

Examining the Teaching Behaviors of Successful Teachers in a College of Agricultural and Life Sciences



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Abstract

The purpose of this study was to explore the teaching behaviors of successful teachers in a college of agricultural and life sciences. Five successful teachers were identified by nomination from the director of the Teaching Resource Center or winning a teaching award such as the University of Florida's College of Agricultural and Life Sciences teaching award or the NACTA Teacher Fellow's award. In consultation with each teacher, a minimum of two class sessions were identified for video recording. Teaching behaviors were assessed to determine the learning activities used, the cognitive levels reached, and the teacher immediacy (or rapport) behaviors exhibited. This group of successful teachers shared teaching beliefs that indicated they were highly sensitive to student needs. They used lecture and questioning most frequently in their classes and most of the teachers also used cooperative learning activities. This group of teachers commonly taught in a way that engaged students at higher cognitive levels. These successful teachers also created a psychologically inviting learning environment by exhibiting frequent positive verbal and nonverbal teacher immediacy behaviors.

Introduction

"During the next ten years, colleges of agriculture will be challenged to transform their role in higher education and their relationship to the evolving global food and agricultural enterprise" (National Research Council, 2009, p. 1). As a key piece of the mechanism for this transformation, the National Research Council recognized a need to prepare teachers in colleges of

agriculture to teach effectively so that graduates are ready to help solve complex global problems. This sounds like a reasonable recommendation, however, it begs the question, what does effective teaching in the agricultural sciences look like?

Given that the teacher is key to teaching effectiveness, a logical place to start examining teaching effectiveness is teaching beliefs. Teaching involves two domains: (a) teachers' thought processes (beliefs), and (b) teachers' actions followed by their observable effects (Clark and Peterson, 1986). The teaching activities chosen by a teacher can develop into a pattern of behavior and thus be predictable. A potential means for improving teaching effectiveness is for teachers to understand their predilections toward a teaching style (Heimlich, 1990). According to Heimlich (1990), sensitivity and inclusion are the two key dimensions that describe the teacher's beliefs related to their thoughts and actions. Sensitivity relates to understanding learners' needs, while inclusion refers to the amount of control the students have over their learning within the teacher's classroom. A recent study of the teaching beliefs of successful teachers in the College of Agricultural and Life Sciences at the University of Florida revealed that 91% and 77% scored high for the dimensions of sensitivity and inclusion, respectively (Giorgi and Roberts, 2011).

Another aspect of teaching effectiveness is the level to which teachers are able to encourage students to think critically about the subject matter. This is often operationalized as the cognitive level at which teachers teach (Whittington, 1995). Whittington and

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colleagues (Ewing and Whittington, 2007; Lopez and Whittington, 2001; Whittington, 1995, 1998, 2000) have shown that teachers in colleges of agriculture ascribe to teach at higher levels of cognition but generally teach at lower. Ewing et al. (2011) found that student cognition was positively influenced by teacher discourse and negatively influenced by the use of lecture during class sessions. Whittington (1995) wrote, "Mastering the higher order thinking of which Bloom speaks is one of the most significant activities of life" (p. 46). She also said professors conduct class "at lower levels of cognition 98% of the time" (p. 37) and thus infrequently use the higher cognitive levels of application, analysis, synthesis, and evaluation in class.

Another facet of teaching effectiveness is the manner in which teachers interact with students, often examined as rapport or teacher immediacy. Teacher immediacy is one way of measuring the psychological connection between a teacher and student (Christophel, 1990). However, this topic is just beginning to receive attention in the agricultural sciences. Velez and Cano (2008) examined the relationship between teacher immediacy and motivation in undergraduate agriculture students. Results confirmed the relationship between student motivation and verbal and nonverbal immediacy. Further results revealed a moderate positive relationship between nonverbal immediacy and expectancy-value motivation. Expectancy-value motivation is a motivation theory that postulates students are more motivated by tasks in which they expect success and value the activity (Velez and Cano, 2008). Additionally, Velez and Cano (2008) examined differences in immediacy with regard to teacher type and found that immediacy does play a role in the college classroom, which is consistent with prior immediacy research that has primarily been conducted in the arena of communications education.

Teaching effectiveness is also influenced by the learning activities that teachers elect to use in a given class session. Most of the literature on this topic has focused on the impacts of specific learning activities instead of the actual learning activities that are utilized in college classrooms. In a study that examined the actual learning activities that occurred in the classroom, Whittington (1997) noted that teachers predominantly used lecture with poor-quality visual aids and attempted to ask questions, typically phrased as "are there any questions?" (p. 41). Additionally, the term active learning has been used to describe a variety of learning activities that engage learners. Hiller and Tyre (2009) examined the active learning strategies used in a wildlife management course and reported

that lecture, coupled with cooperative learning and inquiry resulted in most students (77%) showing gains in knowledge. Getter and Rowe (2008) examined the use of a discussion technique, Think-Pair-Share. Their results showed no difference in learning, but did reveal that students enjoyed the experience more.

Although the research literature begins to paint a picture of teaching effectiveness in the agricultural sciences, there is still considerable need to identify replicable teaching behaviors that could be used as a benchmark of effectiveness. One approach to provide this information would be to identify teachers that could be used as models of success. The purpose of this study was to explore the teaching behaviors of successful teachers in a college of agricultural and life sciences.

Methods

This study employed a case-study approach (Gall et al. 2003) to examine the classroom teaching practices of a selected group of teachers in a college of agricultural and life sciences deemed to be successful teachers, identified through multiple indicators of success, including nomination from the director of the Teaching Resource Center or winning a teaching award such as the University of Florida's (UF) College of Agricultural and Life Sciences (CALs) teaching award selection and the NACTA Teacher Fellow's award. This case consisted of five faculty, four of which have received teaching awards at the college level or higher and one faculty member that is widely recognized through CALs as an innovator in the classroom. A description of each person is provided below.

Teacher 1

Teacher 1 is a white male in his early 60's. He holds the rank of professor in forestry, specializing in fire ecology. He is a NACTA Teacher Fellow and the recipient of 2004-05 CALs Undergraduate Teaching Award. He has worked at UF since 1986, where he typically teaches four undergraduate and two graduate courses per year. He served as graduate teaching assistant at North Carolina State University while working on his PhD. In addition to his experiences as a graduate teaching assistant, he attributes participation in a variety of teaching-related workshops in helping him learn how to teach. Teacher 1's observed class was a combination graduate and upper-division undergraduate class designed for students in the major. There were approximately 14 students enrolled in the class and the classroom had fixed desks that would accommodate approximately 40 students.

Teacher 2

Teacher 2 is a white male in his late 40's. He holds the rank of associate professor in agricultural economics, specializing in agricultural sales. He is a NACTA Teacher Fellow and was the recipient of the 2001-02 CALS Undergraduate Teaching Award. Teacher 2 was hired at UF in 1998 and typically teaches four undergraduate and two graduate courses per year. He was a graduate teaching assistant at Michigan State University while working on his PhD. He credits a variety of activities in shaping his teaching abilities, including coursework, workshops, independent reading, and consulting with teaching experts. Teacher 2's observed class was an upper-division undergraduate course that had a mixture of students from inside and outside the major. There were approximately 105 students enrolled in the class. The lecture hall was equipped with fixed desks that would accommodate approximately 200 students.

Teacher 3

Teacher 3 is an African-American female in her mid-30's. She holds the rank of assistant professor in family studies, specializing in family structure. She was selected to receive the Undergraduate Teaching Award in 2008-09. She was hired at UF in 2005 and typically teaches six undergraduate courses per year. She served as a graduate teaching assistant while earning her PhD at Florida State University. She credits a variety of activities in developing her teaching abilities, including coursework, workshops, independent reading, and consulting with teaching experts. Her observed class was an upper-division undergraduate course with a mixture of students from inside and outside the major. There were approximately 88 students enrolled in the class. The lecture hall had fixed desks that would accommodate approximately 160 students.

Teacher 4

Teacher 4 is a white male in his early 30's. He is an assistant professor in agricultural economics, specializing in agribusiness. He was the recipient of the 2010-11 CALS Undergraduate Teaching Award. He has worked at UF since 2006, typically teaching four undergraduate classes and two graduate classes per year. While working on his PhD at Purdue University, he worked as a graduate teaching assistant. He attributes coursework, workshops, independent reading, and consulting with teaching experts as things that have influenced his teaching. His observed class was an upper-division undergraduate course for students within the major. There were approximately 43 students enrolled in the class. The lecture hall had

fixed desks that would accommodate approximately 100 students.

Teacher 5

Teacher 5 is a white female in her late 40's. She holds the rank of lecturer in agronomy, specializing in plant production. She is widely recognized as an innovator in the classroom. She has been through Process Oriented Guided Inquiry Learning (POGIL, www.pogil.org) training and began implementing those practices in her classes. She was hired at UF in 2008 and typically teaches five undergraduate and two graduate courses per year. Teacher 5 earned her PhD at the UF in Plant Pathology, but was not a graduate teaching assistant. She indicated that workshops, independent reading, and consultations with experts have all influenced her teaching. Her observed course was an upper-division undergraduate class with a mixture of students from a variety of majors. There were approximately 38 students enrolled in the class, which was held in a classroom with movable desks accommodating approximately 40 students.

Data Collection

The Institutional Review Board at University of Florida approved the activities undertaken as a part of this research and signed informed consent was obtained from each participant. Data were collected during the Fall 2009 and Spring 2010 semesters. When each teacher was recruited to participate in this study, they provided some background information about their prior teaching experiences and also completed the Van Tilburg-Heimlich Teaching Belief Scale (Heimlich, 1990). This self-report assessment is used to identify a teacher's underlying philosophy and approach to teaching. The Van Tilburg-Heimlich Teaching Belief Scale uses two scales, sensitivity and inclusion, to categorize teachers as Experts (low sensitivity, low inclusion), Facilitators (low sensitivity, high inclusion), Providers (high sensitivity, low inclusion), and Enablers (high sensitivity, high inclusion). According to Heimlich (1990), Experts are focused on the subject and efficiency in content delivery. Providers are learner-centered and focus on teaching effectively. Facilitators are teacher-centered and focus on the educational processes. Enablers are "learning-centered," focusing on the learners and the process (p. 10).

The teaching behaviors of these teachers were explored using observational techniques. In consultation with each teacher, a minimum of two lecture class sessions were identified and then video recorded by the researchers. A high-definition video

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camera was placed in the rear of the classroom to capture the actions of the teacher. The video recordings were converted to an appropriate format and loaded in to the Noldus Observer[®] software suite for analysis.

Data Analysis

The Noldus Observer[®] software suite allows visual appraisal of the video recordings using user-defined indices. For this project, the teaching behaviors of these teachers were assessed with three different instruments (described in greater detail below). The first was a researcher-developed instrument to describe the actual learning activities used in the class session. The second was the Florida Taxonomy of Cognitive Behavior (Brown et al., 1968). The third was a modified version of the Immediacy Behavior Scale (Christophel, 1990).

When conducting observational research, the quality of observational data is critical (Gall et al., 2003). Gall et al. (2003) express three key elements that must be considered to establish reliability. Criterion-related observer reliability is the extent that an observer's ratings agree with a known expert (Gall et al., 2003). Intra-observer reliability is the extent that an observer is able to consistently code an observation (Gall et al., 2003). Inter-observer reliability is the extent that two raters are able to agree on ratings (Gall et al., 2003). Criterion-related observer reliability was accomplished through training of each observer and then periodic comparisons with the ratings of the lead researcher, a nationally recognized scholar on teaching methods. Intra and Inter-observer reliability were established using a system of multiple raters, with two researchers focusing on each aspect of the observation.

A total of six researchers were used to analyze the data. Each rater had at least two years of teaching experience and was trained by the lead researcher on the specifics of what they were asked to assess. Each researcher coded the video independently and then compared ratings after each class session. This allowed continuous benchmarking for consistency. If discrepancies were found, the pair of observers went back and jointly re-analyzed the periods of time in which the discrepancies were noted and came to agreement.

Instrumentation

Learning activities were described using a researcher-developed instrument based on the model developed by Roberts et al. (2010). This model categorizes learning activities on a continuum from teacher-centered to social learning to student-centered

activities. The learning activities included lecture, demonstration, questioning, discussion, cooperative learning, inquiry, and individualized application. The teacher-centered learning activities were lecture and demonstration. Lecture is characterized by a transmittal of information from the teacher to students. Demonstration involves the teacher showing students how to do something. The social learning activities were questioning, discussion, and cooperative learning. Questioning consists of the teacher asking questions to individual students. Discussion involves students talking with each other and the teacher. Cooperative learning involves students working together to accomplish an educational task. The student-centered learning activities included inquiry and individualized application. Inquiry was characterized by students working individually or cooperatively to solve problems or discover new information. Individualized application involved students working independently to learn the material.

The Florida Taxonomy of Cognitive Behaviors (FTCB) was used to determine the cognitive level reached during instruction (Brown et al., 1968). This rating tool is based on Bloom's Taxonomy of the Cognitive Domain (Bloom and Krathwohl, 1956) and has widely been used in the agricultural sciences to assess cognitive level of instruction (Whittington, 1997; 1998). The instrument contains 55 different teaching actions spread out over a modified version of Bloom's Taxonomy. Lower cognitive levels included knowledge, translation, and interpretation. Higher levels included application, analysis, synthesis, and evaluation. Cognitive levels were continually assessed throughout each class session.

Teacher immediacy was assessed using a modified version of the Immediacy Behavior Scale (Christophel, 1990). The original version of this instrument was designed to allow students to rate their teachers on a 1 to 5 rating scale for 20 verbal behaviors and 14 nonverbal behaviors. The instrument was modified by the researchers to allow determining the frequencies that each behavior was observed. Therefore, immediacy behaviors were noted each time they were demonstrated by the teachers. Example positive verbal behaviors included using personal examples, addressing students by name, praising students, and referring to the class as "our" class. Example negative verbal behaviors included criticizing students, referring to the class as "my" class, and calling on students who did not want to talk. Example positive nonverbal behaviors included gesturing while talking, moves around classroom, smiles at students, and uses a variety of vocal expressions. Example negative

Table 1. Learning Activities used by Five Successful Teachers in the College of Agricultural and Life Sciences at the University of Florida

Teacher	Class Session (Duration ^a)	Class Size	Learning Activity				
			Lecture Time ^b	Questioning Time ^b	Discussion Time ^b	Cooperative Learning Time ^b	Individual Application Time ^b
1	Session 1 (44:14)	14	30:23 (69%)	13:51 (31%)	–	–	–
	Session 2 (63:27)		33:03 (52%)	30:24 (48%)	–	–	–
2	Session 1 (48:58)	105	29:01 (59%)	10:00 (20%)	5:04 (10%)	4:53 (10%)	–
	Session 2 (94:47)		47:34 (50%)	33:40 (36%)	–	4:13 (4%)	9:20 (10%)
	Session 3 (86:37)		53:12 (61%)	5:39 (7%)	18:07 (21%)	9:39 (11%)	–
3	Session 1 (82:37)	88	40:19 (49%)	7:47 (9%)	–	34:31 (42%)	–
	Session 2 (93:59)		36:31 (39%)	24:31 (26%)	15:23 (16%)	14:35 (16%)	2:59 (3%)
	Session 3 (98:13)		52:59 (54%)	31:32 (32%)	10:50 (11%)	–	2:52 (3%)
4	Session 1 (47:31)	43	24:40 (52%)	22:51 (48%)	–	–	–
	Session 2 (50:07)		–	–	–	50:07 (100%)	–
	Session 3 (105:51)		14:10 (13%)	12:21 (12%)	–	79:20 (75%)	–
5	Session 1 (97:50)	38	38:13 (39%)	0:14 (0%)	–	59:23 (61%)	–
	Session 2 (50:31)		40:16 (80%)	9:10 (18%)	–	1:05 (2%)	–

Note. Demonstration and inquiry were not used during any of the observed class sessions. ^aDuration refers to the total amount of time in that class session.
^bTime refers to the amount of class time spent on that learning activity.

nonverbal behaviors included sitting or standing behind the desk/podium, looks at board while talking to the class, and using a monotone/dull voice. For a complete list, consult Christophel (1990).

Results

In terms of teaching beliefs, Teachers 2, 3 and 5 were Enablers (Heimlich, 1990), characterized by high sensitivity and high inclusivity, focusing on both the learners and the learning process. Teachers 1 and 4 were Providers, characterized by high sensitivity and low inclusivity, focusing on the learner and their own effectiveness.

A summary of the observations from the five teachers for the 13 class sessions is presented in Table 1. Teacher 1 only used two types of learning activities. Teacher 2 used at least four different learning activities in each of the observed class sessions. Teacher 3 used the greatest variety of learning activities. She used three or more different learning activities in each class session. Teacher 3 was the only teacher to use five learning activities in the same session. Teacher 4 was the only teacher that did not lecture or ask questions

during a class session. Teacher 5 used the same set of learning activities each time she was observed.

A summary of the observed cognitive levels is presented in Table 2. Teacher 1 was able to reach higher cognitive levels in both of the class sessions he

Table 2. Observed Cognitive Levels of Five Successful Teachers in the College of Agricultural and Life Sciences at the University of Florida Determined by the Florida Taxonomy of Cognitive Behaviors

Teacher	Class Session	Highest Cognitive Level ¹
Teacher 1	Session 1	Analysis
	Session 2	Analysis
Teacher 2	Session 1	Synthesis
	Session 2	Application
	Session 3	Analysis
Teacher 3	Session 1	Application
	Session 2	Application
	Session 3	Application
Teacher 4	Session 1	Analysis
	Session 2	Application
	Session 3	Analysis
Teacher 5	Session 1	Application
	Session 2	Application

¹Potential cognitive levels included knowledge, translation, interpretation, application, analysis, synthesis, and evaluation.

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was observed. Teacher 2 also reached higher levels of cognition, but a different level in each class session. Teacher 2 reached the highest level of all the teachers, synthesis. Teacher 3 reached the same cognitive level in each class session. Teacher 4 reached analysis in two sessions and application in the other session. Teacher 5 reached the same cognitive level in each class session.

A summary of teacher immediacy behaviors is presented in Table 3. In terms of teacher immediacy behaviors, all five of the teachers exhibited more positive behaviors than negative behaviors. Teacher 1 most frequently exhibited positive verbal behaviors and least frequently exhibited negative verbal behaviors. Teacher 2 most frequently exhibited positive nonverbal behaviors and least frequently exhibited negative nonverbal behaviors. He exhibited the most positive nonverbal behaviors of all the teachers. Teacher 3 most frequently exhibited positive verbal behaviors and least frequently exhibited negative verbal behaviors. Interestingly, Teacher 3 exhibited more positive verbal behaviors and negative nonverbal behaviors than any of the other teachers. Teacher 4 most frequently exhibited positive nonverbal behaviors and least frequently exhibited negative verbal behaviors. Teacher 5 most frequently exhibited positive nonverbal behaviors and least frequently exhibited negative verbal behaviors. She was the only teacher that did not exhibit any negative verbal behaviors in a class session.

Summary

Teacher 1

Teacher 1 exclusively used lecture and questioning as his learning activities and was fairly balanced between the two activities. He was able to reach the

analysis cognitive level during each class session. He consistently exhibited a moderate level of both positive verbal and positive nonverbal teacher immediacy behaviors. As noted earlier, Teacher 1 was a Provider, characterized by high sensitivity and low inclusion.

Teacher 2

Teacher 2 used lecture, questioning, discussion, cooperative learning, and individualized application. He used four different learning activities in each of the observed sessions. He used lecture and questioning more frequently and for a greater duration than the other learning activities. Teacher 2 reached higher cognitive levels in each of the observed class sessions and was the only teacher to reach the synthesis level. Teacher 2 exhibited a high number of positive verbal and positive nonverbal teacher immediacy behaviors in each class session, although the frequency varied somewhat by each session. As mentioned earlier, Teacher 2 was an Enabler, characterized by high sensitivity and high inclusion.

Teacher 3

Teacher 3 used lecture, questioning, discussion, cooperative learning, and individualized application. She used at least three different learning activities in each class session and was the only teacher to use five different learning activities in a class session. Teacher 3 used lecture and questioning most frequently and for the greatest amount of time. Teacher 3 reached the application cognitive level in each of the observed class sessions. Overall, she exhibited the greatest number of teacher immediacy behaviors (positive and negative). The number of teacher immediacy behaviors exhibited varied greatly by class session. She had the greatest number of positive verbal behaviors and positive nonverbal behaviors in the same class session. She also exhibited more negative nonverbal behaviors than the other teachers. As presented earlier, Teacher 3 was an Enabler, characterized by high sensitivity and high inclusion.

Teacher 4

Teacher 4 used lecture, questioning, and cooperative learning. Each of his observed class sessions was different, with the first using lecture and questioning, the second using only cooperative learning, and the third using lecture, questioning, and cooperative learning. He was the only teacher to use a single learning activity (cooperative

Table 3. Observed Teacher Immediacy Behaviors of Five of Successful Teachers in the College of Agricultural and Life Sciences at the University of Florida Determined by the Teacher Immediacy Scale

Teacher	Class Session	Teacher Immediacy Behaviors			
		Positive Verbal Frequency	Negative Verbal Frequency	Positive Nonverbal Frequency	Negative Nonverbal Frequency
1	Session 1	99	16	48	21
	Session 2	96	14	51	18
2	Session 1	112	30	232	34
	Session 2	207	48	180	34
	Session 3	132	2	117	0
3	Session 1	64	2	24	6
	Session 2	362	54	282	72
	Session 3	252	10	142	30
4	Session 1	117	6	143	16
	Session 2	19	2	1	0
	Session 3	89	6	105	10
5	Session 1	66	14	90	12
	Session 2	75	0	149	4

learning) in a class session. He was able to reach higher cognitive levels in each class session. He exhibited moderate levels of positive verbal and positive nonverbal teacher immediacy levels, while exhibiting very few negative teacher immediacy behaviors. As noted earlier, Teacher 4 was a Provider, characterized by high sensitivity and low inclusion.

Teacher 5

Teacher 5 utilized lecture, questioning, and cooperative learning in each of the observed class sessions, although the proportion of each varied in each session. She was able to reach the application cognitive level in both class sessions. She exhibited the fewest positive and negative verbal teacher immediacy variables. She also exhibited the fewest overall negative verbal and nonverbal teacher immediacy behaviors. As presented previously, Teacher 5 was an Enabler, characterized by high sensitivity and high inclusion.

Discussion

As a group, these successful teachers all exhibited a high level of sensitivity, which was consistent with previous research on teacher beliefs (Giorgi and Roberts, 2011). In addition, this group used a variety of learning activities in each class session, although they did use lecture and questioning most often. This is consistent with what Whittington (1997) found, however this group of successful teachers seemed more effective in asking questions and were able to engage students at higher levels of cognition. Four of the five teachers also used cooperative learning. This group of successful teachers also reached higher levels of cognition in every class session, which was different than what Whittington and her colleagues (Ewing and Whittington, 2007; Lopez and Whittington, 2001; Whittington, 1998) had consistently found and perhaps a reason why this group has been recipients of numerous teaching awards.

Based on the observations of this group of successful teachers, a few promising characteristics and teaching behaviors emerged that are likely worthy of emulating. First, this group was highly sensitive, likely revealing a very student-friendly persona. Second, this group used lecture and questioning most frequently, reaching higher levels of cognition with both activities. This contradicts what Whittington and her colleagues (Ewing and Whittington, 2007; Lopez and Whittington, 2001; Whittington, 1998) found, perhaps because this group of teachers only lectured for very short durations, interspersed with questioning. Moreover, most of the teachers also used cooperative learning activities in at least one class session,

effectively reaching higher levels of cognition each time. Third, these teachers created a psychologically inviting learning environment by exhibiting frequent positive verbal and nonverbal teacher immediacy behaviors.

While the methodology used in this study does not allow for widespread generalizability, the results do reveal some promising behaviors that likely should be attempted in other settings and by other teachers. Other colleges of agriculture and related sciences should consider using the Florida Taxonomy of Cognitive Behaviors, the Teaching Belief Scale, and the Teacher Immediacy Scale as diagnostic tools to help individual teachers explore their own teaching and improve practice. Additionally, colleges that have extensive doctoral education programs should consider using these tools to help graduate students prepare for their future roles as faculty members.

Effective teaching involves a complex set of behaviors that are difficult to capture in a single research study. To gain a better understanding of this phenomenon, the teaching behaviors of additional successful teachers should be explored. Finally, to be able to give more specific suggestions about which types of learning activities should be used, the impacts of each learning activity should be explored in detail.

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