a manner consistent with the overall classroom flow.

As an enhancement to the original idea of the projected screen, the teachers felt that such a screen would be particularly effective if it could be controlled via some type of wireless interface, like a laser-pointer mouse, or a Wii controller. In this way they could choose the information to see at any given time, without having to look down at another computer screen.

Taken in sum, these sessions show that teachers are willing to engage with information displays that can provide them with more information that they find through the traditional measures of student hand-raising and eyebrow-furrowing.

Detailed Findings

The following are summaries of the Question Sets that teacher completed while in Session 2.

Question Set 1:

We asked teachers to provide their comments and thoughts based on the first session.

Q1 and 2: Teachers stated that they did not engage in much thought about the representations between the two sessions. One teacher stated that any display would have to be simple and visual, another stated that using the representations to foster student sharing would be beneficial.

Q2: When asked to comment on the specific displays, one teacher stated that the displays are best for sharing information with students, and another stated that any display would have to be very visual and simple to use. While the notion of simplicity is not a surprise, it may be worth mentioning that this is in slight tension with one of the AgileViz tenets, which holds that the next generation of teachers, if trained appropriately, will be able to use very complex data displays in real time, akin to airplane pilots use of data (the team has discussed the pros and cons of this perspective in the past: the author of this document, Phil Vahey, is not sure that significantly increasing the cognitive load of display interpretation is a viable path in the relatively near-term, as airplane pilots do not have the added requirement of interacting with 30 students in real-time).

Q3: Critical decision making junctures pointed out by teachers are:

- Questions students ask (3 teachers)
- Student answers to teacher questions (3 teachers)

- Examining student facial expressions in real-time (1 teacher)

The steps mentioned by teachers that they take based on the outcome of these critical junctures are (each only mentioned by 1 teacher):

- Re-teaching concepts
- Reviewing procedural steps
- Clarifying
- Time management

Other information teachers would find useful included (each only mentioned by 1 teacher):

- Percent of students who would want to re-cover material
- Percent of students who understand the current topic
- Whether students are ready to move on to the next topic.

Question Set 2:

We asked teachers to indicate their expected usefulness of the set of tools presented. The results follow:

| Tool | Description | Usefulness | Notes |
|----------------|---|-------------------|---|
| Resources | LSI mapped to seating chart Available objects | 4: Yes 0: No | Unanimously agreed on usefulness |
| LSI Screen | Alpha list of LSIs and objects | Mixed | Seemed redundant with above |
| Thumbnails | Thumbnail of all student screens | 4: Yes | Unanimous agreement |
| Indiv screens | An individual student screen | 4: Yes | Unanimous agreement. Some also liked the ability to write on the student screen. |
| Gradebook | Shows all student grades | Mixed | While a gradebook is useful, felt that many options exist |
| Q bucket | Student Question bucket, where students can input questions | 4: Yes | Agreement on usefulness, teachers wanted control of when students could input Qs. Some wanted this for only after school. Some would use this for setting up student-students interactions. |
| Library Status | Shows what objects are being used most often | 4: Yes | Some thought they only would use the top part of the display, with the frequency counts. |
| Direct Help | Students input questions for the teacher to answer via IM | Mixed | Some felt that students should have to ask questions in class, others felt it would help students who don't talk in class. This is one display in particular some thought would be good for a whole-class |

| | | | |
|--|--|--|----------|
| | | | display. |
|--|--|--|----------|

Question Set 3:

Teachers were asked to comment on the displays used, if they would use realistically use such a display, if a Teaching Assistant would add value, if the displays may be useful outside of class, and what features or information might enhance the display's usefulness. In this section I will only include information not found in the teacher answers to Questions Sets 1 and 2.

Projected Screen: this was mentioned by all 4 teachers. This was perhaps the most important original idea to arise from the teacher sessions. Additionally, 3 of the teachers mentioned wanting some kind of remote controlled mouse or handheld (Andy H introduced the idea of a Wii-based controller).

Teaching Assistants: teachers stated that High School teaching assistant tend to be administrative, and not content-experts. In fact, will often have Algebra students being TAs for Calculus class. Furthermore, due to privacy concerns, TAs often do not have access to individual student grades. As such, the TA can be expected to make photocopies, collect assignments, etc., but cannot do higher-level tasks. They would not be able to make sense of, or even legally see, most of the screens used in this project. However, teachers stated that if they were to have an advanced TA, this would be worthwhile.

Usefulness outside of class: all teachers stated that at least some screens would be useful outside of class. They would use these screens to:

- Review classroom interactions (1 teacher)
- Better understand what the students know and what questions they have (e.g. Question bucket) (2 teachers)
- Review what learning objects are being used (library) (2 teachers)
- Use the gradebook, but only if it was better than the competition, which would be hard to do (2 teachers)

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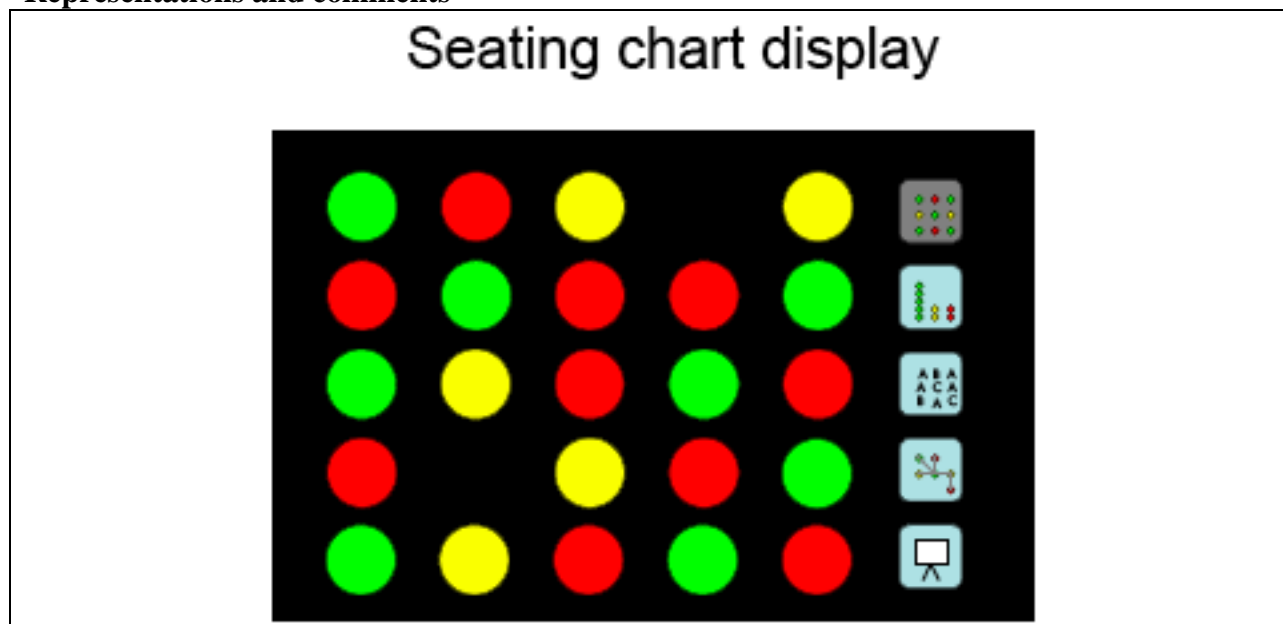
In 2007 SRI participated in weekly meetings to advance the design of the ALASKA system, as well as suggest research directions for the project. In addition, SRI completed several tasks, including 1. Creating designs for potential implementations of ALASKA representations; 2. Advising on, and helping to organize, a set of AgileViz workshops conducted at AIED and CSCL, 3. Analyzed video to explore where the ALASKA system could be used to improve teacher and student performance, and 4 Advising on, and beginning implementation of, a formative interaction and engagement study. These are described in turn.

1. Creating designs for potential implementations of ALASKA representations

Background

Key to ALASKA is the creation of representations that teachers can employ in their moment-by-moment classroom teaching. The SRI team created and presented a set of draft representations that illustrate how this can be done using an iPhone-like interface.

Representations and comments



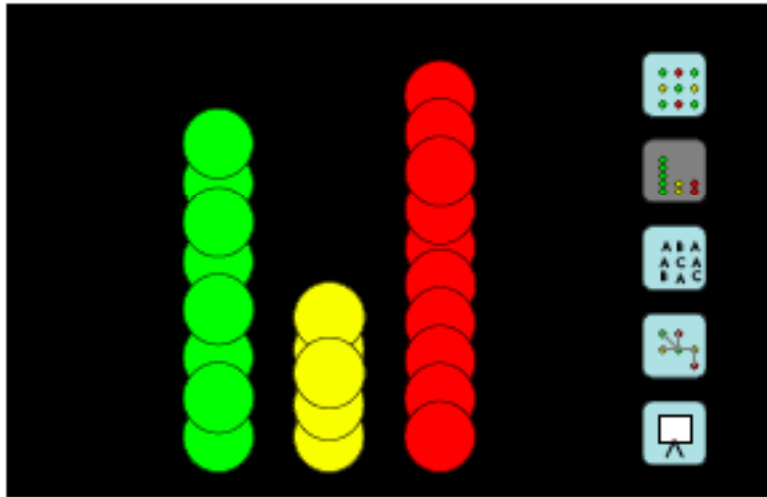
Using the earlier ALASKA idea of student indicators, students (or the system) somehow indicates their current level of understanding as green, yellow or red. Teacher sees this plotted over the seating chart. Imagine a grayscale face shot behind each of the dots to remind the teacher of each student.

The icons to the far right are used to change the display. We see that the options available (so far) include the seating chart view (this view), a pictograph/bar chart view, an alphanumeric view that shows students answer to the last question, and a current chats view (shows a network diagram of current IM sessions).

The final icon allows the teacher to control what is on the screen at the front of the class. This, in particular, is highly underspecified.

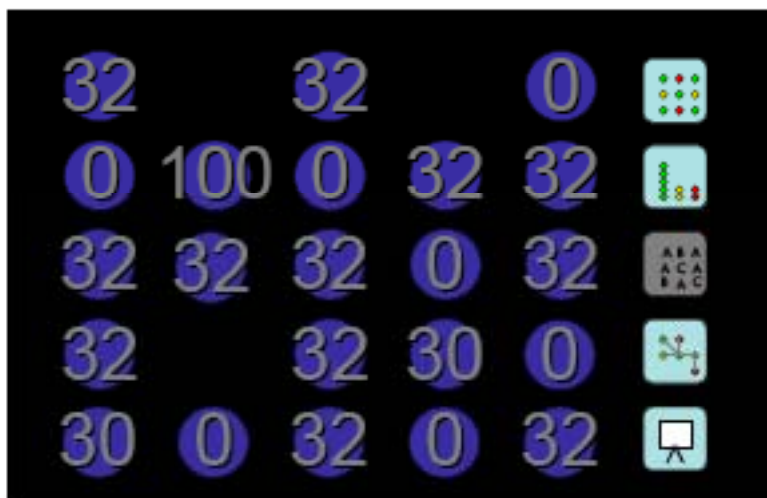
By tapping a student, the teacher goes to the student view (next)

Frequency Plot



Shows frequency of self-reported understanding

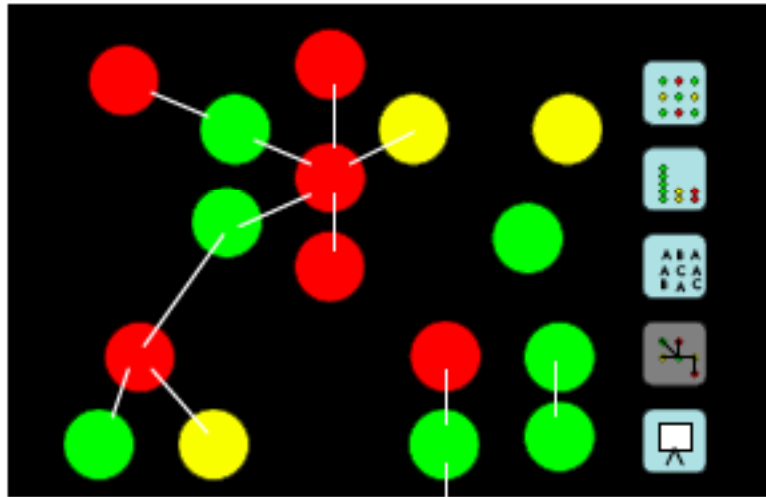
Alphanumeric Responses



Teacher asks “What is the freezing point of water in Fahrenheit?”.

We made the dots all one high-contrast color: having the dots be multi-colored was distracting, but getting rid of them allowed all the numbers to run into each other. We will find some color that allows the number, and possibly the student thumbnail, to appear.

Current chats



In this view, a quasi-intelligent network diagram is shown (using standard network diagramming software). We can choose how to group, if icon sizes should indicate being a “hub”, etc.

In this view we may decide to make it scrollable, instead of trying to fit all students on one screen. We will also break the “grid” that we have had until now.

Roster view

| <u>Student</u> | <u>Understanding</u> | <u>Grade</u> |
|----------------|----------------------|--------------|
| Amy Baylor | ● | B |
| Chris DiGiano | ● | C |
| Eric Hamilton | ● | A- |
| Andy Hurford | ● | B+ |
| Linda Keyes | ● | A |
| Leo Lee | ● | B+ |
| Phil Vahey | ● | B- |

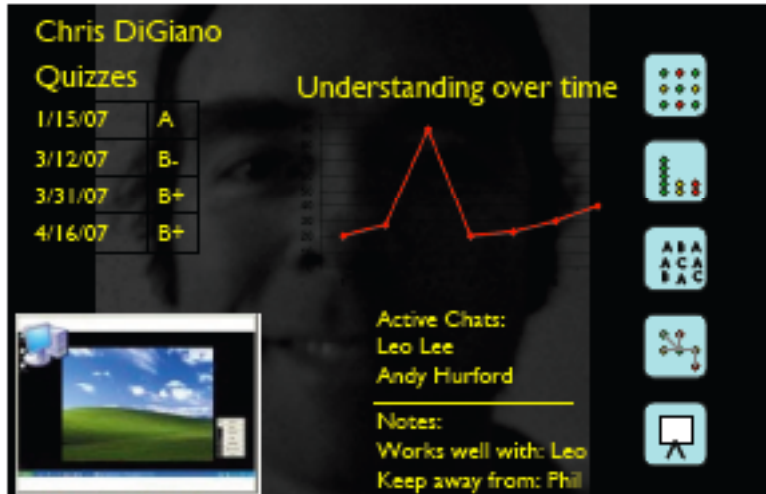
Below the table are five light blue square icons.

Rotating the teacher device to a portrait orientation converts the seating chart to a list view.

Tapping any column header will sort by that column.

Still haven't decided what the icons below would be used for.

Individual Student



Tapping on an individual student icon causes details on that student to appear.

Tapping any screen element causes that element to take over the entire screen (not shown). For instance, tapping in the quizzes area will show the entire gradebook for that student. Tapping active chats will show the chat windows. Tapping the screen thumbnail will zoom the screen.

Individual Student Screen



Clicking this will put the student screen up on the projected screen. There may be options, such as replace what is there, add to what is there, etc.

2. AgileViz workshops

The SRI team helped to conceptualize, propose, and organize a series of two AgileViz workshops that were run by the AFA team. Both proposals were accepted, and the first was held at AIED in Southern California, the second was held at CSCL at Purdue.

3. Video analysis

The SRI team analyzed video from the TIMSS study to create a preliminary framework for understanding how key representations in the ALASKA environment can be best employed in teaching. This analysis has resulted in a more nuanced understanding of the how different types of representations in the ALASKA system interact with different learning activities and goals.

4. Formative interaction and engagement study

The SRI team has been advising AFA on all aspects of a formative interaction and engagement study. SRI has helped to conceptualize the study, design components of the study (such as the representations discussed in task 1), investigate teacher roles and recruitment, and has begun working with AFA on the protocols to be used in the study. This study will take place in the November to December timeframe.

SRI 2006 Annual Report for the ALASKA Project

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In 2006 SRI participated in weekly meetings to advance the design of the ALASKA system, as well as suggest research directions for the project. In addition, SRI completed several tasks, including 1. A user test conducted at SRI with SRI employees on a preliminary version of the ALASKA software; 2. A series of user tests conducted at SRI with pre-calculus students from a local community college, and 3. Contributed to the technological capabilities of the ALASKA system. These are described in turn.

1. User test at SRI with SRI employees

Background

Five SRI employees were in a 1.5 hour session to use ALASKA as an aid in learning more about the SRI internal wiki system. None of these users had ever used ALASKA before, and most had some experience with the wiki.

Data Sources

- Observation notes (from Phil)
- Debrief with Chris (the teacher), Leo, and Mark
- Surveys completed by all participants

Overall impression

There were some aspects of the system that worked quite well. The teacher was able to view the work of students, the students were able to use the chat system, and students tended to use hybrid models of communication (chat and off line talking).

There was a bug in the parser-buddy interface that severely limited the ability of the buddy to point students to another student or the teacher.

While this group has higher than average technology experience, the overhead of so much technology (screen sharing, Alaska buddy, multiple chat windows, the LSI, etc.) was difficult for students (note that students who had the tablets liked them).

We may want to reconsider the LSI interface and functionality based on our observations and survey responses.

The set of all technology available to the teacher may be something to consider moving forward. For our situation we had one computer being used to project slides and web pages to the front of the class, and another for the teacher ALASKA system. Different tech setups will have very different implications for how the system is used.

Some “best practices” for use of different system elements are emerging. We may want to keep these in mind as we conduct more research (that is, see if they are robust across different users)

or we may want to train teachers and students on these best practices in the hope that these get refined and lead to more productive use of the ALASKA system.

SynchronEyes and the overall teacher configuration

This was generally a success. The teacher was able to use the thumbnails to get an overview of what students were doing, and then was able to click to view students' screens. SynchronEyes (SE) was typically used in combination with talking, and rarely with messaging.

The teacher had difficulty moving between the layout of students on the SE screen and the actual physical layout of students. Since this class was small, it was simple enough to rearrange the SE screen to match the physical layout of students, which greatly improved teacher use. For a class of 30 this may be difficult, so in further user tests we may want to have this set up beforehand (and the final version should allow the teacher to do this beforehand). Chris would also have liked to see the chat more strongly linked to SE.

Due to the small class size, it was easy for the teacher to click on every student in order to see how the class overall was doing.

The teacher had a 2 computer configuration. One computer projected slides and websites to the students, and the other ran the Alaska system. This had some benefits, in that Alaska information was not being projected to the students, and the teacher had a clear separation of what technology was doing what (and, when the Alaska system was down for a little while, the presentation could continue). Unfortunately, the teacher computer was not a tablet and was wired, so the teacher could not walk the room with the Alaska system.

If we expect teachers to use computers as part of their regular teaching, we must pay attention to the one or two computer configurations. For instance, in a one-computer configuration, can we show Alaska on the primary screen, and allow the secondary screen to show slides, etc.? This could be similar to the way that PowerPoint currently works: when an external monitor/projector is attached, the external monitor shows the slides, and the primary monitor shows a complex control panel (in our case it would be the Alaska system).

Potential best practices:

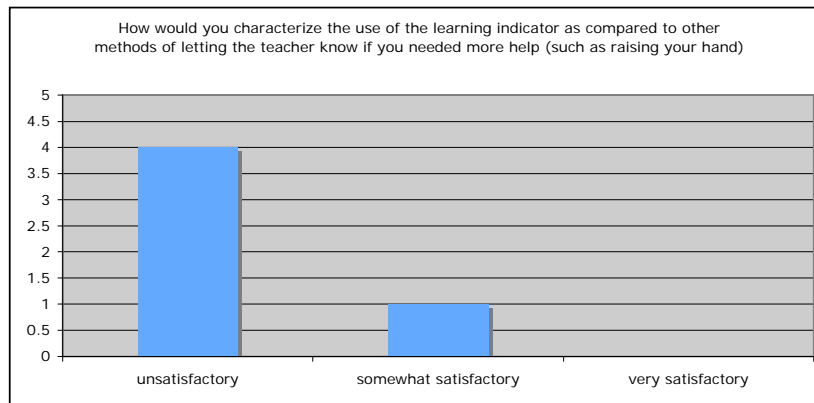
- Have the teacher look at the thumbnail student screen images to see if any students are doing something wildly different than their classmates (or than what is expected)
- Have the teacher click on a few students randomly (or in an informally stratified random manner) to get a sense of the overall status of the class
- Engage students who seem to be having problems, either through chat or talk

LSI

The LSI was quite problematic in practice.

The teacher did not use the LSI as an indicator of student state. It was easier to look at the screens. Furthermore, the LSI was just one thing too many—between teaching the class, using SE, using chat, and occasionally screen sharing, LSI just got dropped.

From the student perspective, the LSI was also problematic. It was rarely observed being used, and our survey results confirm that students did not tend to use the LSI.



Some quotes from the user survey provide some insight into how students thought about the LSI. Students were not clear exactly what the purpose of the LSI was and how the LSI was represented to the teacher. In addition, they did not take the time to update their own LSI while engaging in the problem.

- I didn't see any use in the indicator. The only encounter I feel I had with it was seeing it on the right side of my buddy window. Not sure how it works on the teachers end, but maybe an alert should go out to the teacher or anyone who can help out notifying them, and from there whoever sees the alert can click to accept it and it will go away from the need help alert.
- i really didn't get the point of it. It seemed to just take up more space in the messenger window. The learning indicator seems to be inaccurate of who knows what-- i wasn't really attentive to click on the button to let them know my status was b/c i was busy doing the task.
- I couldn't see any difference from being in the 'I'm O.K.' mode and the 'I need help' mode. It was more frustrating than useful. This option also takes more screen real estate. There should be another way to flag down the instructor (a button that would open the chat link with the instructor?) without having to have a status showing in this extra window. It's also not intuitive to have to change the mode once you're in an O.K. state.

In addition, the current method of showing the LSI was problematic. The user has to bring up the Alaska buddy, and then choose “show LSI” from the “Activities” menu (the specifics may not be correct, but the overall process is close). For students new to Alaska, this is one more thing that they simply may not do. Could the team consider adding functionality such that the Alaska buddy can ping the user upon sign in, and they simply press an OK button to initiate the LSI?

In our discussion we discussed implications around intrinsic resistance, or if we can highlight the importance of metacognition for students, and help students develop more sophisticated self-regulation. Could something like the LSI be used once students see that self-regulation is important? Part of the Alaska vision is changing what people see and do. The teacher should be offloading cognitive demands for routine stuff, and takes on cognitive demands for more complex tasks. The student also has to skillfully move in and out of different modes of

assistance, which requires more metacognition. So, we may want to find technological and social ways to increase the use of the LSI (or something very close to the current LSI).

Options discussed include: build it into the activities, like Dylan Wiliam's cups? Have Alaska buddy infer your LSI state (or just ping the teacher when someone is particularly active asking Qs or chatting)? Create something that is more like a flight attendant indicator button. May have the Alaska buddy poll students on occasion, asking them how they are doing in a poll. Also, having the LSI appear on the SE screen seems more appealing, so there is not another screen.

Alaska buddy, MS Messenger, and the FAQ

The FAQ/parser/HAT interface had a significant bug such that students were rarely pointed to another student when they had a question that the FAQ couldn't answer. This limited the usefulness of the Alaska buddy. Nonetheless, there were still interesting outcomes from this study.

While most students were observed talking to each other instead of using Messenger, there were times that students did chat. In general these chats seemed useful, but in a small group of 5 coworkers, simply talking seemed more efficient. One comment, which is representative of the participant statements is:

- Not intuitive, especially in a situation where there are people in the same room working on the same issues. If the classroom needs to stay quiet, this tool would be useful, but it's inhibiting.

Students also initiated chats with the teacher, and these chats were observed to be helpful on occasion. One participant did point out a weakness with chatting with the teacher, however, in that one sends a question out, and is not sure of what to expect.

- The lack of feedback I find problematic. The question goes off into cyberspace and I don't know if it will ever be answered, if the teacher is helping someone else and how close he/she/they are to resolving her/his/their problem. I don't even know where I am in the queue or whether my question is somewhat like someone else's question.

It appears that, while the chat interface has some potential in larger classrooms where cross-student talk is not the norm, it was not stressed in our user test.

While the FAQ rarely was able to provide students with answers to questions, we observed students using the FAQ, and persisting in asking questions even when they were becoming frustrated (this frustration was based on the lack of their questions being answered, as well as the bug that prevented the buddy from referring them to the teacher or another student). A representative statement shows that the participants could see the value, assuming the FAQ was well populated with relevant questions, and the directing to other students was productive:

- I like having it direct to someone else who thinks he/she can help. I also found the URI references useful (that is , when it had a response rather than stating 'I don't have an answer for ____'!)

So, while the FAQ and Alaska Buddy were not fully functional for this user test, we see the potential value of these components.

Screen Sharing

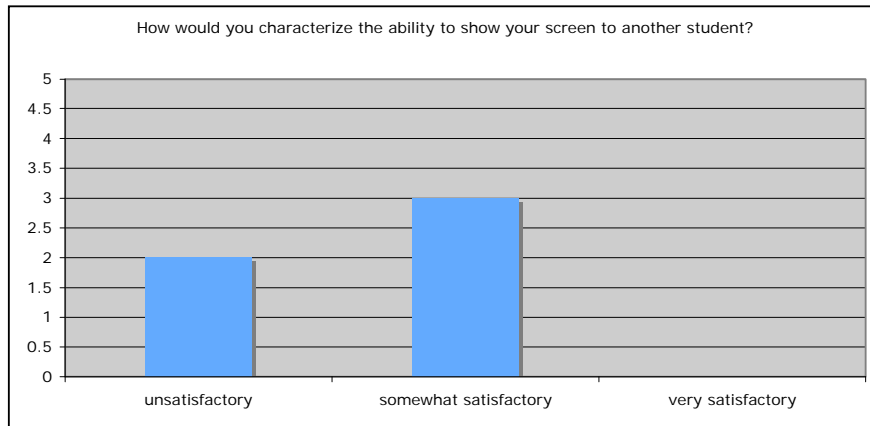
Screen sharing, both through SE and Messenger, was so complex as to be difficult to use.

There were several difficulties that participants had with the Messenger screen sharing. These include:

- Figuring out who was “driving”
- Figuring out which was the window on the other person’s computer
- Understanding that, when a sharer covers part of a shared window with another window, that part of the window becomes black on the sharees screen.

Using the SE sharing capability, the teacher became confused as to which screen was on his computer, and which was on a student’s (and accidentally launched an application on a student computer). In addition, the student then received an IM, but didn’t know (because the teacher was in control), and the teacher wasn’t paying attention to this. So, the sender of the IM was left waiting for a response that did not happen for a very long time.

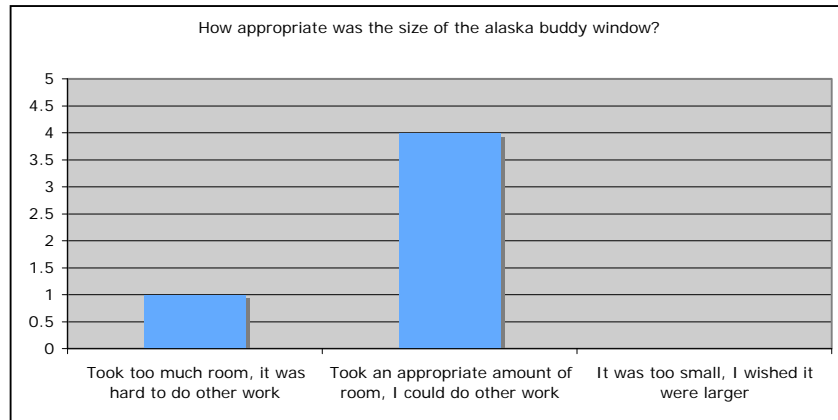
That said, there are 2 findings worth noting to the contrary. First, there was one instance in which screen sharing was valuable: a student had written some text in the wiki markup language, and was not getting the expected results. It was very difficult to explain the problem to the teacher, but by sharing the screen the issue became obvious. I believe this was done using the SE sharing capability, and it is not clear that the teacher needed full sharing capability to provide this input (as opposed to just seeing a picture of the screen). Second, while participants said that screen sharing was “very satisfactory”, three did call it “somewhat satisfactory” and one of the participants said that one of the participants identified screen sharing as one of the key benefits to the system. Again, it is not clear if a less sophisticated version (such as showing a picture of the screen) would suffice.



Overall, while the ability to see what is on another students’ screen is valuable, the current implementation of screen sharing was very problematic. We may consider looking into other forms of information sharing that require less cognitive overhead.

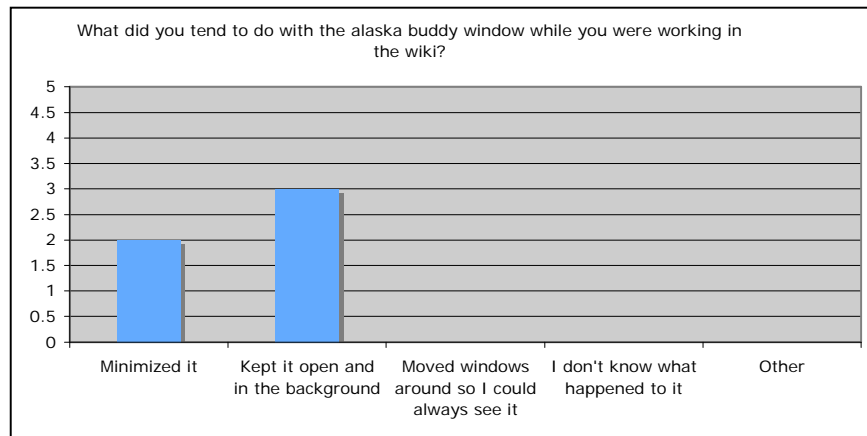
Screen real estate

Perhaps most surprisingly, during observations there were few complaints about the overall screen real estate required ALASKA, and in the surveys participants were generally satisfied with the size of the Alaska buddy window:

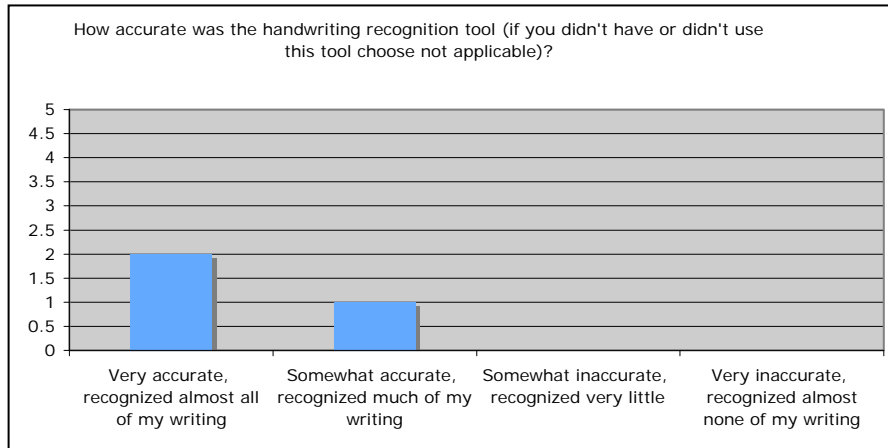


Other (minor) UI findings

Participants were split between minimizing the buddy window and leaving it in the background:



Of the three students who used tablets, 2 said that the tablets were very accurate in recognizing their handwriting, one said somewhat accurate. Overall, this is probably a higher rating than expected. Note, however, that our chat didn't require mathematical symbols, which may give different results.



2. User test at SRI with local community college students

Background

Five local community college students participated in a series of 3 user test sessions, each of approximately 2 hours in length. Eric Hamilton, the project PI, was a key participant for these sessions and found them generative for thinking about the project. It was thus decided that a formal writeup was not required, but instead SRI report on ideas for improvement based on user tests and related brainstorming.

Brokering help, and anonymous questions

During a help relationship brokerage, allow a student to forward a question through the buddy directly to another student

Provide a way to ask a question of another student anonymously.

[note that the two above bring up a whole host of questions around social dynamics, UI, and technology: when do different people want to be anonymous, how do they do it, do people behave differently based on who is giving the reply via the buddy, etc.

Potentially might want an AQB (anonymous question bucket) as a place where folks can drop Qs in, and get answers, all anon.]

Teacher interface and synchroneyes

Allow the teacher to take what is on s-eyes and display it for all (either on the projector or by sending to all students). Projecting is currently difficult because s-eyes and the projector are on 2 different computers. Is there a way to allow the teacher to broadcast a student screen to everyone?

Allow the teacher to write on a student screen from within s-eyes (simultaneous writing). This is currently not supported in s-eyes, maybe we could convince them to do it (since it was previously covered in a patent eric held, that has since expired).

Is there a way to zoom a student screen from within s-eyes? At one point eric couldn't quite read what was on Alvin's screen, and could not zoom it to see more clearly.

Student suggested having teachers be able to pair up students. Would we want this in technology, or socially?

The LSI

Students did not use the LSI. Recommend noticing when a computer is idle, and asking students if they are done and can help, or if they are stuck. This interacts with some of the buddy ideas, below.

The FAQ and other resources

We have currently been considering the FAQ as a resource for synchronous F2F interactions. However, there are other possibilities, as seen in the following table:

| | | Physical Location | |
|---------------------------------|--------------|--|-----------------------------|
| | | Face to face | At a distance |
| Timeframe of interaction | Synchronous | current use of buddy | pre-determined study time |
| | Asynchronous | Lab/help session: same place, different topics | buddy/FAQ for homework help |

We might want to consider the other cells as contexts in which the buddy and the FAQ can help (initial possibilities written into the table).

Right now there is only one way to get to the resources, which is the FAQ. The answers are the resources, and there should be other ways to get to the resources.

We may want to consider what it would mean to go beyond the FAQ, for instance with a set of resources that can be used for homework. The goal is already to have the teacher drop applets in and out of work areas. This may help us create/leverage artifacts that are immediately accessible and relevant.

Currently you have to be able to verbalize a question (and that may mean translating from visual thinking to textual). Can we invest more into the buddy parser and have it help students narrow down what they want? Sort of like a wizard or the airplane reservation system Chris mentioned before. Such a system may sit on top of the parser, and be a large undertaking.

We can do a wizard of oz test where there is someone who helps narrow down questions and give appropriate responses. May do this with the WOZ being outside the classroom, but still being a human. This can be done for multiple purposes, including helping to build up the FAQ (seeing what questions students ask), and helping to better understand what types of interactions students find most useful (especially if we WOZ to find out how the buddy can help the students to better formulate a Q, and/or have the buddy proactively ask students if they need help).

Big idea: have a TA be the main ALASKA user:

Now, if we can use a grad student in the classroom to do this, it may be even more helpful, and require less intelligence in the overall system. If this person can manage the FAQ, broker relationships, etc. It could even be that the grad students have the teacher view, and the teacher has a different view that works with the grad students. Note that if there is a huge class and several grad students, then each student is assigned to a grad student. Big benefit is that the teacher has to be engaged on a human level with people, and doing that plus windows is very difficult. Since this is funded for research on undergrad classes, so it is OK to do this.

Note that we are killing 2 birds with 1 stone: one purpose of this is to create a better FAQ. Another is to see if we can leverage a grad student in the classroom.

What would be offloaded from the system to the human (by using the TA in the classroom)?

1. Questions to the FAQ that don't get answered properly
2. Human-human relationships
3. An extra step before the Q gets to the teacher (grad student interjects before teacher would)

The FAQ isn't as effective as we may have liked, so this may (a) help us figure out how to make it more effective; and/or (b) help us make the system more effective keeping the FAQ as is.

Perspective: the sensory processing of the windows is substantial, and a "shock to the system" to have so many windows that give important info, while also managing human interactions. So, while the classroom of the future requires "seeing more", that also requires more processing. Having another person would be helpful, and may also help scaffold a teacher as they become proficient (and many college classes already have a TA). [potential concern about the airplane pilot hypothesis: they don't really have to deal with human interactions in the same way a teacher does—does this matter? Human interactions take a lot of processing.]

We may want to go ahead with a non co-located task with seatwork time where an ALASKA buddy is running (controlled by a human) and see what kind of Qs come in to the buddy. Can help us gather "real" questions. Can also help with the idea of the buddy always running.

Another idea: allow for better aggregation, so the teacher sees more than individual student screens. Plus, how can an agent help the teachers, including facilitating getting resources to the students. E.g. a count of what questions students asking or answers they are getting, better polling of students, etc.

Further conversation about these topics:

What are our hypotheses? At least 3 big ideas (buddy 24/7; better FAQs with free-form interaction (and a human wizard study); TA intermediary), should perhaps pare them apart and figure out how to study them?

Should probably do the human wizard to help build out the content area resources available. That is, FAQ development, and building our understanding of under what conditions would such a resource be useful? Intermediary may also be good about getting pilot. So, FAQ + intermediary, can do both with local CC system.

May be tough to do a good pilot with our resources, and may have enough info to serve as fodder for a proposal. While we have been looking at students as a source of data, but the teacher data points are probably even more important. Can we have them write down answers to questions, etc.?

The dialogic model of the buddy could be good, where we narrow down what the student has help with. This may be a good way to run the problem solving exercise.

We can instrument the heck out of things, to see when the human wizard does interject. However, have “rules of engagement” to see if we can sort of model what a computer would do (Think of eliza).

3. SRI contributions to the technical capabilities of the ALASKA system

- Integrated FAQ into ALASKA system and developed web based front end.
- developed use cases. See <https://wiki.sri.com:1800/display/alaska/FunctionalRequirements>
- Held weekly technical status meetings with Leo and developed set of milestones
- Migrated old project wiki to Confluence
- Developed set of messaging scenarios for team to discuss
<https://wiki.sri.com:1800/display/alaska/Messaging+Scenarios>
- Developed integration scenarios for team to discuss
<https://wiki.sri.com:1800/display/alaska/Integration+Scenarios>
- Developed proof of concept ALASKA buddy using IM and Conversagent
- Visited AFA calculus class and observed use of tablets and SynchronEyes
- Attended project meeting at CU Boulder
- Set up technical infrastructure for user tests