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## I. INTRODUCTION

### A. STATEMENT OF MUTUAL EXPECTATIONS (SME)

(The following are the first two pages of a faculty Dossier. Total cannot exceed 2 pages. The text in italics should remain unchanged – it represents department's expectations. Please keep the order of items – with ref to university REG05.20.27 – link: <http://policies.ncsu.edu/regulation/reg-05-20-27>)

***i) General Departmental Expectation** – Responsibilities and contributions of CSC faculty conform to relevant departmental, college, and university rules, policies and regulations, including departmental **Teaching Load**, **Release Time**, and **Definitions** policies (<http://www.csc.ncsu.edu/department/policies/index.php>); departmental, college and university Reappointment Promotion and Tenure (**RPT**) and Post-Tenure Review (**PTR**) policies, etc. Faculty work in collegial manner. Load follows departmental load policy and distribution. Excellence is expected. **Evidence** of good teaching, research, service and other activities is **required**. Faculty are evaluated, based on the departmental and college RPT and PTR rules using individual consideration but with due attention to total and effective service to the institution. Faculty pro-actively mentor junior colleagues, and participate in faculty recruiting and other activities of import to the department, including those that increase and propagate good national and international standing, ranking and reputation of the department. Department will **support** faculty according to their contributions, departmental mission and scope, policies, regulations and rules, and within the scope of funding and other resources available to the department. This document may contain short-term and long term goals, actions and information. It will be updated as needed<sup>1</sup>. All faculty are required to have a signed SME on file with the department.*

**Faculty input:** My current research effort level is: very active research, and my current service effort level is: more than base-line service. Based on this and planned leadership, my teaching effort for the next SME period<sup>2</sup> 2015-2018 is 2 CSC 226 courses per academic year.

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<sup>1</sup>

For example, during annual faculty evaluation period (spring semester every academic year), when a major RPT or PTR action occurs, or when status or activity level of the faculty member changes (e.g., sabbatical, leave of absence, partial/phased retirement, major changes in duties, etc.), and at least once within a PTR cycle of the faculty member (annually for assistant, every 3 years for associate, and every 5 years for full professors). Updates may be issued via email, or some other form of written communication, as addenda to the signed SME.

<sup>2</sup>

New SME period typically covers at least one academic year into the future, however the document may cover longer periods if that is appropriate. Current (past) period performance, on which future teaching load expectations are determined, is based (barring special arrangements, such as start-up) on a moving average analysis of research, service and teaching performance described in the CSC Definitions

**ii) Teaching (academic activities) – Teaching Responsibilities**

**Departmental expectations:** Excellence in teaching is expected. Current departmental teaching load and other related policies will be followed. Teaching of both undergraduate and graduate courses, and mentoring and advising of undergraduate and graduate students is required. Leadership and participation in the design and implementation of new courses, and in the revision of existing core and area of specialty courses, is expected. Faculty are expected to pro-actively engage in all academic activities of import to the department.

**Faculty input:** My teaching effort for AY 2015-2018 is 2 large CSC 226 courses in fall semesters, with additional support of large spring CSC 226 courses. I teach graduate and undergraduate courses (to date, CSC 226: Discrete Mathematics, CSC 495/591: Serious Games, CSC 495/591 Educational Data Mining, CSC 495/591: Interdisciplinary Game Based Learning Design.)

**iii) Scholarship (research and innovation) – Research Areas**

**Departmental expectations:** Excellence in scholarship is expected. An active, funded, peer-reviewed, nationally and internationally prominent research program in chosen areas of expertise is expected. This includes research, publications and direction of PhD and MS students to successful completion (as chair or co-chair). High-quality scholarship is expected to be a) funded well beyond the individual faculty salary level (including release time) over long periods of time, and b) is expected to support graduate students. Faculty are expected to engage pro-actively in all scholarship activities of import to the department.

**Faculty input:** During the next SME period I plan to have my research effort at a very active research level.

**iv) Professional Activities (service)**

**Departmental expectations:** Excellence in leadership and professional activities is expected. All faculty are expected to participate in departmental, college and university level committees and other governance activities and roles. All faculty are expected to participate in relevant external professional activities (e.g., professional societies, conference program committees, national and international professional bodies and activities).

**Faculty input:** During the next SME period I plan to have my service effort at more than base-line service level. I will participate in activities of the Digital Transformation of Education CFEP cluster and seek opportunities to collaborate with other members in this and other CFEP clusters.

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 Tiffany Barnes, Associate Professor

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 Mladen A. Vouk, Dept. Head

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 Date

## B. BRIEF RESUME

### 1. Education background:

- Ph.D., Computer Science, North Carolina State University, Raleigh, NC, USA, 2003.
- M.S. (1999), BS (1995), Computer Science & Math, NC State, Raleigh, NC, USA, 1999.

### 2. Professional experience:

- 2012-present: Associate Professor, North Carolina State University, Raleigh, NC, USA.
- 2010-12 (Assoc. Prof), 2004-2010 (Asst. Prof): UNC Charlotte, Charlotte, NC, USA.
- 2007-12: Game Design and Development Graduate Certificate Director, UNCC.
- 2002-07: Instructor, Engineering Online, North Carolina State, Raleigh, NC, USA.

### 3. Scholarly and creative activities/publications (see CV for details):

<i>Books</i>	<i>Career Total (number)</i>	<i>Since Joining NCSU</i>	<i>7/1/15- 6/30/16</i>	<i>Total over moving PTR Period<sup>1</sup></i>	
Edited books and proceedings	8	4	2	2	
Refereed book chapters	6	1	1	1	
<i>Papers, Articles, Patents, Reports, News Interviews</i>	<i>Career Total (number)</i>	<i>Since Joining NCSU</i>	<i>7/1/15- 6/30/16</i>	<i>Total over moving PTR Period<sup>1</sup></i>	
Magazine articles	4	4	4	4	
Refereed journal articles	17	6	4	4	
Refereed conference papers	90	41	17	17	
Refereed workshop papers	20	13	4	4	
Refereed posters, panels	45	19	2	2	
<i>Talks, Presentations, etc.</i>	<i>Career Total (number)</i>	<i>Since Joining NCSU</i>	<i>7/1/15- 6/30/16</i>	<i>Total over moving PTR Period<sup>1</sup></i>	
Keynotes and distinguished speaker invitations	8	3	.	.	
Other invited talks	14	4	.	.	
Other talks	15	.	.	.	
<i>Funded Research, Development and Teaching</i>	<i>Career Total (dollars)</i>	<i>Since Joining NCSU</i>	<i>7/1/15- 6/30/16</i>	<i>Total over moving PTR Period<sup>1</sup></i>	<i>Pending (\$)</i>

(\$)

Contracts and Grants	\$15,631,147	\$3,584,107	\$2,109,875	\$2,109,875	.
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<i><b>Mentoring and Supervision</b></i>	<i><b>Career Total (number)</b></i>	<i><b>Since Joining NCSU</b></i>	<i><b>7/1/15- 6/30/16</b></i>	<i><b>Total over moving PTR Period<sup>1</sup></b></i>	<i><b>In Progress</b></i>
PhD (chair/co-chair)	8	4	2	2	7
MS (chair/co-chair)	16	4	3	3	1
Undergraduate research advisees	112	25	10	10	1

<i><b>Courses created and/or revised in a significant way (complete list in CV)</b></i>	<i><b>Career Total (number)</b></i>	<i><b>Since Joining NCSU</b></i>	<i><b>7/1/15- 6/30/16</b></i>	<i><b>Total over a moving PTR Period<sup>1</sup></b></i>
Undergraduate	9	4	0	0
Graduate	7	3	0	0

<i><b>Courses taught</b></i>	<i><b>Career Total (number)</b></i>	<i><b>Since Joining NCSU</b></i>	<i><b>7/1/15- 6/30/16</b></i>	<i><b>Total over PTR Period<sup>1</sup></b></i>
Small undergrad (3 cred, x < 10 students)	4	.	.	.
Regular undergrad (3 cred, 10 < x < 100 stud)	20	4	.	.
Distance undergraduate (3 cred, ~20 students)	18	.	.	.
Large undergraduate (3 cred, x > 100 students)	9	9	2	2
Small graduate (3 credits, x < 10 students)	10	1	.	.
Regular graduate (3 cred, 10 < x < 100 stud)	4	.	.	.

**4. Membership in professional organizations:**

- Association of Computing Machinery (ACM),
- Artificial Intelligence in Education (AIED) Executive Committee 2014-2019
- ACM SIG Computer Science Education, Board At Large Member June 2013-16
- International Educational Data Mining Society, Executive Steering Committee 2008-2016

**5. Scholarly and professional honors:**

- NCWIT Undergraduate Research Mentoring Award 2016
- NSF Ideas Lab invitation in Oct 2013, Data Intensive Research on Teaching & Learning
- NSF Career Award 2009-2015
- Keynote Speaker: ACM SouthEast 2014, Learning Analytics Summer Institute 2014, STARS Celebration 2012, BigSURS 2012, CCSC Northeast 2010
- College Board CS Principles Phase I Piloter 2010-2011, Phase 3 piloter 2013-14
- 3 paper nominations, top-tier AI in Education & Intelligent Tutoring Systems conferences
- UNCC CCI Essam El-Kwae UG Research Mentor Award, 2012, 2011, 2010, 2007
- UNCC CCI Excellence in Undergraduate Teaching Award 2009 & 2008

**6. Professional service on campus (current, see CV for full list):**

- CSC Strategic Planning Committee, 2014-present.
- Member, Centers for Education Informatics & Digital Games Research, 2012-present.
- STARS Student organization faculty advisor 2012-present
- Engineering Outreach Summer Camps 2013-16

**7. Professional service off campus (Highlights, see CV for full list):**Organization of International Conferences and Workshops

- General Chair: ACM SIGCSE 2018, Program Co-Chair: ACM SIGCE 2017
- General Co-Chair: 1<sup>st</sup> & 2<sup>nd</sup> IEEE Intl. Conference on Research on Equity and Sustained Participation in Engineering, Computing, and Technology, August 2015, 2016
- General Chair: 8<sup>th</sup> Intl. Conference on Educational Data Mining, June 2016
- General Co-Chair: STARS Celebration 2015, 2016
- Program Co-Chair: Intl. Conference on Foundations of Digital Games (FDG 2014)
- Doctoral Consortium Chair: ACM FDG 2012, EDM 2013, AIED 2015
- Program Track Chair: ACM Intl. Conference on Foundations of Digital Games 2009
- Program Chair: 2<sup>nd</sup> Intl. Conference on Educational Data Mining 2009
- General Conference Chair: 6<sup>th</sup> Annual STARS Celebration, August 2011
- General Conference Chair: 1<sup>st</sup> Intl. Conference on Educational Data Mining, June 2008

Program Committees:

- Intelligent Tutoring Systems 2012-16 (bi-annual), Educational Data Mining 2010-2016
- Artificial Intelligence in Education Conference (AIED 2011-15, bi-annual conference)

Journal & Book Chapter Reviewing

- J. Educational Data Mining 2011-14, Intl. J. Artificial Intelligence in Education 2011-13
- Intl. Journal of Human-Computer Studies 2010 - 2013
- Applied Psychological Measurement 2008-2012
- Journal of Intelligent Information Systems, 2005, 2006, 2009, 2012



## C. CANDIDATE'S STATEMENT

Dr. Barnes's main research contributes to advancing personalized learning through artificial intelligence and educational data mining, while she also conducts research in the development and evaluation of serious games, broadening participation in computing, and human-computer interaction.

### *Educational Data Mining*

Dr. Barnes has demonstrated leadership in Advanced Learning Technologies in educational data mining and games for teaching computer science. Dr. Barnes's primary interest in educational data mining research is in building intelligent, adaptive teaching systems using machine learning, which can greatly reduce the ratio of 100-1000 hours of development per hour of instruction. The motivation in Dr. Barnes's work is to increase our understanding of human learning and how to best support this learning through interactive and intelligent learning environments. In her work, Dr. Barnes has performed a combination of a) theoretical work, developing computational models of student knowledge, b) empirical study of the effectiveness of these models for remediation, and c) integration of the results of my research into practical systems.

Deep Thought is a mature tutoring system for logic proofs that has been used in the Discrete Mathematics course here at North Carolina State University and at Philosophy courses at UNC Charlotte since 2008. We recently completed development and deployment of Deep Thought 3.0 that has been updated for modern browsers, expanded with additional instructor features, and augmented with a data-driven mastery learning (DDML) system that guides student problem selection based on past performance. In recent studies we have shown that this data-driven mastery learning system enhances student learning and retention and helps to support ongoing engagement.

### *Serious Games*

Dr. Barnes established the Game2Learn Research Lab at UNC Charlotte and NCSU, which investigates the use of games that teach computer science in improving recruiting, performance, and retention of diverse students in computer science. The lab was transitioned to the Center for Educational Informatics at NC State in 2012. This tiered model has engaged 112 advanced high school and undergraduate computing students in research. Dr. Barnes was recognized for her outstanding mentoring of undergraduates as a 2016 NCWIT Undergraduate Research Mentor Awardee. Dr. Barnes's results have shown that the project recruits advanced students into graduate school, and that the games have potential for learning in introductory classes.

### *Broadening Participation in Computing*

Dr. Barnes has been working in improving recruiting and retention of girls and women in computing since 1997, when she participated (as a graduate student) in writing the successful NSF-ITWF Girls on Track grant to run a year-round enrichment program centered on a summer camp designed to teach girls math concepts through solving urban and social problems. Dr. Barnes has worked to design, implement, and evaluate the **NSF-funded STARS Computing Corps** (formerly called the STARS Alliance), which provides college and university computing faculty and students with a multiple-year opportunity to serve as leaders and mentors to effect dramatic change in the computing pipeline. The STARS program is effective in raising students' feelings of computing identity, interest in graduate programs in computing, and intention to remain in the field, which is an indicator of future behavior. Barnes et al. have demonstrated that STARS at UNC Charlotte is effective in building a STARS computing identity and improving students' commitment to computing. Since 2006, STARS has scaled from 10 institutions in 2006 to over 50 institutions nationally in a collective effort to address the need for recruiting and retaining students from groups typically underrepresented in computing, i.e. women and minority groups. STARS has engaged over 2000 college students and 100 faculty in computing departments 2006-2016. We have built over 200 partnerships between our 53 universities and local organizations including industry and K-

12 schools and are institutionalizing our programs to ensure that our interventions will last. STARS has also encouraged increased adoption of pair programming as a teaching method in computing at a number of our universities. STARS students and faculty have conducted outreach to over 120,000 K12 students from 2006-2016. Dr. Barnes is Vice Chair of the STARS Executive Board and directs STARS Evaluation. She chaired the 2015 STARS Celebration in Charlotte, NC.

Barnes was PI for **“FRABJOUS CS: Framing a Rigorous Approach to Beauty and Joy with Outreach to Underrepresented groups at Scale”** (1346922, \$438,831, 2/1/13-2/28/16 + Supplement for \$565,874 8/31/16-9/1/2018) that provided Computer Science Principles PD for the Beauty and Joy of Computing (BJC) course (Garcia et al. 2015) for 133 teachers who taught 89 high school BJC courses from 2013-2015. Based on a Summer 2014 survey, the PD significantly improved teachers’ perceived readiness to teach BJC content, to use equitable pedagogies, and to integrate social justice topics into the course (Price, et al. 2016). Following the 2014 PD, fifty-two out of the 61 instructors planned to use BJC materials in 2014-2015, with 35 planning high use (over 70% of the BJC curriculum), and 17 with medium use (25-50%). The likelihood of teaching BJC related to taking the online BJC course (77%) and having taught 8+ years in K12 (51%) (Price, et al. 2016). On a 2015 BJC post-course survey, 257 high school and college students from 10 high schools and 2 colleges would recommend the course to others, and agreed the course was interesting, they had a better idea of how computers work, the course was of value to them, the course helped them to better figure out how to solve problems, the assignments and resources helped them learn, and that they were motivated to learn in the course (Price et al. 2015). Frabjous also trained 10 CSP master teachers who facilitated BJC PD for 114 new teachers at 12 locations in Summer 2016.

Based on the success of Frabjous and her leadership in STARS, Barnes has initiated a newly funded project, **“Track 2: CS10K: BJC-STARS: Scaling CS Principles through STARS community & leadership development”** (1542922, \$500K, 10/1/15-09/30/18), which seeks to engage universities and local leaders as change agents in their local communities, who can support new high school teachers to teach new Computer Science Principles courses.

## Conclusion

Dr. Barnes has established herself as a leader in games, CS education, broadening participation, and educational data mining. She is currently supervising 9 PhD students, and 1 Master’s student, many of whom are supervising undergraduates in research as well. She has brought in **over \$15 million in grants**. Dr. Barnes has mentored an outstanding number (112 and counting) of high school and undergraduate research projects, a known strategy to retain students and interest them in graduate programs. Dr. Barnes’s leadership in computing education has been recognized through her invitations to national dialogues on computer science education and as a member of the ACM SIGCSE Board from 2010-2016. Although many of her publications are in conference venues, it is of particular note that most of these are top tier and well-respected, widely read publications of high quality, peer-reviewed status, with acceptance rates of 35% or below.



## II. TEACHING AND MENTORING OF UNDERGRADUATE AND GRADUATE STUDENTS

### A. TEACHING EFFECTIVENESS

#### Teaching Honors and Awards

1. NCWIT Undergraduate Research Mentoring Award 2016.
2. UNC Charlotte CCI “Essam El-Kwae Undergraduate Research Mentor” Award 2011-12
3. UNC Charlotte CCI “Essam El-Kwae Undergraduate Research Mentor” Award 2010-11
4. UNC Charlotte CCI “Essam El-Kwae Undergraduate Research Mentor” Award 2009-10
5. UNC Charlotte CCI “Excellence in Undergraduate Teaching” Awards 2008-09, 2007-08
6. UNC Charlotte CCI “Essam El-Kwae Undergraduate Research Mentor” Award 2006-07
7. UNC Charlotte Summer Diversity Institute<sup>3</sup> Invited Speaker 2006, Scholarship 2005
8. NCSU UGSA Outstanding Teaching Assistant Award (1999)
9. NCSU Preparing the Professoriate Award Winner (1998-1999)<sup>4</sup>
10. NCSU Hewlett Initiative Graduate Fellow (1997-1999)<sup>5</sup>

#### Courses Taught

##### NC State

1. CSC 226, Fall 2016, Discrete Mathematics for Computer Scientists. Enrollment: 260 in 2 sections (co-taught one section with Donald Bitzer)
2. CSC 226, Fall 2015, Discrete Mathematics for Computer Scientists. Enrollment: 275 in 2 sections (co-taught one section with Donald Bitzer)
3. CSC 495, Spring 2015, Interdisciplinary Game-Based Learning Design. Enrollment: 20 in CSC, 22 in Education (co-taught with Deniz Eseryel in Education).
4. CSC 200, Spring 2014, Introduction to Computers and Their Uses. Enrollment: 79
5. CSC 226, Fall 2014, Discrete Mathematics for Computer Scientists. Enrollment: 266 in 2 sections (co-taught one section with Donald Bitzer)
6. CSC 226, Fall 2013, Discrete Mathematics for Computer Scientists. Enrollment: 243 in 2 sections (co-taught one section with Donald Bitzer)
7. CSC 495, Fall 2013, Special Topics in Computer Science Enrollment: 21 UG.
8. CSC 495/591, Spring 2013, Serious Games, Enrollment: 10 UG, 6 grad

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3 This Summer Diversity Institute provides UNCC faculty professional development around creating course materials and environments that acknowledge and integrate activities around diversity into courses.

4 This competitive Preparing the Professoriate program selected 10 NCSU students university-wide to receive a stipend and participate in teaching effectiveness workshops and mentored teaching experiences.

5 This competitive program selected 20 graduate students to develop strategies for instituting active learning practices at NCSU. I was co-leader of the Pedagogy group, who developed an active learning student handbook.

9. CSC 226, Fall 2012, Discrete Mathematics. Enrollment: 139

### **Distance Education at NCSU**

1. Distance Education Applied Discrete Mathematics, each Spring, Summer, & Fall 2002-7; Enrollment approximately 12-20 each semester.

### **Courses Taught @ UNC Charlotte**

1. ITCS 1203, Fall 2011, Beauty and Joy of Computing Enrollment: 15 UG
2. ITCS 1203, Spring 2011, Beauty and Joy of Computing Enrollment: 22 UG
3. ITCS Spring 2011, Introduction to Cognitive Science Enrollment: 15 Grad.
4. ITCS4/5010 F 2011 Serious Games Prototyping & Evaluation Enrollment: 11UG 3 Grad.
5. ITCS4/5010 F 2009 Serious Games Prototyping & Evaluation Enrollment: 22UG 6 Grad.
6. ITCS 4/5231 Spr2012 Advanced Game Design & Dev. Enrollment: 10 UG 2 Grad.
7. ITCS 4/5231 Spring 2009 Advanced Game Design & Dev. Enrollment: 9 UG 10 Grad.
8. ITCS 4/5231 Fall 2006 Advanced Game Design & Dev. Enrollment: 8 UG 1 Grad.
9. ITCS 4/5231 Fall 2005 Advanced Game Design & Dev. Enrollment: 2 UG 4 Grad.
10. ITCS 4/5231 Spring 2005 Advanced Game Design & Dev. Enrollment: 39 UG 3 Grad.
11. ITCS 4/5230 Fall 2010 Intro. To Game Design & Dev. Enrollment: 26 UG 14 Grad.
12. ITCS 4/5230 Fall 2008 Intro. To Game Design & Dev. Enrollment: 24 UG 10 Grad.
13. ITCS 6/8159 Fall 2007 Intelligent Tutoring Systems Enrollment: 6 Grad.
14. ITCS 6/8159 Spring 2006 Intelligent Tutoring Systems Enrollment: 6 Grad.
15. ITCS 6/8159 Fall 2004 Intelligent Tutoring Systems Enrollment: 6 Grad.
16. CICS 1214 Spring 2007 Introduction to Computer Science Enrollment: 38 UG.
17. ITCS 2175 Fall 2011 Logic & Algorithms Enrollment: 75 UG.
18. ITCS 2175 Fall 2009 Logic & Algorithms Enrollment: 83 UG.
19. ITCS 2175 Spring 2009 Online Logic & Algorithms Enrollment: 60 UG.
20. ITCS 2175 Spring 2008 Online Logic & Algorithms Enrollment: 52 UG.
21. ITCS 2175 Fall 2007 Logic & Algorithms Enrollment: 47 UG.
22. ITCS 2175 Fall 2006 Logic & Algorithms Enrollment: 6 UG.
23. ITCS 4650/1 Senior Project I-II 2004 – 2013 Enrollment: 23 UG.

**Student Evaluations of Teaching.**

Question	226-f15	226-f14	226-f13	226-f12	game-s15	200-s14	game-s13	edm-f13
<b>Responses</b>	51	58	66	70	10	28	11	14
<b>Enrolled</b>	161	155	144	138	20	79	15	21
1. instructors teaching aligned with courses learning objectives/outcomes	4.6	4.3	4.7	3.7	4.1	2.9	3.5	4.2
2. instructor was receptive to students outside classroom	4.4	4.2	4.7	3.7	3.9	3.1	3.7	4.4
3. instructor explained material well.	4.4	3.9	4.6	2.9	3.7	2.7	3.4	3.9
4. instructor was enthusiastic about teaching course	4.6	4	4.7	3.5	4.1	3.6	4.4	4.4
5. instructor was prepared for class	4.5	4.1	4.7	3.5	3.1	3.1	2.7	3.5
6. instructor gave useful feedback.	4.2	4	4.7	3.4	3.8	2.8	3.6	4.1
7. instructor consistently treated students with respect	4.4	4.2	4.6	3.9	4.4	3.7	4.3	4.8
8. Overall, instructor was an effective teacher	4.4	4.1	4.8	3	3.9	2.4	3.5	3.8
9. course materials were valuable aids to learning	4.1	3.7	3.9	3	3.8	2.8	3.5	4.1
10. course assignments were valuable aids to learning	4.2	4.3	4.6	3.8	4.2	2.5	3.7	4
11. This course improved my knowledge of subject	4.4	4.3	4.8	3.5	3.9	3	4	4.3
12. Overall, this course was excellent	4.2	3.8	4.5	3	3.5	1.8	3.4	3.6

**Selected Student Comments****Fall 2015 CSC 226 Discrete Math for Computer Scientists**

- Incredibly good professor. Taught material quickly and effectively. Avoided making lectures too long or boring.
- The exams were fair the and the webassign/labs were very helpful to help learn the material. The weakness would be that the textbook can be confusing when trying to learn a concept, not the best examples/explanations.
- Peer tutoring is a great idea and I liked that it was an aspect of this course. There was always some student available to help others learn material. Review sessions were helpful as well.
- An excellent and well-designed course that greatly enhanced my understanding of the concepts of Discrete Mathematics. Everything in the course objectives and tested on the exams were thoroughly covered by the lectures with extensive examples and explanations of the concepts. Dr. Barnes's lectures, course packets, Webassign problem sets, labs, and assigned readings greatly enhance students' understanding of the subject matter. Students are greatly helped with the availability of lecture notes on Piazza and the online recorded lectures when reviewing the materials. The practice test and special tests, in addition to the review lectures and peer-tutoring hours were valuable resources in learning the course

material and preparing for the exams. Through the innovative peer-tutoring system, Dr. Barnes' office hours, the TA's office hours, the TA's recitation, and the Piazza forum, Dr. Barnes's course is structured in a way that makes obtaining help in preparing for the exams and on assignments to be the most accessible experience any students might have in any class.

#### Fall 2014 CSC 226 Discrete Math for Computer Scientists

- Instructor used class time well and made helpful examples and comparisons to make sure students understood the concepts being presented to them. Instructor was very understanding of deadline conflicts and granted extensions when they were needed. I am very appreciative of everything the instructor did, and hope to do research with the instructor in the future.
- I did like all of the **different homework assignment platforms**. I think they really helped with learning.
- The course was set up to allow for various types of learning, and I particularly appreciated the opportunities given to me as a **peer tutor**.
- Online discussion forum is a great way to ask a question and receive a reply with a matter of minutes.
- Strengths: I love how open Dr. Barnes is to her students. She is open for undergraduate research and peer tutors, and that is amazing! She is really open for everyone. As well, Dr. Barnes is a great instructor, teaching in an understandable and easy way for all students to comprehend. With her writing notes with the students, it allows the students to stay on track and not feel like they have to catch up. As well, she waits for questions that anyone may have, and it is just great. Weaknesses: Sometimes the shorthand gets confusing. A little reminder of what some of the terms mean would help during class.

#### Fall 2013 Special Topics: Educational Data Mining

- Really knowledgeable about EDM, the instructor was able to provide very useful feedback or comments on a wide range of methods, **you could tell she really cared if the students understood the concept**.
- The instructor clearly knew her course material, and was very helpful when asked for advice.

#### Fall 2013 CSC 226 Discrete Math for Computer Scientists

- Dr. Barnes is great! She has a **real knack for explaining things and is very receptive and helpful** when you ask questions in class. Her lectures, homework, labs, and tests are all very similar in structure and question style such that you really don't have an excuse to fail.
- Dr. Barnes was especially helpful with answering questions on Piazza, giving just enough information for students to effectively learn material without reciting solutions to copy down. She also **provides a vast number of resources** to help cover material outside of lectures, which also proved to be greatly helpful.
- She was a fantastic instructor. She **listened to student feedback and was able to respond appropriately**. She also provided numerous tools that were invaluable to passing the course and learning the material.

- **I was greatly impressed with the policies in this course.** It gave the impression that if you put forth the effort, you are guaranteed to pass. I absolutely love this policy and I wish that every course would adopt these same policies. It shows Dr. Barnes is more concerned with making sure we know the content, rather than if we are able to get lucky and answer something right the very first time. Also, I really love the peer tutoring system, not only was I able to help other students, but it greatly increased my own understanding of the content in the process.
- **Greatest Professor ever.** Used a lot of examples which furthered students' understanding about the materials. Also availed all possible channels for students success. Should keep up the good job.

Fall 2012 CSC 226-002 Discrete Mathematics for Computer Scientists:

- Dr. Barnes is an **inspiring and enthusiastic instructor**. She has a thorough understanding of discrete mathematics and is usually able to simplify it or present it in ways that any student can understand [...] I am particularly impressed with her courage and wisdom in **trying new things**, such as a "flipped classroom" and the use of Piazza to **promote teaching between students**. Later in the semester, she provided incentive enough that dozens of students with an "A" in the class scheduled "office hours" to provide tutoring to their peers. I [...] gained much from [this], since teaching others is an excellent way to reinforce my own understanding.
- Dr. Barnes consistently **treats her students with respect** and understanding and demonstrates a **passion to see her students succeed**. At times she would reassure them and try to find different ways to explain the same topic repeatedly until it either became a disruption to class (in which case she would answer it either in person after class or via the class forum) or they understood it. [...] she has a way of making what seems to be impossible to grasp seem easier.
- I am **incredibly glad to have had her as my instructor**. Despite all the unreasonable drama regarding the [requirement to watch pre-recorded videos], her class was remarkably straightforward and material was presented in a manner easily digested by students. Dr Barnes went well **out of her way to address questions** [...] and comments whenever they arose, and was very much **clear about her expectations** and requirements, especially regarding tests. [...] **Dr Barnes wants students to succeed, and she is an excellent instructor.**

B. INSTRUCTIONAL DEVELOPMENT

- Barnes taught one CSC 200 course using her curriculum for the CS Principles: Beauty and Joy of Computing course that will match with the new CS Principles Advanced Placement course. The CSC 200 instructors have incorporated 6 labs/homeworks from this course into a redesign of CSC 200.
- A special topics class, CSC 495/591: **Interdisciplinary Game-Based Learning Design**, was developed and taught in Spring 2015 with 20 CSC and 22 education students.
- A special topics class, CSC 495/591: **Educational Data Mining**, was developed and taught in Fall 2013 with 21 students
- A special topics class, CSC 495/591: **Serious Games**, was developed and taught in Spring

2013 with 14 students

- Developed and taught CSC 226, Applied Discrete Mathematics, for the Distance Ed program at NC State, offered from Spring 2002 – 2007.

### **Curricular Development at UNC Charlotte, Total: 2 Certificates, 5 Graduate, 5 Undergraduate, 1 Workshop**

- Undergraduate Certificate in Game Design & Development
- Graduate Certificate in Game Design & Development
- ITCS 4238/5238                      Serious Games @UNCC                      First offer: Fall 2009
- ITCS 1203                      Beauty and Joy of Computing                      Approved Spring 2012
- ITCS 8159                      Intelligent Tutoring Systems                      Approved May 2007
- ITCS 6159                      Intelligent Tutoring Systems                      Approved May 2007
- ITCS 4230                      Intro. to Game Design & Development                      Approved May 2006
- ITCS 5230                      Intro. to Game Design & Development                      Approved May 2006
- ITCS 4231                      Advanced Game Design & Development                      Approved May 2006
- ITCS 5231                      Advanced Game Design & Development                      Approved May 2006
- ITCS 2175                      Logic & Algorithms (ONLINE)                      First offer: Spring 2008
- Video Game Development workshops for visiting students, 3 week course through International Programs, Summers 2005,2006,2008

## **B. MENTORING ACTIVITIES**

### **Undergraduate Advisee Awards and Honors**

1. 12 Nationally Recognized Students by NSF, NASA, Microsoft, DHS Fellowships valued at over \$985,000 received by REU mentees for study in computing graduate programs
  1. National Science Foundation (NSF) Graduate Research Fellowships (GRF) (\$130K each):
    - a. Evie Powell (2008-12), Drew Hicks (2011-15), Veronica Catete (2012-16)
  2. NSF GRF Honorable Mentions:
    - a. Alexandra Milliken (2016), Thomas Price (2015), Michael Eagle (2008), Acey Boyce (2011), Katelyn Doran (2012)
  3. NASA GSRP Fellow (\$60K):
    - a. Katelyn Doran (2010-2013)
  4. Microsoft Graduate Women's Scholarship (\$15K):
    - a. Veronica Catete (2012)
  5. 3 Former REUs receiving NSF GRF (\$130K):
    - a. Jordana Hodges 2011-2015 @ UW, Samantha Finkelstein 2011-15 @ CMU, Amy Shannon 2014-2019 @ CMU
  6. Former REU receiving Department of Homeland Security Fellowship (\$130K):
    - a. Lane Harrison 2009-2013 @ UNCC – Now a professor at Tufts

2. 13 externally funded individual REU projects valued at \$78,000 in student support
  - a. 12 DREU projects funded through the CRA/CDC, 1 through McNair Scholarships
3. UNC Charlotte College of Computing Essam El-Kwae Award for Undergraduate Research Mentoring, awarded to an advisor-advisee pair for outstanding research
  - a. Shaun Pickford (2011-2012)
  - b. Katelyn Doran (2010-2011)
  - c. Samantha Finkelstein (2009-2010)
  - d. Evie Powell (2006-2007)
4. ACM Undergraduate Student Research Competition Winners
  - a. Katelyn Doran, 1<sup>st</sup> place @ Tapia 2009
  - b. Samantha Finkelstein, 3<sup>rd</sup> place @ Tapia 2009
  - c. Michael Eagle, 1<sup>st</sup> place @ Tapia 2007

### Undergraduate (and High School) Mentoring.

#### 1. High School Research Supervised @ NC State

1. Linnea Hollander	HSR 15-16: Bots testing
2. Aidan Curtis	HSR 15-16: Snag'em App Development
3. Qiyuan (Jerry) Pan	REHS 2014: Snap program analysis
4. Keishla Sanchez Ortiz	PREHS 2014: BJC and Snap program analysis
5. Gerardo Serrano	PREHS 2014: BotsCRAFT: Bots in MineCraft
6. Wilmaris Rivera Medina	PREHS 2014: BJC and Snap program analysis
7. Reniel Irizarry-Del Toro	PREHS 2014: BotsCRAFT: Bots in MineCraft
8. Genesis Rosado Martinez	PREHS 2013-4 Lebanese Dance game
9. Ruben Hernandez Diaz	PREHS 2013: Lebanese Dance game
10. Christopher Alicea Nieves	PREHS 2013: Snap music programming mod
11. Joshua Pupo	PREHS 2013: Snap music programming mod

#### 2. Undergraduate Research Supervised @ NC State

1. Erin Snider	NCSU	UGR Sp16: BJC rubrics
2. Caroline Law	NCSU	UGR Sp16: BJC rubrics
3. Meghana Subramaniam	NCSU	UGR Sp16: BJC rubrics
4. Alexander Rouse	NCSU	UGR Sp16: Discrete Math tutor
5. *Markel Sanz Ausin	NCSU	UGR 15-16: Class analytics
6. Hengxuan Li	NCSU	UGR f15-f16: Class analytics
7. Gerardo Serrano	PR	REU 2015: Pyrenees Probability Tutor
8. Genesis Rosado Martinez	PR	REU 2015: BJC Delphi study
9. Joshua Cook	NCSU	REU 2015: Bayesian Knowledge Tracing
10. Emily Sharp	NCSU Fa15	REU 2015: NutraNinja
11. Melba Rodriguez	PR	PREU 2014: Lebanese Dance Game
12. Justis Peters	NCSU	REU 2014: EEG & reading difficulty
13. Elisabeth Frasch	NCSU	REU 2014: BJC CS Principles research
14. Katherine Kjeer	non-NCSU	REU 2014: Justified Thought logic tutor
15. Robert Benson	NCSU	REU'14-15: Deep Thought MVC redesign
16. Melissa Ketcham	non-NCSU	REU 2014: Flow diagramming

17. Yuri Nascimento da Silva	Brazil Fa14	REU 2014: Bots Level Editor
18. *Alexandra Milliken	Xavier Sp15	REU 2014: Bots User Experience
19. Nicole Sands	NCSU Sp15	Su14, Fa14: Snag'em
20. Vinaya Polamreddi	NCSU Sp15	AY13-14 Honors: Hover Hints
21. Katie Wassell	NCSU Sp15	AY12-13, AY13-14: DT Logic
22. Trevor Brennan	NCSU Sp15	AY12-13, AY13-14, Fa14: Bots
23. Michael Clifton	NCSU	Sp13, Bots
24. Cameren Dolecheck	NCSU Fa15	Su13, Fa13, Su14, Fa14: DT Logic
25. Aaron Quidley	NCSU Fa14	AY13-14, F14 Bots & Lebanese games

3. Undergraduate Research Projects Supervised @ **UNCC** (\*= entered CS grad. program)

26. Matthew Tremper	UNCC	Sr. Proj 2012-2013: Game2Learn, OrderOps
27. Stephanie Yeh	non-UNCC	<b>DREU</b> 2012: InVis and EDM
28. *Aaron Springer	non-UNCC	REU 2012: InVis and EDM
29. Keith Payne	UNCC	REU 2012: InVis and EDM
30. Mykel Pendergrass	UNCC	REU 2012: Exercise games
31. Maybelline Burgos	UNCC	REU 2012: Exercise games
32. *Nathaniel Blanchard	non-UNCC	REU 2012: Exercise games
33. Brian Thomas	non-UNCC	REU 2012: Exercise games
34. Rose Abernathy	non-UNCC	REU 2012: Snag'em
35. Chitra Gadwal	non-UNCC	REU 2012: Bead Loom Game
36. *Amy Shannon	Emory, Sp14	REU2012: BeadLoom, 3 <sup>rd</sup> REU Award
37. Andrew Messick	UNCC Fa13	REU 2012: BOTS
38. Andrew Haskett	UNCC Spr12	Sr. Proj 2012: Kinder. Reading Game
39. Derek Mayfield	UNCC	REU 2011: G2L: BLG & Wu's Castle
40. Jonathan Curry	UNCC	REU 2011: G2L: BLG & Wu's Castle
41. *David Brickler	Morehouse	REU 2011: G2L: BLG & Wu's Castle
42. Ivanna Gutierrez	Summer 2011 HS Apprenticeship (mobile phone games)	
43. *Nathan Kingsley	May 2012 UNCC	Sr. Proj 2011: Greener & Bots
44. Ken Hinton	May 2012 Shaw	REU 2011: Programming tutor
45. *Javier Olaya	Kean Univ. Sp12	REU 2011: Bots
46. Zach Lehmann	UNCC Sp12	Fa12: Greener
47. Victoria Cooper	Randolph-Macon Coll Sp 12	REU 2011: Bots
48. Shaun Pickford	UNCC Fa11	REU10-11: CSDT online, Dance Tool, Greener
<ul style="list-style-type: none"> <li>• <b>2011-2012 CCI Essam El-Kwae Undergraduate Research Award</b></li> <li>• Working at Microsoft, Charlotte</li> </ul>		
49. *Dustin Culler	UNCC Fa11	REU10-11: CSDT online, Greener
50. Meena Seralathan	Haverford Sp11	DREU 2010: Final Reality iPhone
51. *Joshua Situka	U. Houston Sp11	REU 2010: Bots
52. Lance Newby	UNCC Sp11	Sr Proj. F09: Charlotte Dancesport
53. Thomas Phifer	Winthrop Sp11	REU09-11 & AY09-10: Snag'em
54. *Samantha Finkelstein	UNCC Sp11	REU08, AY09-10: Games for autism
<ul style="list-style-type: none"> <li>• <b>2009-2010 CCI Essam El-Kwae Undergraduate Research Award</b></li> <li>• <b>2011 NSF Graduate Research Fellow (at Carnegie Mellon)</b></li> <li>• <b>3<sup>rd</sup> place, ACM SRC, Tapia 2009</b></li> </ul>		
55. *Jordana Hodges	UNCC Sp11	REU07: Australian Fire Game



- **2011 NSF Graduate Research Fellow (at University of Washington)**

56. Bethany Miller	App State Sp10	REU09: Bunny Generals & Heaps
57. *Veronica Catete	NCSU Fa10	REU 2010: Bots
58. *Rachel Brinkman	Grove City Sp10	DREU 2009: Table Tilt
59. *Antoine Campbell	UNCC Sp10	REU09,10: G2L Bunny Generals
60. *Christie Thornton	UNCC Sp09	REU09 & CREU09-10: Dance Tool
61. *Katelyn Doran	UNCC Sp10	REU08 & AY08-10: Bunny General

- **2010-2011 CCI Essam El-Kwae Undergraduate Research Award**

- **First place, ACM SRC, Tapia 2009, Now at Microsoft**

62. Jasamine Jackson	Winthrop Sp09	DREU 2008: Dance Tool
63. *Hanan Al Nizami	Youngstown St Sp09	DREU 2008: Dance Tool
64. Michelle Chamberlain	Brooklyn Coll Sp09	DREU 2007-8: Game2Learn
65. *Drew Hicks	Marietta Coll Sp09	REU 2008: Game2Learn
66. Henry Van Eseltine	UNCC Sp09	Sr Proj 08-09: Game2Learn
67. Joshua Darnell	UNCC Sp09	Sr Proj 08-9, REU09: Dance Tool
68. *Lane Harrison	UNCC Sp09	Sr Proj 08-9: cMotion game
69. *Shana Collins	JCSU Sp08	McNair 2006-7: Ed. Data Mining
70. *Laura Hassey	UNCC Sp08	STARS REU07-8: Evaluation
71. Abigail Corfman	Oberlin Sp08	REU07: G2L Logo Game
72. Taylor Dubois	Penn State Sp08	REU 07: G2L Bunny Arrayser
73. *Michael Eagle	UNCC Fa07	REU07/ Sr. Proj: G2L Wu's Castle

- **First place, ACM SRC, Tapia 2007**

- **NSF Honorable Mention, now at NCSU**

74. *Eve Powell	UNCC Sp07	REU06/ Sr. Proj: G2L Saving Sera
75. Dimitris Couchell	UNCC Fa07	Sr Proj 2007: G2L Unreal Dev.
76. Tiffany Ralph	Colorado State Sp07	DREU 2006: G2L, works @ Google
77. Paige Matthews	Wofford Sp07	DREU 2006: Game2Learn
78. Hyun Jordan	Lynchburg Coll Sp07	DREU 2006: G2L
79. *Casey Paver	UNCC Fa06	Sr Proj/Ind.Study 05-6: G2L in Flash
80. *Alex Godwin	UNCC Fa06	REU06/ Sr. Proj: MMO weather
81. *Amanda Chaffin	UNCC Sp06	REU06/ Sr. Proj: G2L Catacombs
82. Brian Ingles	UNCC Sp06	Sr Proj 05-06: Building Java Games
83. David Markham	UNCC Sp06	Sr Proj 05-06: Game2Learn
84. Nathaniel Watson	UNCC Sp06	Sr Proj 05-06: Game2Learn
85. *Rachael Dwight	UNCC Fa05	Sr Proj 05-06: Coding in DLLs
86. Carson Black	UNCC Sp05	Sr Proj 04-05: Director's Assistant
87. Daniel Curtis	UNCC Sp05	Sr Proj 04-05: Director's Assistant

### **Student Organizations @ NC State**

Faculty Advisor, International Game Developers Association (2012-Present)

Faculty Advisor, STARS Alliance Student Organization (2012-Present)

### **Student Organizations @ UNC Charlotte**

Faculty Advisor, 49er Social and Ballroom Dance Club (2005-2012)

Faculty Advisor, ACM-Women (2007-2012)

Faculty Advisor, Gamer's Alliance (2006-2012)

**Graduate Committees (Total: 15 @ NC State, 9 while @ UNC Charlotte).**

1. Brittany Johnson, Ph.D. Committee, Spring 2016
2. Chen Lin, Ph.D. Written Qualifying Committee, Spring 2016
3. Adam Amos-Binks, Ph.D. Written Qualifying Committee, Fall 2015
4. Russell Meredith, Ph.D. Written Qualifying Committee, Fall 2015
5. Philip Buffum, Ph.D. Written Qualifying Committee, Spring 2015
6. Fernando Rodriguez, Ph.D. Written Qualifying Committee, Fall 2014
7. Ignacio Dominguez, Ph.D. Written Qualifying Committee, Summer 2014
8. Justus Robertson, Ph.D. Written Qualifying Committee, Spring 2014
9. Lihua Hao, Ph.D. Written Qualifying Committee, Spring 2013
10. Joseph Grafsgaard, Ph.D. Committee, 2013
11. Jennifer Sabourin, Ph.D. Committee, 2013
12. Aysu Ezen, Ph.D. Committee, Fall 2014; Ph.D. Written Qualifying Committee, 2013
13. Julio Bahamon, Ph.D. Written Qualifying Committee, 2013
14. Kristy Boyer, Ph.D. Committee 2010 (External member while faculty at UNC Charlotte)
15. Lalit Ponnala, Ph.D. Committee 2007 (External member while faculty at UNC Charlotte)

**PhD Committees at UNC Charlotte, Total: 7**

1. Pamela Thompson, 2012
2. Fritz Heckel, 2011
3. Hunter Hale, 2011
4. Wenxin Jiang, 2009
5. Rory Lewis, 2008
6. Cathy Zambaka, 2007
7. Sabarish Babu, 2007

**Masters Thesis at UNC Charlotte, Total: 2**

8. Priyesh Dixit, 2008
9. Kalpani Tiwani, 2005

**C. MASTERS AND DOCTORAL THESES DIRECTED**

**Table 5. Summary of Post-Doc and Graduate Student Advising and Mentoring.**

Post-Docs Previously Supervised	2 NCSU, 1 UNCC
PhD Students Graduated @ NC State	2

PhD Students Currently Advised	7
PhD Students Graduated @ UNC Charlotte	4
MS Students Graduated @ NC State	1
MS Students Graduated @ UNC Charlotte	16
MS Students Currently Advised	2

## Graduate Advisee Awards and Honors

### NCSU

Acey Boyce

- 2013 selected for first PhD internship program at Turbine Games
- 2010 National Science Foundation Graduate Research Honorable Mention
- 2009-2012 Graduate Assistantships in Areas of National Need (GAANN) Scholarship

Veronica Catete

- 2012-2013 Microsoft Research Graduate Women's Scholarship
- 2012-2016 National Science Foundation Graduate Research Fellowship

Andrew Hicks

- 2011-2015 National Science Foundation Graduate Research Fellowship
- 2009-2012 Graduate Assistantships in Areas of National Need (GAANN) Scholarship

Michael Eagle

- 2013 selected for first PhD internship program at Turbine Games
- 2008 National Science Foundation Graduate Research Honorable Mention
- 2008-2012 Graduate Assistantships in Areas of National Need (GAANN) Scholarship
- 2010 NSF EAPSI Fellowship to study in Japan for 6 weeks
- ACM FDG 2009 Doctoral Consortium Scholarship
- 2007 Tapia ACM Undergraduate Student Research Competition 1<sup>st</sup> Place Winner

Alexandra Milliken

- 2015 National Science Foundation Graduate Research Honorable Mention

Thomas Price

- 2015 National Science Foundation Graduate Research Honorable Mention

### UNC Charlotte

Matthew Johnson

- First foreign national hired at Square Enix Japan, started June 2013

Andrea Nickel

- 2008-2013 Graduate Assistantships in Areas of National Need Scholarship

Amanda Chaffin

- 2008-2013 Graduate Assistantships in Areas of National Need Scholarship

## Post-Docs Supervised (Total: 3)

Wanda Eugene (June 2012-Jan 2013)

Jennifer Albert (Jan 2014-Aug 2015)

Collin Lynch (Mar 2014-Aug 2015)

**Current Ph.D. Advising (Total: 7)**

**NC State**

1. Veronica Catete
2. Christa Cody
3. Yihuan Dong
4. Aurora Liu
5. Alexandra Milliken
6. Thomas Price
7. Rui Zhi

**Current M.S. Advising (Total: 1)**

1. Mehak Maniktala, Fall 2016, Modeling Social Interactions in Discrete Math

**PhD Students Graduated at NC State (Total: 4)**

1. Andrew Hicks, December 2016, Dissertation: **Improving Quality of User-Authored Puzzles In A Programming Game.**; Hired at IBM Watson; NSF Graduate Research Fellow.
2. Behrooz Mostafavi, August 2016, **Dissertation: Improving Individualized Instruction in a Logic Tutor using Data-driven Methods.**
3. Michael Eagle, December 2015, Dissertation: **Data-Driven Methods for Deriving Insight from Educational Problem Solving Environments**; Hired at Carnegie Mellon as a Postdoctoral Researcher; NSF Graduate Research Honorable Mention
4. Acey Boyce, December 2014, Dissertation: **Deep Gamification: Combining Game-based and Play-based Methods.**  
Hired at Turbine Games as Games Analyst  
NSF Graduate Research Honorable Mention

**PhD Students Graduated at UNC Charlotte (Total: 4)**

1. John Stamper, May 2010, Dissertation: **Automatic generation of intelligent tutoring capabilities via educational data mining**  
Hired at Carnegie Mellon as an Assistant Professor, August 2015  
Hired at Carnegie Mellon as a System Scientist, August 2009  
2007 AIED, 2006 AAAI Doctoral Consortia  
2007 NSF EAPSI Fellow for study in Korea
2. Eve Powell, August 2012, Dissertation: **A framework for the design and analysis of socially pervasive games**  
Started own games company Verge of Brilliance, summer 2015  
Hired at Microsoft Xbox as a Program Manager, August 2012  
2008 NSF Graduate Research Fellow

2007 GAANN Fellow, 2007 CCI Essam El-Kwae UG Research Award

3. Matthew Johnson, December 2013, Dissertation: **Visualizing interaction networks for educational software**  
Hired at Square Enix, Japan, June 2013
4. Andrea Nickel, December 2013, Dissertation: **Designing Better Exergames: Application of Flow Concepts and the FITT Principle to Full Body Exertion Games and Flexible Challenge Systems**

### M.S. Students Graduated @ NC State (Total: 3)

1. Adithya Seshadri, Spring 2016, Modeling Social Interactions in Discrete Math
2. Vikas Pidempally
3. Vinay Sheshadri
4. Stephen Schroeder, 2013-2014, Deep Thought & Lebanese Games

### MS Students Graduated @ UNC Charlotte (\*=received PhD in CS)<sup>6</sup>

- Amanda Chaffin (2009)
  - **Thesis:** Game2Learn: Building a compiler into a game engine to increase learning gains in computer science students
  - **2009 GAANN Fellow**
- Katelyn Doran S12 Greener Challenge, Citizen Schools Game Curriculum
  - **2010-2013 NASA Graduate Student Research Project Fellow**
  - **2012 NSF Graduate Research Honorable Mention, MS 2012**
- Dustin Culler S12 CSDT Community games, Greener Challenge
- Leena Joseph S11 Educational Data Mining
- Antoine Campbell S12 CSDT Community games, Greener Challenge
- Rachel Brinkman S12 Educational Data Mining and Games
- Laura Hassey F09 STARS Alliance Evaluation
- Sandhya Charugulla F09 CSDT Dance Tool Game Development
- Su Hyung Cho S09 CSDT Dance Tool Game Development
- Isaac Moore S06 Coding In-Game Requirements Engineering
- Johnny Hopkins F05 Networking for Game2Learn
- \*Ted Carmichael S05 Intelligent Tutoring for Nurse Training
- Rath. Ramanujam S05 The Q-Matrix Method for Face Recognition
- Rath. Ramanujam F04 Modeling Protein Translation in Prokaryotes

### III. SCHOLARSHIP IN THE REALMS OF FACULTY RESPONSIBILITY

#### A. PUBLICATIONS

**Authorship Policy:** Since 2005 it has been the policy of Barnes's laboratory for Barnes to appear as the final author for publications co-authored with her graduate and undergraduate students unless publication stemmed from an invitation extended to Barnes or publication presents a summary of her research group's work. Author names are italicized if the publication was written while that author was a student.

#### Magazine & Editor-Reviewed Articles (Total: 4 new)

- M1. Tiffany Barnes (2015). Broadening Participation gets RESPECT *ACM SIGCSE Bulletin* 47(3), pp. 8-8, July 2015.
- M2. Tiffany Barnes, Oliver Bown, Michael Buro, Michael Cook, Arne Eigenfeldt, Héctor Muñoz-Avila, Santiago Ontañón, Philippe Pasquier, Noriko Tomuro, R Michael Young, Alexander Zook (2015) Reports of the Workshops Held at the Tenth AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment *AI Magazine*, 36(1), pp. 99-102, March 2015.
- M3. Lisa Kaczmarczyk, Tiffany Barnes (2015) SIGCSE BP: Enrollments and Diversity at Odds? *ACM SIGCSE Bulletin* 47(2), pp. 8-8, May 2015.
- M4. Garcia, Dan, Brian Harvey, and Tiffany Barnes. "The beauty and joy of computing." *ACM Inroads* 6, no. 4 (2015): 71-79.

#### Peer-Reviewed Journal Articles (Total: 17; 2 new)

- J1. Payton, J., Barnes, T., Buch, K., Rorrer, A., Zuo, H., Nagel, K., Napier, N., Randeree, E., & Dennis, L. (2016). STARS Computing Corps: Enhancing Engagement of Underrepresented Students and Building Community in Computing, In *Best of RESPECT, Part 2. Computing in Science & Engineering*, 18(3).
- J2. Mostafavi, B. & T. Barnes. (2016). Evolution of an Intelligent Deductive Logic Tutor using Data-Driven Elements. *International Journal of Artificial Intelligence in Education*, 2016: pp 1—32.
- J3. Payton, J., Barnes, T., Buch, K., Rorrer, A., & Zuo, H. (2015). The effects of integrating service learning into computer science: an inter-institutional longitudinal study. *Computer Science Education*, 25(3), 311-324.
- J4. Richard Burns, Wanda Eugene, Tiffany Barnes, Stephen Chandler, Megan Harwell, Osarieme Omokaro. (2014). Reflections from a computational service learning trip to Haiti. *The Journal of Computing Sciences in Colleges*, 29(3), pp. 43-50, January 2014.
- J5. Karen Bean, Kim Buch, Teresa Dahlberg, Tiffany Barnes, Audrey Rorrer Cagley. (2014). An Innovative Partnership between National and Regional Partnerships: STARS Meets McPIE. *Prism*, Vol. 3 (2014), Iss. 2. Available online at: <http://encompass.eku.edu/prism/>
- J6. John Stamper, Michael Eagle, Tiffany Barnes, and Marvin Croy. 2013. Experimental Evaluation of Automatic Hint Generation for a Logic Tutor. *Intl. Journal on AI in Education (IJAIED)*, Volume 22(1-2): 3-17 (2013). IOS Press.<sup>7</sup>

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7 A peer-reviewed, invited extension of AIED 2011 Best paper nominee conference paper

- J7. Sabarish V. Babu, Evan Suma, Larry F. Hodges and Tiffany Barnes. 2011. Learning Cultural Conversational Protocols with Immersive Interactive Virtual Humans. *The International Journal of Virtual Reality*, 2011, 10(4): 25-35.
- J8. John Stamper, Tiffany Barnes, and Marvin Croy. 2011. Enhancing the Automatic Generation of Hints with Expert Seeding. *International Journal of Artificial Intelligence in Education*, Special Issue “Best of ITS”, 2011. IOS Press.<sup>8</sup>
- J9. Samantha L. Finkelstein, Andrea Nickel, Zachary Lipps, Tiffany Barnes, Zachary Wartell, and Evan A. Suma. 2011. Astrojumper: Motivating Exercise with an Immersive Virtual Reality Exergame. *Presence* 20(1): 78-92 (2011).
- J10. Teresa Dahlberg, Tiffany Barnes, Kim Buch, and Audrey Rorrer. 2011. The STARS Alliance: viable strategies for attracting, retaining, supporting, and developing underrepresented students in computing. *ACM Transactions on Computing Education TOCE* 11(3): 18 (2011).
- J11. Teresa Dahlberg, Tiffany Barnes, Karen Bean, and Kim Buch. 2010. Engaging Under-represented Computer Science Students in Service: An Innovative Course and Case Study Findings. *Computer Science Education*, volume 20 (issue 3), September 2010, pp. 169-180.
- J12. Tiffany Barnes and John Stamper. 2010. Automatic hint generation for logic proof tutoring using historical data. *Journal of Educational Technology & Society*, Vol. 13, Issue: 1- *Special issue on Intelligent Tutoring Systems*, pp. 3-12.<sup>9</sup>
- J13. Tiffany Barnes, Teresa Dahlberg, Kim Buch, and Karen Bean. 2009. The STARS Leadership Corps: An innovative computer science learning community. *Learning Communities Journal*, 1, 5-18.
- J14. Kera Bell-Watkins, Tiffany Barnes, and Nathan Thomas. 2009. Developing computing identity as a model for prioritizing dynamic K-12 computing curricular standards. *J. Comput. Small Coll.* 24, 3 (January 2009), 125-131.
- J15. Sarah B. Berenson, Maria Droujkova, Laurie Cavey, Nancy Smith, and Tiffany Barnes. 2000. Girls on Track with information technology. *Meridian*, 3 (1), Winter 2000. [<http://www.ncsu.edu/meridian/2000wint/math/index.html>].
- J16. Tiffany Barnes and Carla D. Savage. 1997. Efficient generation of graphical partitions. *Discrete Applied Mathematics*, 78 (1997). p 17-26.
- J17. Tiffany Barnes and Carla D. Savage. 1995. A recurrence for counting graphical partitions. *Electronic Journal of Combinatorics*. Volume 2, R11. 1995.

### **Refereed Book Chapters (Total: 6; (1 new))**

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of same title.

8 A peer-reviewed, invited extension of ITS 2010 Best paper nominee conference paper of same title.

9 A peer-reviewed, invited extension of ITS2008 Best Paper nominee conference paper of same title.

- BC1. Eagle, M., B. Mostafavi, and T. Barnes (2016). Data-driven Domain Models for Problem Solving. Accepted to appear in: *Design Recommendations for Intelligent Tutoring Systems: Domain Modeling (Volume 4)*.
- BC2. Barnes, T. & J. Stamper. (2011). Using Markov decision processes for student problem-solving visualization and automatic hint generation. *Handbook on Educational Data Mining*. CRC Press.
- BC3. Barnes, T. (2011). Novel derivation and application of skill matrices: The q-matrix method. *Handbook on Educational Data Mining*. CRC Press.
- BC4. Croy, M., T. Barnes, J. Stamper. (2007). Towards an Intelligent Tutoring System for propositional proof construction. In Philip Brey, Adam Briggie and Katinka Waelbers (eds.), *Proceedings of the 2007 European Computing And Philosophy Conference*, Amsterdam, Netherlands: IOS Publishers. (30 presenters invited to submit full papers; 76 abstracts presented).
- BC5. Barnes, T., S.B. Berenson, M. Vouk. (2006). On participation of women in information technology, In: Trauth, E. (Ed.). *Encyclopedia of Gender and Information Technology*. Idea Group Publishing.
- BC6. Barnes, T., S.B. Berenson, M. Vouk. (2006). Young women and persistence in information technology, In: Trauth, E. (Ed.). *Encyclopedia of Gender and Information Technology*. Idea Group Publishing.

#### Refereed Conference Publications (Total: 90 (17 new))

- CP1. Thomas Price, N.C.C. Brown, Dragon Lipovac, Tiffany Barnes and Michael Kölling. (2016). Evaluation of a Frame-based Programming Editor *Computing Education Research Conference (ICER2016)*, Australia.
- CP2. Behrooz Mostafavi and Tiffany Barnes. Exploring the Impact of Data-driven Tutoring Methods on Students' Demonstrative Knowledge in Logic Problem Solving. *Educational Data Mining (EDM'16)*, Raleigh, NC, 2016: 460-465. (Short paper, acceptance rate 52%, 51/154 papers)
- CP3. Elizabeth Rowe, Jodi Asbell-Clarke, Michael Eagle, Andrew Hicks, Tiffany Barnes, Rebecca Brown and Teon Edwards. Validating Game-based Measures of Implicit Science Learning. *Educational Data Mining (EDM'16)*, Raleigh, NC, 2016: 490-495. (Short paper, acceptance rate 52%, 51/154 papers)
- CP4. Zhongxiu Liu, Rebecca Brown, Collin Lynch, Tiffany Barnes, Ryan Baker, Yoav Bergner and Danielle Mcnamara. MOOC Learner Behaviors by Country and Culture; an Exploratory Analysis. *Educational Data Mining (EDM'16)*, Raleigh, NC, 2016: 127-134. (Full paper, acceptance rate 27.5%, 30/109 papers)
- CP5. Andrew Hicks, Zhongxiu Liu and Tiffany Barnes. Measuring Gameplay Affordances of User-Generated Content in an Educational Game. *Educational Data Mining (EDM'16)*, Raleigh, NC, 2016: 78-85. (Exemplary paper, acceptance rate 15%, 16/109 papers) **BEST PAPER NOMINEE**
- CP6. Thomas Price, Yihuan Dong and Tiffany Barnes. Generating Data-driven Hints for Open-ended Programming. *Educational Data Mining (EDM'16)*, Raleigh, NC, 2016. Raleigh, NC, USA: 191-198. (Exemplary paper, acceptance rate 15%, 16/109 papers)
- CP7. Veronica Catete, Erin Snider, and Tiffany Barnes. (2016). Developing a Rubric for a Creative CS Principles Lab. In *Proceedings of the ACM Conference on Innovation and Technology in Computer Science Education (ITiCSE)*. Lima, Peru. **BEST PAPER**



**NOMINEE**

- CP8. Andrew Hicks, Michael Eagle, Elizabeth Rowe, Jodi Asbell-Clarke, Teon Edwards, and Tiffany Barnes. (2016). Using Game Analytics to Evaluate Puzzle Design and Level Progression in a Serious Game. *International Conference on Learning Analytics & Knowledge (LAK2016)*. Edinburg, UK: 440-448.
- CP9. Mostafavi, Behrooz and Tiffany Barnes. Data-driven Proficiency Profiling – Proof of Concept. In *International Conference on Learning Analytics & Knowledge (LAK2016)*. Edinburg, UK: 324-328. (short paper).
- CP10. Thomas W. Price, Veronica Cateté, Jennifer Albert, Tiffany Barnes, and Daniel D. Garcia. 2016. Lessons Learned from "BJC" CS Principles Professional Development. In *Proc. 47th ACM Technical Symposium on Computing Science Education (SIGCSE '16)*. ACM, New York, NY, USA, 467-472.
- CP11. Payton, Jamie, Tiffany Barnes, Kim Buch, Audrey Rorrer, and Huifang Zuo. STARS computing corps: Enhancing engagement of women and underrepresented students in computing. In *Research in Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT'15)*, pp. 1-6. IEEE, 2015.
- CP12. Michael Eagle, E. Rowe, Rebecca Brown, J. Asbell-Clarke, Andrew Hicks, Tiffany Barnes and T. Edwards. (2015). Visualization of Play: Graph-based analytics for measuring implicit science learning. In *Proceedings of the 2nd ACM SIGCHI annual symposium on Computer-human interaction in play (CHI PLAY '15)*. (short paper)
- CP13. Michael Eagle, Elizabeth Rowe, Drew Hicks, Rebecca Brown, Tiffany Barnes, Jodi Asbell-Clarke, and Teon Edwards. 2015. Measuring Implicit Science Learning with Networks of Player-Game Interactions. In *Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play (CHI PLAY '15)*. ACM, New York, NY, USA, 499-504. DOI=<http://dx.doi.org/10.1145/2793107.2810330>
- CP14. Price, T. W., Albert, J., Catete, V., & Barnes, T. (2015, August). BJC in action: Comparison of student perceptions of a computer science principles course. In *Research in Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT)*, 2015 (pp. 1-4). IEEE.
- CP15. Andrew Hicks, Veronica Catete, Rui Zhi, Yihuan Dong, and Tiffany Barnes. (2015) Applying Deep Gamification Principles to Improve Quality of User-Designed Levels. *11th Annual Games+Learning+Society Conference (GLS 15)*.
- CP16. Thomas W. Price and Tiffany Barnes. 2015. Comparing Textual and Block Interfaces in a Novice Programming Environment. In *Proceedings of the eleventh annual International Conference on International Computing Education Research (ICER '15)*. ACM, New York, NY, USA, 91-99. DOI=<http://dx.doi.org/10.1145/2787622.2787712>
- CP17. Guojing Zhou, Thomas Price, Collin Lynch, and Tiffany Barnes, Min Chi. (2015) The Impact of Granularity on Worked Examples and Problem Solving. *Proceedings of the 37th Annual Meeting of the Cognitive Science Society, CogSci 2015*, Pasadena, California, USA, July 22-25, 2015.
- CP18. Liu, Z., Mostafavi, B., Barnes, T. (2016). Combining Worked Examples and Problem Solving in a Data-driven Logic Tutor. In *Proceedings of the 13th International Conference on Intelligent Tutoring Systems*. Zagreb, Croatia.
- CP19. Eagle, M., Hicks, D., & Barnes, T. Interaction Network Estimation: Predicting Problem-Solving Diversity in Interactive Environments. In *Proceedings of the 8th*

*International Conference on Educational Data Mining (EDM 2015)*, pp. 342-349. Madrid, Spain. 2015.

- CP20. Price, T. W., Lynch, C. F., Barnes, T., & Chi, M. An Improved Data-Driven Hint Selection Algorithm for Probability Tutors. In *Proceedings of the 8th International Conference on Educational Data Mining (EDM 2015)*, pp. 335-341. Madrid, Spain. 2015.
- CP21. Mostafavi, Behrooz, Zhongxiu Liu, and Tiffany Barnes. Data-driven Proficiency Profiling. In *Proceedings of the 8th International Conference on Educational Data Mining (EDM 2015)*, pp. 335-341. Madrid, Spain. 2015.
- CP22. Crossley, S., Danielle, S., Baker, R., Wang, Y., Paquette, L., Barnes, T., & Bergner, Y. Language to Completion: Success in an Educational Data Mining Massive Open Online Class. In *Proceedings of the 8th International Conference on Educational Data Mining (EDM 2015)*, pp. 388-391. Madrid, Spain. 2015.
- CP23. Eagle, Michael, and Tiffany Barnes. Exploring Missing Behaviors with Region-Level Interaction Network Coverage. In *Artificial Intelligence in Education: Proceedings of the 17th International Conference, AIED 2015*, Madrid, Spain, June 22-26, 2015, pp. 831-835. Springer International Publishing, 2015.
- CP24. Eagle, M., Hicks, D., Peddycord III, B., & Barnes, T. (2015, March). Exploring networks of problem-solving interactions. In *Proceedings of the Fifth International Conference on Learning Analytics And Knowledge (LAK'15)*: (pp. 21-30). ACM.
- CP25. Mostafavi, Behrooz, Michael Eagle, and Tiffany Barnes. Towards data-driven mastery learning. In *Proceedings of the Fifth International Conference on Learning Analytics And Knowledge (LAK'15)*, pp. 270-274. ACM, 2015.
- CP26. Michael Eagle, Vinaya Polamreddi, Behrooz Mostafavi, and Tiffany Barnes. (2014). Exploration of student's use of rule application references in a propositional logic tutor. *Educational Data Mining (EDM2014)*, London, UK, pp. 249-252. (short paper)
- CP27. Barry Peddycord III, Andrew Hicks, and Tiffany Barnes. (2014). Generating hints for programming problems using intermediate output. *Educational Data Mining (EDM2014)*, London, UK, pp. 92-98. (Full paper, Acceptance rate: 17%)
- CP28. Michael Eagle, Tiffany Barnes (2014). Exploring differences in problem solving with data-driven approach maps. *Educational Data Mining (EDM2014)*, London, UK, pp. 76-83. (Full paper, Acceptance rate: 17%)
- CP29. Michael Eagle, Tiffany Barnes (2014). Survival analysis on duration data in intelligent tutors. *Intelligent Tutoring Systems (ITS2014)*, Honolulu, Hawaii, June 2014, pp. 178-187. (Acceptance rate: 31/177: 17.5%)
- CP30. Andrew Hicks, Barry Peddycord III, and Tiffany Barnes. (2014). Building games to learn from their players: Generating hints in a serious game. *Intelligent Tutoring Systems (ITS2014)*: 312-317. (short paper)
- CP31. Drew Hicks, Veronica Cateté, Tiffany Barnes. (2014). Part of the game: Changing level creation to identify and filter low quality user-generated levels. *Foundations of Digital Games (FDG2014)*, Fort Lauderdale, FL, April 3-7, 2014. (full paper, 38/86, 44% acceptance rate)
- CP32. Andrea Nickel, Tiffany Barnes, Jamie Payton, Erik Wikstrom. (2014). Balancing Physical and Cognitive Challenge: A study of players psychological responses to exergame play. *Foundations of Digital Games*, Fort Lauderdale, FL, April 3-7, 2014. (exemplary paper, 14/86, 16% acceptance rate)

- CP33. Veronica Cateté, Katherine Wassell, Tiffany Barnes. (2014). Use and Development of Entertainment Technologies in After School STEM Program. In Proceedings of the ACM Technical Symposium on Computer Science Education (SIGCSE 2014): 163-168.
- CP34. Matthew Johnson, Michael Eagle, Tiffany Barnes(2013). InVis: An Interactive Visualization Tool for Exploring Interaction Networks. *Educational Data Mining (EDM 2013)*: pp. 82-89.
- CP35. Matthew Johnson, Michael Eagle, Tiffany Barnes, John Stamper (2013). An Algorithm for Reducing the Complexity of Interaction Networks. *Educational Data Mining (EDM 2013)*: pp. 248-251.
- CP36. Michael Eagle, Tiffany Barnes. (2013). Interaction Network Clustering to Evaluate Between-Group Differences in Problem Solving Environments. *Educational Data Mining (EDM 2013)*, Memphis, TN, July 2013.
- CP37. Wanda Eugene, Shaudra Daily, Richard Burns, and Tiffany Barnes 2013. Building Technology Fluency: Fostering Agents of Change. In 120th ASEE Conference (ASEE 2013), Atlanta, GA, June 23-26, 2013.
- CP38. Amy Shannon, Acey Boyce, Chitra Gadwal, Tiffany Barnes. 2013. Effective Practices in Game Tutorial Systems. In 8th ACM Foundations of Digital Games (FDG2013): 338-345. **BEST PAPER NOMINEE.**
- CP39. Michael Eagle, Matthew Johnson, Tiffany Barnes, and Acey Boyce. 2013. Exploring Player Behavior with Visual Analytics. 8<sup>th</sup> ACM Foundations of Digital Games 2013: pp. 380-383. Short paper.
- CP40. Michael Eagle, Matthew Johnson, Tiffany Barnes, and Acey Boyce. 2013. Exploring Player Behavior with Visual Analytics. 8<sup>th</sup> ACM Foundations of Digital Games 2013: pp. 380-383. (short paper).
- CP41. Andrea Nickel, Hugh Kinsey, Tiffany Barnes and Zachary Wartell. 2012. Supporting an Interval Training Program with the Astrojumper Video Game. In electronic proceedings of Meaningful Play 2012, East Lansing, MI, USA, Oct. 18-20, 2012.
- CP42. Acey Boyce, Antoine Campbell, Shaun Pickford, Dustin Culler, and Tiffany Barnes. 2012. Maximizing learning and guiding behavior in free play user generated content environments. In Proceedings of the 17th ACM annual conference on Innovation and technology in computer science education (ITiCSE '12). ACM, New York, NY, USA, 10-15.
- CP43. Katelyn Doran, Acey Boyce, Samantha Finkelstein, and Tiffany Barnes. 2012. Outreach for improved student performance: a game design and development curriculum. In Proceedings of the 17th ACM annual conference on Innovation and technology in computer science education (ITiCSE '12). ACM, New York, NY, USA, 209-214.
- CP44. Michael Eagle, Matt Johnson, and Tiffany Barnes. 2012. Interaction networks: generating high level hints based on network community clusterings. In Proceedings of the 5th international conference on Educational Data Mining (EDM '12). Chania, Greece, June 19-21, 2012, 164-167. (short paper)
- CP45. Michael John Eagle and Tiffany Barnes. 2012. Data-Driven method for assessing skill-opportunity recognition in open procedural problem solving environments. In *Proceedings of the 11th international conference on Intelligent Tutoring Systems (ITS'12)*, Stefano A. Cerri, William J. Clancy, Giorgos Papadourakis, and Kitty

- Panourgia (Eds.) Springer-Verlag, Berlin, Heidelberg, pp. 615-617. (Young Researcher Track paper)
- CP46. Lorrie Lehmann, Dale-Marie Wilson, and Tiffany Barnes. 2012. Using individualized feedback and guided instruction via a virtual human agent in an introductory computer programming course. In *Proceedings of the 11th international conference on Intelligent Tutoring Systems (ITS'12)*, Stefano A. Cerri, William J. Clancy, Giorgos Papadourakis, and Kitty Panourgia (Eds.) Springer-Verlag, Berlin, Heidelberg, pp. 612-614. (Young Researcher Track paper)
- CP47. Matt Johnson, Tomoko Okimoto, and Tiffany Barnes. 2012. Leveraging game design to promote effective user behavior of intelligent tutoring systems. In *Proceedings of the 11th international conference on Intelligent Tutoring Systems (ITS'12)*, Stefano A. Cerri, William J. Clancy, Giorgos Papadourakis, and Kitty Panourgia (Eds.) Springer-Verlag, Berlin, Heidelberg, 597-599.
- CP48. Wei Jin, Tiffany Barnes, John Stamper, Michael John Eagle, Mathew W. Johnson, and Lorrie Lehmann. 2012. Program representation for automatic hint generation for a data-driven novice programming tutor. In *Proceedings of the 11th international conference on Intelligent Tutoring Systems (ITS'12)*, Stefano A. Cerri, William J. Clancy, Giorgos Papadourakis, and Kitty Panourgia (Eds.) Springer-Verlag, Berlin, Heidelberg, 304-309.
- CP49. Evie Powell, Rachel Brinkman, Tiffany Barnes, and Veronica Cateté. 2012. Table tilt: making friends fast. In *Proceedings of the International Conference on the Foundations of Digital Games (FDG '12)*. ACM, New York, NY, USA, 242-245.
- CP50. Michael John Eagle and Tiffany Barnes. 2012. A learning objective focused methodology for the design and evaluation of game-based tutors. In *Proceedings of the 43rd ACM technical symposium on Computer Science Education (SIGCSE '12)*. ACM, New York, NY, USA, 99-104.
- CP51. Eve Powell, Felesia Stukes, Tiffany Barnes, and Heather Lipford. 2011. Snag'em: Creating and Monitoring Strong Community Connections through Games. In *Proceedings of the Third International Conference on Social Computing (SocialCom '11)*, Boston, MA, Oct. 9-11, 2011, 591-593.
- CP52. Behrooz Mostafavi, Tiffany Barnes and Marvin Croy. 2011. Automatic Generation of Proof Problems in Deductive Logic. In *Proceedings of the 4th International Conference on Educational Data Mining (EDM '11)*. Eindhoven, Netherlands, July 6-8, 2011, 289-294. (short paper)
- CP53. John C. Stamper, Michael Eagle, Tiffany Barnes, and Marvin Croy. 2011. Experimental evaluation of automatic hint generation for a logic tutor. In *Proceedings of the 15th international conference on Artificial Intelligence in Education (AIED'11)*, Gautam Biswas, Susan Bull, Judy Kay, and Antonija Mitrovic (Eds.). Springer-Verlag, Berlin, Heidelberg, 345-352. **Best paper nominee.**
- CP54. D. Scott McCrickard, DeMarcus Townsend, Woodrow W. Winchester III, Tiffany Barnes. 2011. Leveraging Card-Based Collaborative Activities as Culturally Situated Design Tools. In *Proceedings of the 2011 international conference on Human Computer Interactions (HCI'11)*, Orlando, FL, July 9-14, 2011, 232-236.
- CP55. Acey Boyce, Katelyn Doran, Antoine Campbell, Shaun Pickford, Dustin Culler, and Tiffany Barnes. 2011. BeadLoom Game: adding competitive, user generated, and social features to increase motivation. In *Proceedings of the 6th International Conference*

*on Foundations of Digital Games (FDG '11)*. ACM, New York, NY, USA, 139-146. (30% Acceptance rate)

- CP56. Acey Boyce, Antoine Campbell, Shaun Pickford, Dustin Culler, and Tiffany Barnes. 2011. Experimental evaluation of BeadLoom game: how adding game elements to an educational tool improves motivation and learning. In *Proceedings of the 16th annual joint conference on Innovation and technology in computer science education (ITiCSE '11)*. ACM, New York, NY, USA, 243-247. (39% Acceptance rate)
- CP57. Katelyn Doran, Shaun Pickford, Cory Austin, Tory Walker and Tiffany Barnes. 2010. World of Workout: Towards pervasive, intrinsically motivated, mobile exergaming. In *Proceedings of Meaningful Play 2010*, East Lansing, MI, USA, Oct. 21-23, 2010.
- CP58. Samantha L. Finkelstein, Eve Powell, Andrew Hicks, Katelyn Doran, Sandhya Rani Charugulla, and Tiffany Barnes. 2010. SNAG: using social networking games to increase student retention in computer science. In *Proceedings of the fifteenth annual conference on Innovation and technology in computer science education (ITiCSE '10)*. ACM, New York, NY, USA, 142-146.
- CP59. Evie M. Powell, Samantha Finkelstein, Andrew Hicks, Thomas Phifer, Sandhya Charugulla, Christie Thornton, Tiffany Barnes, and Teresa Dahlberg. 2010. SNAG: social networking games to facilitate interaction. In *CHI '10 Extended Abstracts on Human Factors in Computing Systems (CHI EA '10)*. ACM, New York, NY, USA, 4249-4254.
- CP60. Samantha Finkelstein, Andrea Nickel, Tiffany Barnes, and Evan A. Suma. 2010. Astrojumper: motivating children with autism to exercise using a VR game. In *CHI '10 Extended Abstracts on Human Factors in Computing Systems (CHI EA '10)*. ACM, New York, NY, USA, 4189-4194.
- CP61. Amanda Chaffin and Tiffany Barnes. 2010. Lessons from a course on serious games research and prototyping. In *Proceedings of the Fifth International Conference on the Foundations of Digital Games (FDG '10)*. ACM, New York, NY, USA, 32-39. (34% acceptance rate, 32/94 full paper submissions)
- CP62. Acey Boyce and Tiffany Barnes. 2010. BeadLoom Game: using game elements to increase motivation and learning. In *Proceedings of the Fifth International Conference on the Foundations of Digital Games (FDG '10)*. ACM, New York, NY, USA, 25-31. (34% acceptance rate, 32/94 full paper submissions)
- CP63. Katelyn Doran, Acey Boyce, and Samantha Finkelstein. 2010. *Reaching out with game design*. In *Proceedings of the Fifth International Conference on the Foundations of Digital Games (FDG '10)*. ACM, New York, NY, USA, 250-251. (25% acceptance rate, 3/12 short paper submissions)
- CP64. John Stamper, Tiffany Barnes, and Marvin Croy. 2010. Enhancing the automatic generation of hints with expert seeding. In *Proceedings of the 10th international conference on Intelligent Tutoring Systems - Volume Part II (ITS'10)*, Vincent Aleven, Judy Kay, and Jack Mostow (Eds.), Vol. Part II. Springer-Verlag, Berlin, Heidelberg, 31-40. (30% acceptance rate) **Best Student Paper**
- CP65. \* Amanda Chaffin, Katelyn Doran, Drew Hicks, and Tiffany Barnes. 2009. Experimental evaluation of teaching recursion in a video game. In *Proceedings of the 2009 ACM SIGGRAPH Symposium on Video Games (Sandbox '09)*, Stephen N. Spencer (Ed.). ACM, New York, NY, USA, 79-86.

- CP66. John Stamper and Tiffany Barnes. 2009. Unsupervised MDP Value Selection for Automating ITS Capabilities. In *Proceedings of the 2nd International Conference on Educational Data Mining (EDM 2009)*, Cordoba, Spain, July 1-3, 2009, 180-189. (37% acceptance rate, 20/54 paper submissions)
- CP67. Michael Eagle and Tiffany Barnes. 2009. Evaluation of a game-based lab assignment. In *Proceedings of the 4th International Conference on Foundations of Digital Games (FDG '09)*. ACM, New York, NY, USA, 64-70. (19.6% acceptance rate, 9/46 paper submissions)
- CP68. \* Michael Eagle and Tiffany Barnes. 2009. Experimental evaluation of an educational game for improved learning in introductory computing. In *Proceedings of the 40th ACM technical symposium on Computer science education (SIGCSE '09)*. ACM, New York, NY, USA, 321-325. (Paper, 33% acceptance rate, 100/302 submissions)
- CP69. Teresa Dahlberg, Tiffany Barnes, Audrey Rorrer, Cheryl Seals, Mia Lustria, and Lois Hawkes. 2008. The STARS Leadership Corps: Case studies in broadening participation in computing. In *Proceedings of the 38th International Conference on Frontiers in Education (FIE'08)*, Saratoga Springs, NY, October 22-25, 2008.
- CP70. John C. Stamper and Tiffany Barnes. 2008. The validity of providing automated hints in an ITS using a MDP. In *Proceedings of the 23rd national conference on Artificial intelligence - Volume 3 (AAAI'08)*, Anthony Cohn (Ed.), Vol. 3. AAAI Press 1830-1831. (student paper)
- CP71. Michael Eagle and Tiffany Barnes. 2008. Wu's castle: teaching arrays and loops in a game. In *Proceedings of the 13th annual conference on Innovation and technology in computer science education (ITiCSE '08)*. ACM, New York, NY, USA, 245-249. (39% acceptance rate, 60/151 submissions)
- CP72. \* Tiffany Barnes and John Stamper. 2008. Toward Automatic Hint Generation for Logic Proof Tutoring Using Historical Student Data. In *Proceedings of the 9th international conference on Intelligent Tutoring Systems (ITS '08)*, Beverley P. Woolf, Esma Ameer, Roger Nkambou, and Susanne Lajoie (Eds.). Springer-Verlag, Berlin, Heidelberg, 373-382. **Best paper nominee.** (7 nominees) (32.6% acceptance rate, 61/187 submissions)
- CP73. John Stamper, Lorrie Lehmann, Marvin Croy, and Tiffany Barnes. 2008. A pilot study on logic proof tutoring using hints generated from historical student data. In *Proceedings of the 1st Annual International Conference on Educational Data Mining (EDM'08)*, Montreal, CA, June 20-21, 2008, 197-201.
- CP74. Tiffany Barnes, Eve Powell, Amanda Chaffin, and Heather Lipford. 2008. Game2Learn: improving the motivation of CS1 students. In *Proceedings of the 3rd international conference on Game development in computer science education (GDCSE '08)*. ACM, New York, NY, USA, 1-5. (25% acceptance rate; 15 of 60 submissions)
- CP75. Teresa Dahlberg, Tiffany Barnes, Audrey Rorrer, Eve Powell, and Lauren Cairco. 2008. Improving retention and graduate recruitment through immersive research experiences for undergraduates. In *Proceedings of the 39th SIGCSE technical symposium on Computer science education (SIGCSE '08)*. ACM, New York, NY, USA, 466-470.
- CP76. Teresa Dahlberg, Tiffany Barnes, and Audrey Rorrer. 2007. The STARS Leadership Model for Broadening Participation in Computing. In *Proceedings of the 37th International Conference on Frontiers in Education (FIE'07)*, Milwaukee, WI, Oct 10-13, 2007. (425 papers, workshops and panels accepted from 730. Full paper rate reported

as 50% but not confirmed online)

- CP77. John C. Stamper, Tiffany Barnes, and Marvin Croy. 2007. Extracting student models for intelligent tutoring systems. In *Proceedings of the 22nd national conference on Artificial intelligence - Volume 2 (AAAI'07)*, Anthony Cohn (Ed.), Vol. 2. AAAI Press 1900-1901. (student paper).
- CP78. Tiffany Barnes, Heather Richter, *Eve Powell, Amanda Chaffin, and Alex Godwin*. 2007. Game2Learn: building CS1 learning games for retention. In *Proceedings of the 12th annual SIGCSE conference on Innovation and technology in computer science education (ITiCSE '07)*. ACM, New York, NY, USA, 121-125. (30% acceptance rate)
- CP79. *Sabarish Babu, Evan Suma, Tiffany Barnes, and Larry Hodges*. 2007. Can immersive virtual humans teach social conversational protocols?. In *Proceedings of the 2007 conference on Virtual Reality (VR'07)*. IEEE, Charlotte, NC, March 10-14, 2007, 215-218. (acceptance rate: 27%)
- CP80. *Sabarish Babu, Stephen Schmugge, Tiffany Barnes, and Larry F. Hodges*. 2006. "What would you like to talk about?" an evaluation of social conversations with a virtual receptionist. In *Proceedings of the 6th international conference on Intelligent Virtual Agents (IVA'06)*, Jonathan Gratch, Michael Young, Ruth Aylett, Daniel Ballin, and Patrick Olivier (Eds.). Springer-Verlag, Berlin, Heidelberg, 169-180.
- CP81. Tiffany Barnes. 2006. Evaluation of the q-matrix method in understanding student logic proofs. In *Proceedings of the 19th International Conference of the Florida Artificial Intelligence Research Society (FLAIRS 2006)*, Melbourne Beach, FL, May 11-13, 2006.
- CP82. *Sabarish Babu, Stephen Schmugge, Raj Inugala, Srinivasa Rao, Tiffany Barnes, and Larry F. Hodges*. 2005. Marve: a prototype virtual human interface framework for studying human-virtual human interaction. In *Lecture Notes in Computer Science*, Themis Panayiotopoulos, Jonathan Gratch, Ruth Aylett, Daniel Ballin, Patrick Olivier, and Thomas Rist (Eds.). Springer-Verlag, London, UK, UK 120-133.
- CP83. Tiffany Barnes. 2005. Experimental analysis of the q-matrix method in automated knowledge assessment. In *Proceedings of the IASTED International Conference on Computers and Advanced Technology in Education (CATE 2005)*. August 29-31, 2005, Oranjestad, Aruba.
- CP84. Tiffany Barnes, Donald Bitzer, and Mladen Vouk. 2005. Experimental analysis of the q-matrix method in knowledge discovery. In *Proceedings of the 15th international conference on Foundations of Intelligent Systems (ISMIS'05)*, Mohand-Said Hacid, Neil V. Murray, Zbigniew W. Raś, and Shusaku Tsumoto (Eds.). Springer-Verlag, Berlin, Heidelberg, 603-611.
- CP85. *Lalit Ponnala, Tiffany Barnes, Donald Bitzer, and Mladen Vouk*. 2004. Ribosome tail ends as "signal detectors" for protein production in prokaryotes. In *Proceedings of the 2004 IEEE "Technology for Life" NC Symposium on Biotechnology & Bioinformatics 2004*, Oct. 13-15, Raleigh, NC, 15-23.
- CP86. *Lalit Ponnala, Tiffany Barnes, Donald Bitzer, and Mladen Vouk*. 2004. The search for the optimal 3' ribosome tail end in E. coli. In *Proceedings of the 26th Annual International IEEE Engineering in Medicine and Biology Conference (EMBC) 2004*, Sep. 1-5, 2004, San Francisco, CA.
- CP87. Donald Bitzer and *Tiffany Barnes*. 2002. Evaluation of the q-matrix method of fault tolerant knowledge assessment. In *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, & Higher Education 2002 (E-Learn '02)*,

Montreal, CA, Oct. 2002, 1167-1170. (Acceptance rate: 25-39%)

- CP88. *Tiffany Barnes* and Donald Bitzer. 2002. Fault tolerant teaching and automated knowledge assessment. In *Proceedings of the 40th Annual ACM Southeast Conference (ACMSE'02)*, Raleigh, NC, April 27, 2002, pp. 125-132.
- CP89. *Laurie Cavey & Tiffany Barnes*. 2001. Mathematics teachers on track with technology - Problem-based mathematics teacher preparation. In *Proceedings of the 12th International Conference of the Society for Information Technology & Teacher Education (SITE 2001)*, Orlando, FL, March 8, 2001, pp. 1343-1347.
- CP90. *Thomas A. Alspaugh, Annie I. Antón, Tiffany Barnes, and Bradford W. Mott*. 1999. An Integrated Scenario Management Strategy. In *Proceedings of the 4th IEEE International Symposium on Requirements Engineering (RE '99)*. IEEE Computer Society, Washington, DC, USA, 142-149.

### **Refereed Workshop Publications (Total: 20; 0 new since 7/1/2015)**

- W1. *Hicks, A., V. Catete, Rui Zhi, Y. Dong, and Tiffany Barnes*. BOTS: Selecting Next-Steps from Player Traces in a Puzzle Game. In *Proceedings of the Second International Workshop on Graph-Based Educational Data Mining (GEDM 2015)*. CEUR-WS. 2015.
- W2. *Brown, Rebecca, C. F. Lynch, Yuan Wang, Michael Eagle, Jennifer Albert, Tiffany Barnes, Ryan Baker, Y. Bernger, and Danielle McNamara*. Communities of performance & communities of preference. In *Proceedings of the Second International Workshop on Graph-Based Educational Data Mining (GEDM 2015)*. CEUR-WS. 2015.
- W3. *Price, Thomas W., and Tiffany Barnes*. An exploration of data-driven hint generation in an open-ended programming problem. In *Proceedings of the Second International Workshop on Graph-Based Educational Data Mining (GEDM 2015)*. CEUR-WS. 2015.
- W4. *Lynch, Collin, Thomas W. Price, Min Chi, and Tiffany Barnes*. Using the Hint Factory to Compare Model-Based Tutoring Systems. In *Proceedings of the Second International Workshop on Graph-Based Educational Data Mining (GEDM 2015)*. CEUR-WS. 2015.
- W5. *Justis Peters, Sagar Jauhari, and Tiffany Barnes*. (2014). Extracting temporal features using BCIPy. In *Proceedings of the Workshop on Utilizing EEG Input in Intelligent Tutoring Systems*, held at Intelligent Tutoring Systems (ITS2014). Honolulu, Hawaii, USA, June 5, 2014.
- W6. *Behrooz Mostafavi and Tiffany Barnes*. (2014). Evaluation of Logic Proof Problem Difficulty Through Student Performance Data. In: *EDM 2014 Extended Proceedings: Workshop Proceedings of the 7th International Conference on Educational Data Mining*. London, United Kingdom, June 4-7, 2014. Ed. by S. Gutierrez-Santos and O. C. Santos. CEUR-WS, 2014.
- W7. *V. Catete, A. Hicks, T. Barnes, and C. Lynch*. (2014). Snag'em: Graph Data Mining for a Social Networking Game. In: *EDM 2014 Extended Proceedings: Workshop Proceedings of the 7th International Conference on Educational Data Mining*. London, United Kingdom, June 4-7, 2014. Ed. by S. Gutierrez-Santos and O. C. Santos. CEUR-WS, 2014.
- W8. *V. Sheshadri, C. Lynch, and T. Barnes*. (2014). InVis: An EDM Tool for Graphical Rendering and Analysis of Student Interaction Data. In: *EDM 2014 Extended*



*Proceedings: Workshop Proceedings of the 7th International Conference on Educational Data Mining*. London, United Kingdom, June 4-7, 2014. Ed. by S. Gutierrez-Santos and O. C. Santos. CEUR-WS, 2014.

- W9. Samantha Finkelstein, Tiffany Barnes, Zachary Wartell and Evan Suma. 2013. Evaluation of the Exertion and Motivation Factors of a Virtual Reality Exercise Game for Children with Autism. Workshop on Virtual and Augmented Assistive Technology at IEEE Virtual Reality 2013.
- W10. Katelyn Doran, Acey Boyce, Andrew Hicks, Jamie Payton and Tiffany Barnes. 2012. Creation of a Game-Based Digital Layer for Increased Museum Engagement Among Digital Natives. *The 2nd International Workshop on Games and Software Engineering (GAS 2012) held at the International Conference on Software Engineer (ICSE 2012)*. Zurich, Switzerland, June 9, 2012.
- W11. Wei Jin, Lorrie Lehmann, Matt Johnson, Michael Eagle, Behrooz Mostafavi, Tiffany Barnes, and John Stamper. 2011. Towards Automatic Hint Generation for a Data-Driven Novice Programming Tutor. In *Proceedings of the KDD in ED Workshop at KDD 2011*.
- W12. Jamie Payton, Evie Powell, Andrea Nickel, Katelyn Doran, and Tiffany Barnes. 2011. GameChanger: a middleware for social exergames. In *Proceedings of the 1st International Workshop on Games and Software Engineering (GAS '11)*. ACM, New York, NY, USA, 36-39.
- W13. \* Tiffany Barnes, John Stamper. 2007. Toward the extraction of production rules for solving logic proofs. In *Proceedings of the 13th International Conference on Artificial Intelligence in Education, Educational Data Mining Workshop (AIED2007)*, Marina del Rey, CA, July 8, 2007.
- W14. \* Tiffany Barnes, John Stamper, and Tara Madhyastha. 2006. Comparative analysis of concept derivation using the q-matrix method and facets. In *Proceedings of the 21st National Conference on Artificial Intelligence Educational Data Mining Workshop (AAAI2006)*, Boston, MA, July 17, 2006.
- W15. Tiffany Barnes. 2005. The q-matrix method: Mining student response data for knowledge. In *Proceedings of the AAAI-2005 Workshop on Educational Data Mining*, July 9-13, 2005, Pittsburgh, PA. (Acceptance rate: 47%)
- W16. Lalit Ponnala, Tiffany Barnes, Donald Bitzer, Mladen Vouk, and A. Stomp. 2004. A signal-processing based model for analyzing programmed frameshifts. In *IEEE International Workshop of Genomic Signal Processing and Statistics*, May 22-24, 2004, New Port, RI.

**Refereed Conference Posters, Panels, Workshops, and Demo Abstracts in Conference Proceedings (Total: 44; 2 new since 7/1/2015)**

- A1. Tiffany Barnes, Ann Gates, Kim McLeod, Cheryl Seals, Sheila Castaneda, Mark Guzdial, Jamie Payton, Jeff Forbes, Richard Ladner, Beth Quinn (2015) Panel: BPC Fireside Chat *Research in Equity and Sustained Participation in Engineering, Computing and Technology (RESPECT 2015)*, Aug 2015.
- A2. Thomas Price, Veronica Catete, Jennifer Albert, and Tiffany Barnes.

(2015). Determining the impact of teacher professional development on perceived ability to teach a computer science principles course. In *Proceedings of the International Computing Education Research (ICER) Workshop, Omaha, Nebraska*. (poster)

- A3. Zhongxiu "Aurora" Liu and Tiffany Barnes. (2015) Building Compiler-Student Friendship. In *Proceedings of the 17th International Conference on Artificial Intelligence on Education*. Madrid, Spain, June 22nd-26th. (Doctorial Consortium)
- A4. Thomas Price and Tiffany Barnes. (2015) Creating Data-driven Feedback for Novices in Goal-driven Programming Projects. In *Proceedings of the International Conference on Artificial Intelligence in Education (AIED 2015)* (Doctoral Consortium)
- A5. Behrooz Mostafavi, Guojing Zhou, Collin Lynch, Min Chi, Tiffany Barnes (2015) Data-Driven Worked Examples Improve Retention and Completion in a Logic Tutor *Artificial Intelligence in Education (AIED 2015)* (poster)
- A6. Michael Eagle, Tiffany Barnes. Exploring Missing Behavior with Region-Level Interaction Network Coverage. *Artificial Intelligence in Education (AIED 2015)*, pp 831-835. (poster)
- A7. Eagle, Michael, Rebecca Brown, Tiffany Barnes, Elizabeth Rowe, Jodi Asbell-Clarke, and Teon Edwards. Exploring Problem-Solving Behavior in an Optics Game. In *Proceedings of the 8th International Conference on Educational Data Mining (EDM 2015)*, pp. 584-585. Madrid, Spain. 2015.
- A8. Rebecca Brown, Collin Lynch, Michael Eagle, Jennifer Albert, and Tiffany Barnes, Ryan Baker, Bergner, Y., & McNamara, D. (2015). Good communities and bad communities: Does membership affect performance? *Proceedings of the 8th International Conference on Educational Data Mining (EDM 2015)*, Madrid, Spain, 2015, 612-613. (poster)
- A9. Thomas Price, Collin Lynch, Tiffany Barnes and Min Chi. An Improved Data-Driven Hint Selection Algorithm for Probability Tutors. In *Proceedings of the 8th International Conference on Educational Data Mining (EDM 2015)*, pp. 610-611. Madrid, Spain. 2015.
- A10. Jennifer Albert, Barry Peddycord III, and Tiffany Barnes. (2015, March). Evaluating Scratch programs to assess computational thinking in a science lesson. In *Proceedings of the ACM Technical Symposium on Computer Science Education (SIGCSE)*, Kansas City, MO. (poster)
- A11. Tiffany Barnes, Veronica Catete, Andrew Hicks, and Barry Peddycord. 2014. Making games and apps in introductory computer science (abstract only). In *Proceedings of the 45th ACM technical symposium on Computer science education (SIGCSE 2014)*. ACM, New York, NY, USA, 739-739. DOI=10.1145/2538862.2539000.
- A12. Behrooz Mostafavi, Michael Eagle and Tiffany Barnes. (2014). Evaluation of a Problem Selection System for a Logic Proof Tutor. *Intelligent Tutoring Systems (ITS2014)*, Honolulu, Hawaii, June 2014.
- A13. Acey Boyce, Amy Shannon, Chitra Gadwal, Tiffany Barnes. 2013. BeadLoom Game. Game Festival @ ACM Foundations of Digital Games 2013 (FDG 2013), Chania, Greece, May 2013.
- A14. Michael Eagle, Tiffany Barnes. (2013). Evaluation of automatically generated hint feedback. *Educational Data Mining (EDM 2013)*: pp. 372-374. (Young Researcher Track paper).
- A15. Behrooz Mostafavi, Tiffany Barnes. (2013). Determining problem selection for a

logic proof tutor. *Educational Data Mining (EDM 2013)*: pp. 387-389. (Young Researcher Track paper).

- A16. Brian Harvey, Daniel D. Garcia, Tiffany Barnes, Nathaniel Titterton, Daniel Armendariz, Luke Segars, Eugene Lemon, Sean Morris, Josh Paley: SNAP! (build your own blocks) (abstract only). *SIGCSE 2013*: 759.
- A17. Daniel D. Garcia, Brian Harvey, Tiffany Barnes, Nathaniel Titterton, Daniel Armendariz, Luke Segars, Eugene Lemon, Sean Morris, Josh Paley: AP CS principles and the beauty and joy of computing curriculum (abstract only). *SIGCSE 2013*: 761.
- A18. Tiffany Barnes, Acey Kreisler Boyce, Veronica Catete, Katelyn Doran, Andrew Hicks, Leslie Keller: Augmenting introductory computer science classes with GameMaker and mobile apps (abstract only). *SIGCSE 2013*: 767.
- A19. Maybellin Burgos, Mykel Pendergrass, Andrea Nickel, Jamie Payton and Tiffany Barnes. 2012. Sweet Harvest: An Exergame for Increasing Flexibility and Warming Up for Intense Exercise. *Meaningful Play 2012*, East Lansing, Michigan, Oct. 18-20, 2012. Poster.
- A20. Andrea Nickel, Hugh Kinsey, Heidi Haack, Mykel Pendergrass, and Tiffany Barnes. 2012. Interval training with Astrojumper. *IEEE VR 2012*: 161-162. Poster.
- A21. Daniel D. Garcia, Brian Harvey, Tiffany Barnes, Luke Segars, Eugene Lemon, Sean Morris, Josh Paley: AP CS principles and the beauty and joy of computing curriculum (abstract only). *SIGCSE 2012*: 660.
- A22. Acey Boyce, Katie Doran, Antoine Campbell, Shaun Pickford, Dustin Culler, and Tiffany Barnes. 2011. Social User Generated Content's Effect on Creativity in Educational Games. (Poster) *ACM Creativity and Cognition*, Atlanta GA, Nov. 3-6, 2011, pp. 317-318.
- A23. Matthew W. Johnson. 2011. Defining solution boundaries for EDM Vis. In *Proceedings of the 15th international conference on Artificial intelligence in education (AIED'11)*, Gautam Biswas, Susan Bull, Judy Kay, and Antonija Mitrovic (Eds.). Springer-Verlag, Berlin, Heidelberg, 603-605.
- A24. Matt Johnson, Michael Eagle, Leena Joseph, and Tiffany Barnes. 2011. The EDM Vis Tool. *EDM 2011*: 349-350.
- A25. Owen L. Astrachan, Tiffany Barnes, Daniel D. Garcia, Jody Paul, Beth Simon, Larry Snyder: CS principles: piloting a new course at national scale. *SIGCSE 2011*: 397-398.
- A26. John C. Stamper, Tiffany Barnes, and Marvin J. Croy. 2010. Using a Bayesian knowledge base for hint selection on domain specific problems. In *Proceedings of the Third International Conference on Educational Data Mining (EDM '10)*. Pittsburgh, PA, USA, June 11-13, 2010. (poster)
- A27. Behrooz Mostafavi, Tiffany Barnes: Towards the Creation of a Data-Driven Programming Tutor. *Intelligent Tutoring Systems (2)* 2010: 239-241
- A28. Andrea Nickel and Tiffany Barnes. 2010. Games for CS education: computer-supported collaborative learning and multiplayer games. In *Proceedings of the 5<sup>th</sup> ACM*

*Intl. Conf. Foundations of Digital Games (FDG 2010)*. Monterey, CA, USA, June 19-21, 2010, pp. 274-276.

- A29. Matthew Johnson and Tiffany Barnes. 2010 EDM Visualization Tool: Watching Students Learn. *EDM 2010*: 297-298.
- A30. Matthew Johnson and Tiffany Barnes. 2010. Visualizing Educational Data from Logic Tutors. *Intelligent Tutoring Systems (2) 2010*: 233-235.
- A31. Reynold Bailey, Guy-Alain Amoussou, Tiffany Barnes, Hans-Peter Bischof, Thomas L. Naps: Relevant real-world undergraduate research problems: lessons from the nsf-reu trenches. *SIGCSE 2010*: 62-63.
- A32. John Stamper and Tiffany Barnes. 2009. Utility in hint generation: Selection of hints from a corpus of student work. In *Proceedings of the 2009 conference on Artificial Intelligence in Education: Building Learning Systems that Care: From Knowledge Representation to Affective Modelling*, Vania Dimitrova, Riichiro Mizoguchi, Benedict du Boulay, and Art Graesser (Eds.). IOS Press, Amsterdam, The Netherlands, The Netherlands, 749-751. (poster)
- A33. Ursula Wolz, Tiffany Barnes, Jessica Bayliss, and Jamie Cromack. 2009. Girls do like playing and creating games. In *Proceedings of the 40th ACM technical symposium on Computer science education (SIGCSE '09)*. ACM, New York, NY, USA, 199-200. (Panel, 55% acceptance rate, 11/20 submissions)
- A34. Tiffany Barnes, Teresa Dahlberg, and Karen Bean. 2009. Workshop: How to start a STARS Leadership Corps to improve retention and recruiting in computing. *Tapia Celebration of Diversity in Computing*, Portland, OR, Apr. 1-4, 2009.
- A35. Samantha Finkelstein, Andrea Nickel, Lane Harrison, Evan Suma, and Tiffany Barnes. 2009. cMotion: A New Game Design to Teach Emotion Recognition and Programming Logic to Children using Virtual Humans. *IEEE Virtual Reality*. Lafayette, LA. Mar. 14-18, 2009, pp. 267-268.
- A36. Barnes, T., D. Cliburn, B. Ladd. (2009). Workshop: Introduction to Game Development. *ACM SIGCSE 2009*, Chattanooga, TN, March 3-8, 2009.
- A37. Brian Ladd, Tiffany Barnes, and Dan Cliburn. 2009. Workshop: Advanced Game Courses in Computer Science: Getting Beyond Square One with Torque. *ACM SIGCSE 2009*, Chattanooga, TN, March 3-8, 2009.
- A38. Tiffany Barnes. 2009. BoF: Sustaining efforts to broaden participation in computing. *ACM SIGCSE 2009*, Chattanooga, TN, March 3-8, 2009.
- A39. Tiffany Barnes and Teresa Dahlberg. 2007. BoF: Evaluating Diversity Initiatives to Broadening Participation in Computing, *Tapia Celebration of Diversity in Computing*, Orlando, FL, Oct. 17-20, 2007.
- A40. Tiffany Barnes and Teresa Dahlberg. 2007. Innovation in Broadening Participation in Computing: STARS Leadership Corps, Panel at *Tapia Celebration of Diversity in Computing*, Orlando, FL, October 17-20, 2007.
- A41. Teresa Dahlberg, Tiffany Barnes, Kristy Boyer, Cheryl Seals, Mia Lustria, Andrea Lawrence, and Julie Strothman. 2007. Developing student leaders to invent the future,

Panel at *Grace Hopper Celebration of Women in Computing*, Orlando, FL, Oct. 14-17, 2007.

- A42. Ursula Wolz, Tiffany Barnes, Ian Parberry, and Michael Wick. 2006. Digital gaming as a vehicle for learning. In *Proceedings of the 37th SIGCSE technical symposium on Computer science education* (SIGCSE '06). ACM, New York, NY, USA, 394-395.
- A43. Tiffany Barnes and Teresa Dahlberg. 2006. The STARS Alliance: Experiences in Broadening Participation in Computing. *Grace Hopper Celebration*, San Diego, CA, Oct. 4-7, 2006.
- A44. Esteban Clua, Bruno Feijó, Jason Schwartz, Maria das Graças, Ken Perlin, Romero Tori, and Tiffany Barnes. 2006. Games and Interactivity in Computer Science Education. (Panel) *ACM SIGGRAPH 2006*, Boston, MA.
- A45. Ingles, B. (2006). The future of Java game development. *Proc. ACM Southeast Conference, (ACMSE 2006)*. Melbourne, FL. Mar. 10-12, 2006. (Undergraduate Advisee paper)

#### **Dissertation (Total: 1)**

- T. Barnes. The q-matrix method of fault-tolerant teaching in knowledge assessment and data mining, North Carolina State University, Raleigh, NC, 2003.

#### **Introductions to Edited Conference and Workshop Proceedings, Special Issues (Total: 4)**

- P1. Tiffany Barnes, L. Miguel Encarnação, Christopher D. Shaw: Serious Games. *IEEE Computer Graphics and Applications* 29(2): 18-19 (2009).
- P2. Tiffany Barnes, Michel C. Desmarais, Cristóbal Romero, Sebastián Ventura (Eds.): Educational Data Mining - EDM 2009, Cordoba, Spain, July 1-3, 2009. Proceedings of the 2nd International Conference on Educational Data Mining. [www.educationaldatamining.org](http://www.educationaldatamining.org) 2009, isbn 978-84-613-2308-1.
- P3. Cecily Heiner, Neil Heffernan, Tiffany Barnes: Educational Data Mining Workshop. *AIED 2007*: 716.
- P4. Wolfgang Achtner, Esma Aïmeur, Sarabjot Singh Anand, Doug Appelt, Naveen Ashish, Tiffany Barnes, Joseph E. Beck, M. Bernardine Dias, Prashant Doshi, Chris Drummond, William Elazmeh, Ariel Felner, Dayne Freitag, Hector Geffner, Christopher W. Geib, Richard Goodwin, Robert C. Holte, Frank Hutter, Fair Isaac, Nathalie Japkowicz, Gal A. Kaminka, Sven Koenig, Michail G. Lagoudakis, David B. Leake, Lundy Lewis, Hugo Liu, Ted Metzler, Rada Mihalcea, Bamshad Mobasher, Pascal Poupart, David V. Pynadath, Thomas Roth-Berghofer, Wheeler Ruml, Stefan Schulz, Sven Schwarz, Stephanie Seneff, Amit P. Sheth, Ron Sun, Michael Thielscher, Afzal Upal, Jason D. Williams, Steve Young, Dmitry Zelenko: Reports on the Twenty-First National Conference on Artificial Intelligence (AAAI-06) Workshop Program. *AI Magazine* 27(4): 92-102 (2006).

#### **Invited Lectures and Keynote Addresses – National and International (Total: 8; 0 new since 7/1/2015)**

1. Tiffany Barnes. **Keynote Speaker**. Making a difference for most students, most of the time. Learning Analytics Summer Institute, Harvard University, Cambridge, MA, July 2014.
2. Tiffany Barnes. **Keynote Speaker**. ACMSE Conference, Kennesaw State University, March 29, 2014.
3. Tiffany Barnes. **Keynote Speaker**. Alice Symposium, Duke University, Durham, NC, June 19, 2013.
4. Tiffany Barnes. **Keynote Speaker**. STARS Celebration, Hampton, VA, August 2012.
5. Tiffany Barnes. **Keynote Speaker**. Big South Undergraduate Research Symposium (BigSURS 2012), Winthrop, SC, April 13, 2012.
6. Tiffany Barnes, Anne McLaughlin, Amos Zeeberg, James Bower, Lucy Bradshaw (March 2010). With great power comes great responsibility: The future of video games. **Invited Speaker for South by Southwest** (SXSW2010) Interactive panel, Austin, TX, March 12, 2010.
7. Barnes, T. (October 2009). Game2Learn: Creating and evaluating educational games for computing. **SIGCSE Invited speaker** for the 25<sup>th</sup> Annual Eastern Conference of the Consortium for Computing in Small Colleges, Villanova, PA, October 31, 2009.
8. Barnes, T. (April 2005). Technology in education. **Invited speaker** for the National Academies' Board on Higher Education and Workforce meeting on the use of technology in science and engineering (S&E) education. Washington, DC. April 22, 2005.

#### **Invited Lectures RTP, Regional, and at other universities (Total: 10; 0 new)**

1. Tiffany Barnes. Invited talk at SAS Institute on CS Education. July 2014.
2. Tiffany Barnes. Human-amplifying computing. Invited talk. University of Florida. 2015.
3. Tiffany Barnes. Human-amplifying computing. Invited talk. Clemson University. April 9, 2012.
4. Barnes, T. (July 2007). Improving CS Education through Games and Artificial Intelligence & Broadening Participation in Computing. Invited talk at NIU.
5. Barnes, T. (May 2006). Game2Learn: Developing technologies to support and learn about learning. Invited talk for the North Carolina Serious Games Workshop: Collaboration in the N.C. Serious Games Space, Raleigh, NC, May 2, 2006. <http://cde.ncsu.edu/collab-program.html>
6. Young, M., J., Austin, T. Barnes, J. Heneghan, M. Rein. (May 2006). Panel on Serious Games & Serious Game Research Exposition, Center for Entrepreneurial Development's 'Game Night', Research Triangle Park, NC, May 17, 2006.
7. Barnes, T. (July 2005). Technology in education: Data mining, distance education, and gaming to learn. Invited talk for the Pittsburgh Science of Learning Center Seminar, held at Carnegie Mellon University, Pittsburgh, PA, July 7, 2005.
8. Young, M., T. Barnes, F. Boosman, J. Heneghan, D. Sung. (2005). Computer Games In

Serious Applications: Education, Training and Beyond. Panel presentation at the Center for Entrepreneurial Development Fifteenth Annual InfoTech Conference (InfoTech05), Research Triangle Park, NC, USA, October 12, 2005.

<http://www.cednc.org/conferences/infotech/2005/speakers/>

9. Barnes, T. (May 2005). Gender differences in communication styles. Invited talk for the North Carolina Technology Association's Women in Science and Engineering (WISE) Professional Society, Durham, NC, May 18, 2005.
10. Cavey, L., T. Barnes, N. Smith, & M. Droujkova. (1999). Mathematical explorations of urban problems. Presentation at the Joint Meeting of School Science and Mathematics and the North Carolina Council of Teachers of Mathematics, Greensboro, NC.

#### **Invited Lectures @ NC State (Total: 4; 1 new)**

1. Tiffany Barnes. CS Education and Educational Data Mining. Friday Institute, NC State University, April, 2016.
2. Tiffany Barnes. Educational data mining. Friday Institute, NC State University, April, 2014.
3. Tiffany Barnes. Building intelligence for interactive learning environments. Friday Institute, NC State University, November, 2012.
4. Barnes, T., L. Cavey, & N. Smith. (September 2000). Girls on Track: Using technology as a tool for community investigations. Paper presented at the Annual Technology Exposition, North Carolina State University, Raleigh, NC.

#### **Other Presentations at Professional Meetings (Total: 15)**

1. Barnes, T. (2012). Training for Research Experiences for Undergraduates – Finding Funding for Undergraduate Research. STARS Celebration 2012. Hampton, VA, August 11-13, 2012.
2. Barnes, T. (2012). Training for Research Experiences for Undergraduates – How to Mentor Undergraduate Research. STARS Celebration 2012. Hampton, VA, August 11-13, 2012.
3. Barnes, T. (2012). Workshop: Teaching AP CS Principles with Scratch, GameMaker, and AppInventor. STARS Celebration 2012. Hampton, VA, August 11-13, 2012.
4. Barnes, T. (2012). Funding for graduate school: writing proposals for graduate research fellowships. STARS Celebration 2012. Hampton, VA, August 11-13, 2012.
5. Matt Johnson and Tiffany Barnes. (2012). Demonstration of InVis. Educational Data Mining (EDM 2012). Chania, Greece, June 19-21.
6. Barnes, T., K. Buch, & A. Rorrer. (2009). Workshop: Evaluation Training for Academic Liaisons and Evaluator Assistants. STARS Celebration 2009. Tallahassee, FL, August 9-12, 2009.
7. T. Barnes & R. Eglash. (2009). Workshop: CSDTs for Outreach. STARS Celebration 2009. Tallahassee, FL, August 9-12, 2009.
8. Eglash, R., T. Barnes, & C. Lewis. (2009). Conducting Middle and High School

Outreach with Culturally Situated Design Tools. STARS Celebration 2009. Tallahassee, FL, August 9-12, 2009.

9. Barnes, T., K. Buch, & A. Rorrer. (2009). The Impact of the STARS Alliance: A Comprehensive Overview of Results. STARS Celebration 2009. Tallahassee, FL, August 9-12, 2009.
10. Barnes, T., C. Seals, M. Eagle, & K. Boyer. (2009). CRA-W Faculty Mentoring – Managing your Advisor: Advising your Students. STARS Celebration 2009. Tallahassee, FL, August 9-12, 2009.
11. Barnes, T. (2009). Opportunities in Game Development and Research. STARS Celebration 2009. Tallahassee, FL, August 9-12, 2009.
12. Croy, M., T. Barnes, J. Stamper (2008). “Generating Helpful Hints for Propositional Proof Construction.” Presented at the 2008 European Computing and Philosophy Conference, Montpellier, France, June 2008.
13. Black, D. & T. Barnes. (2006). The Director's Notebook. Conference of the Association for Theater in Higher Education. August 2007.
14. Ponnala, L., T. Barnes, D. Bitzer, & M. Vouk. (April 2004). The search for the optimal 3' ribosome tail in E. coli. Poster presented at the Biomedical Engineering Review, UNCCH, Chapel Hill, N.C.
15. Knight, V., L. Cavey, T. Barnes, & N. Smith. (January 2000). Girls on Track: Middle grade girls modeling community problems - An experiment in progress. Presented at the Joint Mathematics Meetings of AMS-MAA-MER, Washington D.C.

### Professional Honors

- NSF-IIS 0845997 CAREER: Educational Data Mining for Student Support in Interactive Learning Environments (2009-2015) \$646,982
- Pilot Instructor (1 of 5) for AP Computer Science Principles. College Board, 2010-11.

### Best paper nominations

- Andrew Hicks, Zhongxiu Liu and Tiffany Barnes. Measuring Gameplay Affordances of User-Generated Content in an Educational Game. *Educational Data Mining (EDM'16)*, Raleigh, NC, 2016: 78-85. (Exemplary paper, acceptance rate 15%, 16/109 papers) **BEST PAPER NOMINEE**
- Veronica Catete, Erin Snider, and Tiffany Barnes. (2016). Developing a Rubric for a Creative CS Principles Lab. *ACM Conference on Innovation and Technology in Computer Science Education (iTSCE)*. Lima, Peru. **BEST PAPER NOMINEE**
- Amy Shannon, Acey Boyce, Chitra Gadwal, Tiffany Barnes. 2013. Effective Practices in Game Tutorial Systems. In *8th ACM Foundations of Digital Games (FDG2013)*: 338-345. **BEST PAPER NOMINEE.**
- John C. Stamper, Michael Eagle, Tiffany Barnes, and Marvin Croy. 2011. Experimental evaluation of automatic hint generation for a logic tutor. In *Proceedings of the 15th international conference on Artificial Intelligence in Education (AIED'11)*, Gautam Biswas, Susan Bull, Judy Kay, and Antonija Mitrovic (Eds.). Springer-Verlag, Berlin,



Heidelberg, 345-352. **Best paper nominee.**

- *John Stamper, Tiffany Barnes, and Marvin Croy. 2010. Enhancing the automatic generation of hints with expert seeding. In Proceedings of the 10th international conference on Intelligent Tutoring Systems - Volume Part II (ITS'10), Vincent Aleven, Judy Kay, and Jack Mostow (Eds.), Vol. Part II. Springer-Verlag, Berlin, Heidelberg, 31-40. (30% acceptance rate) Best Student Paper*
- *Tiffany Barnes and John Stamper. 2008. Toward Automatic Hint Generation for Logic Proof Tutoring Using Historical Student Data. In Proceedings of the 9th international conference on Intelligent Tutoring Systems (ITS '08), Beverley P. Woolf, Esma Ameer, Roger Nkambou, and Susanne Lajoie (Eds.). Springer-Verlag, Berlin, Heidelberg, 373-382. Best paper nominee. (7 nominees) (32.6% acceptance rate, 61/187 submissions)*

#### Award Nominations

- Faculty Research Award Nominee. *UNC Charlotte College of Computing and Informatics*. Nominated each year 2009, 2010, 2011, 2012.
- Woman of the Year Award Nominee. *UNC Charlotte*. 2009.
- Microsoft New Faculty Fellowship Nominee. *Microsoft*, Nominated as sole candidate from UNC Charlotte. Nominated each year of eligibility 2005, 2006, 2007
- Denice Denton Emerging Leader Award Nominee. *Anita Borg Institute*. Nominated each year 2007, 2009, 2010

## **B. SPONSORED RESEARCH (Total: \$12,310,033)**

**Externally Funded Research Sponsorship (Category Total: \$15,631,147).**

**Grants: Barnes - Sole PI (Sub-category Total: \$3,939,367, Subtotal to NCSU: \$3,584,107)**

- Collaborative Research: Type I: **FRABJOUS CS — Framing a Rigorous Approach to Beauty and Joy for Outreach to Underrepresented Students in Computing at Scale**  
Agency: National Science Foundation  
Program: Computing Education for the 21<sup>st</sup> Century  
Grant number: CNS-113858  
2011—2018  
\$432,000 awarded at UNC Charlotte, \$352,831 transferred to NC State, \$86,000 supplement April 2014, \$565,874 supplement September 2016  
PI: Tiffany Barnes
- **Track 2: CS10K: BJC-STARS: Scaling CS Principles through STARS community & leadership development**  
Agency: National Science Foundation  
Program: CNS-STEM+C  
Grant number: 1542922  
10/1/2015-9/30/2018  
\$500,000  
PI: Tiffany Barnes
- Collaborative Research: Modeling Social Interaction and Performance in STEM

**Learning**

Agency: National Science Foundation  
Program: Data-intensive Research on Learning  
Grant number: 1418269  
9/1/2014-8/31/2017  
\$200,000  
PI: Tiffany Barnes

- **REU Site: Intelligent and Interactive Media: Designing and evaluating serious games, narrative and visual experiences, interfaces, and intelligence for games and education**

Agency: National Science Foundation  
Program: Research Experiences for Undergraduates  
Grant number: CNS-1262899  
2013—2016  
\$360,000  
PI: Tiffany Barnes

- **Adding new STARS to support and extend the CS10K project**

Agency: National Science Foundation  
Program: Broadening Participation in Computing - Alliances  
Grant number: CNS-1042468 subcontract; independently funded supplement  
2013—2014  
\$150,000 - Additional funds for 2016: \$39,164  
PI: Tiffany Barnes

- **CAREER: Educational Data Mining for Student Support in Interactive Learning Environments**

Agency: National Science Foundation  
Program: Advanced Learning Technologies  
Grant number: IIS 0845997  
2009—2014  
\$646,982 awarded at UNC Charlotte, \$237,770 subcontracted to NC State  
PI: Tiffany Barnes

- **Math Fluency Data Collaborative.**

Agency: Educause  
Program: Next Generation Learning Challenge  
2011—2012  
\$104,907 subcontract to UNC Charlotte from Carnegie Learning (lead institution)  
Subcontract PI: Tiffany Barnes

- **Computer Science Principles Pilot.**

Agency: College Board (with funding from NSF)  
2011—2012  
\$20,000  
PI: Tiffany Barnes

- **Game2Learn: Creative Computing Education.**

Agency: National Science Foundation  
 Program: Creative IT  
 Grant number: IIS 0757521  
 2008—2012  
 \$216,000  
 PI: Tiffany Barnes

- **Collaborative Research: BPC-D: Improving Minority Student Participation in the Computing Career Pipeline with Culturally Situated Design Tools (CSDTs).**

Agency: National Science Foundation  
 Program: Broadening Participation in Computing  
 Grant number: CNS-0634342  
 2007—2011  
 \$235,109  
 PI: Tiffany Barnes

- **Developing Smart Phone Applications for Earth Science Graduate Student Research Project at Stennis Space Center.**

Agency: National Aeronautics and Space Administration  
 Program: Graduate Student Research Project  
 Grant number: NNX10AK75H  
 2010—2012  
 \$60,000  
 PI: Tiffany Barnes

**Grants: Barnes - Lead PI on Multi-PI grant (Sub-category Total: \$249,604)**

- **CREU Charlotte: GameChanger: promoting health and wellbeing with games**

Agency: Computing Research Association  
 Program: Collaborative Research Experiences for Undergraduates  
 2013—2014  
 \$29,500  
 PI: Tiffany Barnes (This grant was transferred to co-PI per grant rules)  
 Co-PI: Jamie Payton (UNC Charlotte)

- **Envision Charlotte: Growing Greener Game**

Agency: Duke Energy Corporation  
 Program: Envision Charlotte  
 2011  
 \$190,604 (supplemented by UNCC College of Computing & Informatics for \$50K)  
 PI: Tiffany Barnes  
 Co-PIs: Michael Youngblood and Heather Lipford (UNC Charlotte)

- **CREU Charlotte: SNAG: Social Networking and Games**

Agency: Computing Research Association  
 Program: Collaborative Research Experiences for Undergraduates  
 2009—2010  
 \$29,500  
 PI: Tiffany Barnes

Co-PI: Teresa Dahlberg and Jamie Payton (UNC Charlotte)

**Grants: Barnes – Co-PI on Multi-PI grant (Sub-category Total: \$11,420,676)**

- **Educational Data Mining for Individualized Instruction in STEM Learning Environments**

Agency: National Science Foundation

Program: Improving Undergraduate STEM Education (IUSE)

Grant number:

2015-2018

\$639,401

PI: Min Chi

Co-PI: Tiffany Barnes

- **Evaluation for Actionable Change: A Data-Driven Approach**

Agency: National Science Foundation

Program: Division of Graduate Education: PRIME

Grant number: 1544273

1/1/2016-12/31/2019

\$799,837

PI: Teomara Rutherford, **Co-PIs:** Tiffany Barnes, Collin Lynch, Matthew Peterson

- **BPC-AE: Scaling the STARS Alliance: A National Community for Broadening Participation through Regional Partnerships**

Agency: National Science Foundation

Program: Broadening Participation in Computing - Alliances

Grant number: CNS-1042468

2011—2016

\$4,049,367

PI: Teresa Dahlberg (UNC Charlotte)

Co-PIs: Tiffany Barnes, Heather Lipford (UNC Charlotte)

- **REU Site: Exploring Human Centered and Socially Relevant Interactive Technologies in Computer Vision, Visualization, Pervasive Computing, Serious Games, & Social Networks**

Agency: National Science Foundation

Program: Research Experiences for Undergraduates

Grant number: CNS-1156822

2012—2015

\$300,000

PI: Jamie Payton (UNC Charlotte)

Co-PIs: Tiffany Barnes (UNC Charlotte)

- **REU Site: Socially Relevant Computing Research: Visualization, Virtual Environments, Gaming, and Networking**

Agency: National Science Foundation

Program: Research Experiences for Undergraduates Site

Grant number: CNS-0851745

2009—2011

\$393,561

PI: Teresa Dahlberg (UNC Charlotte)

Co-PIs: Tiffany Barnes

- **BPC-AE: The STARS Alliance:** The Southeastern Partnership for Diverse Participation in Computing  
Agency: National Science Foundation  
Program: Broadening Participation in Computing - Alliances  
Grant number: CNS-0739216  
2008—2011  
\$3,009,870  
PI: Teresa Dahlberg (UNC Charlotte)  
Co-PI: Tiffany Barnes
- **BPC-A: The STARS Alliance:** The Southeastern Partnership for Diverse Participation in Computing  
Agency: National Science Foundation  
Program: Broadening Participation in Computing - Alliances  
Grant number: CNS-0540523  
2006—2019  
\$ 2,228,640  
PI: Teresa Dahlberg (UNC Charlotte)  
Co-PI: Tiffany Barnes

**Gifts, Equipment Donations, & Additional Support (Category Total: \$ 99,500)**

- **NCWIT Undergraduate Research Mentoring Award**  
From NCWIT  
2016  
\$5,000  
PI: Tiffany Barnes
- **Minecraft in STEM education: A review**  
Donation to NCSU from Microsoft  
2015  
\$6,500  
PI: Tiffany Barnes
- **Marine Ops: Developing a Game Prototype for Marine History**  
Donation to UNC Charlotte College of Computing & Informatics  
2011  
\$10,000  
PI: Tiffany Barnes
- **Distributed REU and McNair support of Undergraduate Research Mentees**  
13 DREU projects funded through the CRA/CDC, 1 through McNair Scholarship  
2005-2016  
\$84,000 (\$6000 per student)  
Research Advisor: Tiffany Barnes

**UNC-Charlotte Funded Research and Equipment Sponsorship (Category Total: \$100,000).**

- **Envision Charlotte: Growing Greener Game**  
 UNC Charlotte College of Computing & Informatics  
 2012  
 \$50,000  
 PI: Tiffany Barnes
- **Establishment of Games+Learning Lab**  
 UNC Charlotte College of Computing & Informatics  
 2006  
 \$50,000  
 PI: Tiffany Barnes  
 Co-PI: Michael Youngblood

**C. CROSS-DISCIPLINARY ACTIVITIES**

**Department of History, NC State University**

Joint project with Akram Khater (Department of History).

*Cedars in the Pines: The Lebanese in North Carolina*

2012—2014. Supported through class project in CSC 495/591-006.

2014-2016. *Émigré: An immigration game*. Supported through funding by the Lebanese center.

**Department of Mathematics Education, NC State University**

Joint project with Hollylynne Lee (Department of Mathematics Education).

*Teaching Statistical Concepts to Middle School Students*

2012—2013. Supported through class project in CSC 495/591-006.

#### IV. EXTENSION AND ENGAGEMENT WITH CONSTITUENCIES OUTSIDE THE UNIVERSITY

##### **Professionally Relevant Community Service**

- NC State Girls Code and Create Camp 2014, 2015, 2016 1 week
- NC State Game Development Summer Camp 2013, 1 week
- STARS Haiti Spring Break Computing Outreach Program Director March 5-19, 2012
- UNC Charlotte High School Summer Camp 2009, 2010, 2011, 2012 “Aspire! IT”, 1 week
- UNC Charlotte Middle School Summer Camps 2012
  - “Exploring Math, Science, and Computing through Games!”
  - “Super (Computer) Science Investigators”
- UNC Charlotte Middle School Summer Camp 2009, 2010, 2011 “IT: Exploring Math & Technology through Culture & Art”, 1 week
- Established & Advised New Peer Outreach STARS Leadership Team, Fall 2009
- Assisted with Peer-Led Team Learning for ITCS 1215 (CS 2 course)
- Established mentoring program for CS undergraduates
- GameCATS STARS Leadership Team advisor
- Citizen Schools 10-week Game Development after school program, grades 6-8, 2009-2012.
- Outreach on game development and careers, Fall 2007- 2012 (Including: Berry Academy & Kannapolis Middle School Career Days 2008, Microsoft career day at UNCC 2009)
- Outreach using Culturally Situated Design Tools, Fall 2007-Fall 2009 (Including: Kannapolis Middle School, ImaginOn, Charlotte After School Enrichment Program).
- UNC Charlotte Game Lab Demonstrations, 2-3 monthly for K-12 and higher visitors since 2007.
- Technical Director, “Girls on Track” Middle School Summer Camp, Raleigh, Summers 1997-2007.
- NC State Computer Science Departmental ABET/CAC Accreditation Coordinator - 2004
- NC State Computer Science Graduate Student Association (President:1999-2002, Member: 2002-2003)
- Founder: NC State Computer Science Graduate Student Speaker Series (1999-2001)
- Meredith College Women and Mathematics Mentor (1998-2001, 2003-2004)

- NC State Women in Computer Science Founding Member (2003-2004)

## **Interviews**

- Barnes, T. Skirt Magazine, Profile, March 2009.
- Barnes, T. (October 2007). STARS Alliance. Computer Science Teachers Association, Invited Podcast.  
[http://www.csta.acm.org/Resources/sub/Podcast\\_Files/Tapia/TiffanyBarnesSTARSAllianceUNCC.mp3](http://www.csta.acm.org/Resources/sub/Podcast_Files/Tapia/TiffanyBarnesSTARSAllianceUNCC.mp3)
- Eagle, M., L. Harrison, E. Powell, T. Barnes. (October 2007). STARS Alliance. Computer Science Teachers Association, Invited Podcast.  
[http://www.csta.acm.org/Resources/sub/Podcast\\_Files/Tapia/MichaelEagleLanceHarrisonEvePowell.mp3](http://www.csta.acm.org/Resources/sub/Podcast_Files/Tapia/MichaelEagleLanceHarrisonEvePowell.mp3)



## V. TECHNOLOGICAL AND MANAGERIAL INNOVATIONS

N/A

## VI. SERVICE TO THE UNIVERSITY AND PROFESSIONAL SOCIETIES

### University Service

#### Administrative

- Planning for Digital Games Research Center, 2012-2013

#### Committee Service and University, Peer Teaching Evaluation, and Colloquia Organization

- Global Game Jam Coordinator, January 2013, 2014, 2015
- NC State Park Scholars Application Reviewer and Interviewer, 2012
- Peer Evaluator, CSC Peer Teaching Evaluation Program
  - Conducted Teaching Evaluation, 2016 (for C. Savage)
  - Conducted Teaching Evaluation, 2012 (for N. Samatova)

#### UNC Charlotte Departmental Committees

- Member, UNCC CS Departmental Review Committee, May 2010-2012
- Member, UNCC Computer Science Full Professor Recruiting Committee, Spring 2010-2012
- Chair, Computer Science Undergraduate Committee, Fall 2010-Spring 2011
- Chair, Computer Science Awards Committee, Fall 2006-Fall 2009
- Computer Science Peer review of teaching committee, Fall 2007-Spring 2008.
- Chair, Computer Science Faculty Search Committee, Fall 2005-Spring 2006
  - Successfully recruited and hired 4 new faculty members. Responsible for recruiting all six top candidates invited for interviews.
- Bioinformatics Faculty Search Committee, Fall 2004-Spring 2005
- Bioinformatics Curriculum Development Committee, Fall 2004-Spring 2005

#### UNC Charlotte College of Computing & Informatics Committees, Centers & Institutes

- ACM Peer Tutoring Program Director (2010-2011)
- Education Strategy Committee (2010-2012)
- College Strategic Planning (2009-2012)
- Visualization Center (2005-2012)
- Diversity in Information Technology Institute (2004-2012)
- Chair, College Retreat Followup Recommendations Committee (Spring 2005)
- Diversity Committee (2004- 2006)

- Marketing Committee (2004-2005)
- Parliamentarian for College Faculty Meetings, (2005-2006)

## National and International Activities

### Journal Associate Editorship

- Associate Editor 2016-Present  
*IEEE Transactions on Learning Technologies*  
Editor: Peter Brusilovsky
- Associate Editor 2008-2010  
*Journal of Educational Data Mining*  
Editor: Kalina Yacef, Co-Associate Editors: Ryan Baker, Joseph Beck

### Journal Special Issues Edited (Total: 5)

- Special Issue on AI in Computer Science Education, Forthcoming, 2016.  
*Intl. Journal of AI in Education*  
Co-Guest Editors: Nguyen-Thinh Le, Kristy Boyer, Sharon I-Han Hsiao, Sergey Sosnovsky
- Special Issue on “Best of Respect, Volume II.” May-June 2016.  
*Computers in Science and Engineering*  
Co-Guest Editors: Jamie Payton, George Thiruvathukal, Kristy Boyer, Jeff Forbes
- Special Issue on “Best of Respect, Volume II.” Mar-Apr 2016.  
*Computers in Science and Engineering*  
Co-Guest Editors: Jamie Payton, George Thiruvathukal, Kristy Boyer, Jeff Forbes
- Special Issue on Serious Games 2009  
*IEEE Computer Graphics and Applications*  
Co-Guest Editors: L. Miguel Encarnação, Chris Shaw
- Special Issue on Serious Games 2009  
*IEEE Computing Now*  
Co-Guest Editors: L. Miguel Encarnação, Chris Shaw

### Edited Conference and Workshop Proceedings, Special Issues (Total: 8)

1. Tiffany Barnes, George Thiruvathukal, Kristy Boyer, Jeff Forbes, and Jamie Payton.  
*Proceedings of the First Intl. Conf. on Research on Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT 2015)*, Charlotte, NC, USA, August 13-15, 2015.
2. Collin Lynch and Tiffany Barnes. *Proceedings of the 2<sup>nd</sup> Intl. Workshop on Graph-based Educational Data Mining (GEDM 2015)*. Held at EDM 2015.
3. Collin Lynch and Tiffany Barnes. *Proceedings of the 1<sup>st</sup> Intl. Workshop on Graph-based Educational Data Mining (GEDM 2014)*. Held at EDM 2014.

4. Michael Mateas, Tiffany Barnes, and Ian Bogost. *Proceedings of Foundations of Digital Games*, 2014.
5. Tiffany Barnes, L. Miguel Encarnação, Christopher D. Shaw: Serious Games. *IEEE Computer Graphics and Applications* 29(2): 18-19 (2009).
6. Tiffany Barnes, Michel C. Desmarais, Cristóbal Romero, Sebastián Ventura (Eds.): Educational Data Mining - EDM 2009, Cordoba, Spain, July 1-3, 2009. *Proceedings of the 2nd International Conference on Educational Data Mining*. [www.educationaldatamining.org](http://www.educationaldatamining.org) 2009, isbn 978-84-613-2308-1.
7. Cecily Heiner, Neil Heffernan, Tiffany Barnes: *Educational Data Mining Workshop*. AIED 2007: 716.
8. Wolfgang Achtner, Esma Aïmeur, Sarabjot Singh Anand, Doug Appelt, Naveen Ashish, Tiffany Barnes, Joseph E. Beck, M. Bernardine Dias, Prashant Doshi, Chris Drummond, William Elazmeh, Ariel Felner, Dayne Freitag, Hector Geffner, Christopher W. Geib, Richard Goodwin, Robert C. Holte, Frank Hutter, Fair Isaac, Nathalie Japkowicz, Gal A. Kaminka, Sven Koenig, Michail G. Lagoudakis, David B. Leake, Lundy Lewis, Hugo Liu, Ted Metzler, Rada Mihalcea, Bamshad Mobasher, Pascal Poupert, David V. Pynadath, Thomas Roth-Berghofer, Wheeler Ruml, Stefan Schulz, Sven Schwarz, Stephanie Seneff, Amit P. Sheth, Ron Sun, Michael Thielscher, Afzal Upal, Jason D. Williams, Steve Young, Dmitry Zelenko: Reports on the Twenty-First National Conference on Artificial Intelligence (AAAI-06) Workshop Program. *AI Magazine* 27(4): 92-102 (2006).

### Organization of International Conferences and Workshops

- General Co-Chair: ACM SIGSCE 2017.
- Program Co-Chair: ACM SIGCSE 2016.
- General Co-Chair: STARS Celebration, August 2015.
- General Co-Chair: IEEE RESPECT conference, August 2015, August 2016.
- Program Co-Chair: Foundations of Digital Games, April 2014
- Doctoral Consortium Co-Chair: 6th Intl. Conf. Educational Data Mining, July 2013
- Doctoral Consortium Chair: ACM Intl. Conference on Foundations of Digital Games 2012
- Program Track Chair: ACM Intl. Conference on Foundations of Digital Games 2009
- Program Chair: 2nd Intl. Conference on Educational Data Mining 2009
- General Conference Chair: 6th Annual STARS Celebration 2011
- General Conference Chair: 1st Intl. Conference on Educational Data Mining, June 2008
- Steering Committee: International Educational Data Mining Society & Conference, 2008-Present

- Co-Chair: Educational Data Mining Workshop (AIED 2008)
- Co-Chair: Educational Data Mining Workshop (AAAI 2006)
- Steering Committee: 3rd Annual ACM Game Development in Computer Science Education, 2008
- Organizing Committee: STARS Celebration Conference 2006-2009

### **Program Committee Membership**

- ACM Learning @ Scale, 2016
- Learning Analytics (LAK) 2016
- International Conference on Artificial Intelligence in Education 2013-Present
- ACM International Conference on Foundations of Digital Games 2010-Present
- International Conference on Intelligent Tutoring Systems 2010-Present
- International Conference on Educational Data Mining 2008-Present
- Educational Data Mining Workshop at AAAI International Conference of Artificial Intelligence 2005.
- 2nd Annual Academic Days on Game Development in Computer Science Education 2007
- Intl. Conf. Florida Artificial Intelligence Research Society (FLAIRS 2007, 2009, 2010, 2011)
- 45th ACM Southeast Conference (ACMSE 2007)

### **Journal & Book Chapter Reviewing**

- *International Journal of Educational Data Mining* 2011 & 2012, 2015
- *International Journal of Artificial Intelligence in Education* 2011, 2015
- *Learning Analytics* 2012
- *Presence* 2010
- *International Journal of Human-Computer Studies* 2010, 2011, 2013
- *Handbook of Educational Data Mining*, 2009 (Book chapter)
- *IEEE Transactions on Computational Intelligence and AI in Games*, 2009 & 2010
- *Applied Psychological Measurement* 2008-2012
- *IEEE Computer*, BPC column, 2008
- *Psychometrika* 2007

- *IEEE Systems, Man, and Cybernetics*, 2008
- *International Journal on Learning Technology*, 2008
- *Journal of Game Development*, Jan 2007
- *Journal of Computer Programming*, Aug 2006
- *Communications of the ACM*, 2006
- *Journal of Intelligent Information Systems*, 2005, 2006, 2009
- *IEEE Engineering in Medicine & Biology Magazine Special Issue on Bioinformatics* 2005

### **Conference Reviewing**

- Artificial Intelligence in Education 2007-Present
- Educational Data Mining 2008-Present
- Intelligent Tutoring Systems 2012-Present
- ACM CHI Conference on Human-Computer Interaction (CHI) 2007, 2011
- Association of Computing Machinery (ACM) Southeast Conference 2007
- ACM Special Interest Group on Computer Science Education Symposium 2006-2014
- ACM Innovation and Technology in Computer Science Education 2009, 2010
- ACM Intelligent User Interfaces 2012
- Grace Hopper Celebration of Women in Computing 2006, 2009
- Intl. Conf. Florida Artificial Intelligence Research Society (FLAIRS) 2007-2012
- ACM 3rd Annual Academic Days on Game Development in Computer Science Education 2008
- 2nd Annual Academic Days on Game Development in Computer Science Education 2007
- ACM Foundations of Digital Games 2009-2014

### **National and International Grant Reviewing (Total: 8 panels)**

1. Grant Reviewer, National Science Foundation, 2015. (1 Panel)
2. Grant Reviewer & Panelist, National Science Foundation, 2013. (1 Panel)
3. Grant Reviewer & Panelist, National Science Foundation, 2011. (1 Panel)
4. Grant Reviewer & Panelist, National Science Foundation, 2010. (1 Panel)
5. Grant Reviewer & Panelist, National Science Foundation, 2008. (2 Panels)

6. Grant Reviewer & Panelist, National Science Foundation, 2006. (1 Panel)
7. Grant Reviewer & Panelist, National Science Foundation, 2005. (1 Panel)
8. Kuwait National Grant Reviewer, 2012

### **Professional Leadership and Affiliations**

- International Artificial Intelligence in Education Society Board 2016-2019
- International Educational Data Mining Society Executive Steering Committee 2008-Present
- STARS Executive Steering Committee 2010-Present
- ACM SIGCSE Board At-Large Member June 2010-2016  
ACM Special Interest Group on Computer Science Education (SIGCSE)
- Member: Association for Computing Machinery, Artificial Intelligence in Education

### **Advisory Boards**

- 2013-2014 NSF CE21 project at University of Delaware
- 2009-2011 College Board – New Advanced Placement Course in Computer Science Principles
- 2013 NSF REESE - Empirical Research Project on STEM learning in formal and informal settings,  
PIs: Art Graesser, Sidney D'Mello, Andrew Olney