



Dear Parent or Guardian:

Vanderbilt University is doing research on ways to help students improve learning in science. We have developed computer programs students can use to learn about science topics, such as climate change and river ecosystems. These programs allow students to learn by teaching a computer character. If the student does a good job teaching the computer character, the character can answer questions about the science topic. If not, the computer character will need more teaching from student participants. Students can observe the character's performance, which typically motivates them to learn more for themselves and then come back to teach the computer character further. Previous studies have shown that students learn from teaching the computer character, and, further, these students learn more than students who learn with the system but do not teach a character. This year our focus is on teaching students independent, self-regulated learning strategies as they learn their science content. These strategies are promoted through dialog-embedded feedback provided by the Teachable Agent and the Mentor Agent.

We are requesting permission for your child to participate in this research. In this study, students will be randomly assigned to one of two groups. Both groups, as part of their science classroom activities, will teach the computer character about the two topics: (i) climate change and (ii) ecosystems by making concept maps using our software program. They will also receive feedback from the agents on how to be an independent learner. The difference between the groups is that in the *experimental condition* our computer characters will provide learning strategy prompts that are context-specific and relevant to the students' current activities. In the *control condition* the system will provide prompts for the same strategies, but they will be stated in a more general way. We hypothesize that the context-specific feedback provided in the *experimental condition* will be more effective in promoting these strategies than the general support provided in the *control condition*, and this will also lead to better learning performance for the *experimental condition*. We will make sure that both groups are exposed to the other system once the main study is completed.

All of this work will happen during your child's science class, and the science teacher will teach the curricular material before we start the computer intervention. The teacher will also determine the curricular material that the students will practice and learn with the computer system. Vanderbilt researchers will be present to help teachers with the computer software, and also to observe and help the students use the system. The study will take place in two parts. The first phase will run for two weeks in the Fall semester. The second phase will include a homework assignment and then classroom work where students will work in pairs (assigned by the teacher) on the computer system. This part of the study will take place in the Spring semester and run for a week. All computers required for the students' classroom assignments will be provided by the school and the Vanderbilt researchers. Throughout the study, the students will learn about, and practice making, concept maps that describe the causes and effects of climate change and relationships within an ecosystem. If your child chooses not to participate in this research study, the science teacher will find alternate ways to teach and grade your child's science work. From our past studies, we believe that the students will gain a much better understanding of the science material by participating in this study.

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Date of IRB Approval: 11/18/2010

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At the beginning of the study, the Vanderbilt researchers will work closely with science teachers to develop the materials needed for the study. They will also help set up all of the computer systems and computer software in the classroom to allow the teachers to use the system during their regular classroom teaching. At the beginning and end of each unit of this study, students will be given tests to find out what they learned from completing concept map activities and interacting with the computer characters. These tests will take about 30 minutes to complete. At the end of the study, we will conduct 10-minute video interviews with a small group of randomly-selected students. We will ask these students primarily about the usability of the system, and how we may improve the system for future use. In conducting these interviews, we will consult with the teacher to ensure that the interviews do not interfere with students' classroom work. We will also conduct an additional test to determine if students see any differences in interacting with a computer in general versus the virtual agents in our software. This test can be administered any time after they complete the study, and it should take students 30 minutes to complete. If you choose not to have your child participate in this research study, it will not affect your child's grades.

Some feedback will be provided to the teachers during the study to help them develop and improve their teaching strategies. We are also asking permission to obtain your child's latest standardized test scores for math and reading from school administrators. This information will be used only to help us evaluate our study results, and will not be shared with anyone else. In addition to the data we collect during the study, we may request the teacher to provide us with copies of related student assignments given by the teacher. Like all of the other data, this information will be kept confidential, and used solely to calibrate the learning measures we develop for our research. You may request a copy of the study results by contacting your child's teacher or by writing directly to the study PI, Prof. Gautam Biswas, whose address is provided below. These results are usually available three months after the study has been completed.

All data obtained during the course of this study will be accessible only by researchers at the Institute for Software Integrated Systems. Information on children who participate in research will be kept as confidential as legally possible. All students will be given an ID number at the beginning and will be identified only by this number (not by their name) on all study documents. When reporting our findings, no student will be identified by name or ID number. All data will be kept at a secure location at Vanderbilt University for a period not to exceed 7 years, after which time, it will be destroyed. All reasonable efforts will be made to keep the personal information in your child's research record private and confidential, but absolute confidentiality cannot be guaranteed. The information may be shared with institutional/governmental authorities (such as the Vanderbilt Institutional Review Board) if your child or someone else is in danger, or if we are required to do so by law.

Participation in this study is voluntary. Students will not be at any risk by participating in this research. You and your child can withdraw at any time. To withdraw prior to the research, please contact the classroom teacher, or call Gautam Biswas (615) 343-7472; to withdraw during the research have your child tell his or her teacher that s/he wishes to withdraw, or you can contact us at (615) 343-7472. If you have questions about giving your consent or about your child's rights as a participant in the research, please call the Vanderbilt University Institutional Review Board at (615) 322-2918.

If you agree to have your child participate in this research, please complete and sign the form below. Have your child return the completed form to his/her teacher. A copy of the letter is provided for you to keep for your records. If you give your consent to participate, your child will then be given his/her

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own consent letter to read and will have the opportunity to ask researchers questions before they agree to participate in the study. Student consent letters will be given to students at school.

With this research, we hope to better understand how computers can enhance student learning. We appreciate your cooperation in our research. If you have any questions about this research, please call Gautam Biswas at (615) 343-7472.

Sincerely,



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**STATEMENT BY PARENT/GUARDIAN:**

**[ ] I have read this consent letter and the material contained in it. All of my questions have been answered, and I freely and voluntarily choose to have my child participate. I understand that my child may withdraw at any time.**

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**Your Child's Name**

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**Signature of Parent/Guardian**

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**Date**

