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ABSTRACT

Studies of the pauses between teachers' questions and students' responses have indicated that lengthening wait-time produces significant improvement in intellectual performance. Two types of pauses have been identified: the pause after teachers pose questions and students respond, and the pause that takes place when students hesitate momentarily in their replies. Typically, pauses between teacher and student remarks average approximately 1 second. Even though 3-second pauses in classroom interaction have been shown to be important, most efforts to train teachers to use wait-time effectively have met with little success. An electronic device, which provides automatic, continuous monitoring of pauses in classroom dialogue, consists of voice-activated switches, a variable timer, and a system of red and green lights. A red light is activated when a person is speaking, while a green light signals whenever sustained silence occurs. Field testing has indicated that using the device helped teachers to prolong wait-time in questioning. A diagram of a "wait time feedback" device is included with the description. (JD)

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**Development and Field Testing of a Wait Time
Feedback Device for Monitoring and Improving
Classroom Interaction**

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Development and Field Testing of a Wait Time Feedback
Device for Monitoring and Improving Classroom Interaction

Studies of teacher and student interactions in classroom discussions, initiated by Rowe (1974; 1978), identified two types of pauses in the dialogue between teachers and their students. Rowe found that these pauses were critical variables in the determination of the cognitive level and the affective climate of classrooms. The first of these pauses occurs after teachers pose questions (and before students respond). The second pause takes place after students pause momentarily in their replies without teachers ascertaining that the students have completed their replies. Rowe has labeled the pauses wait time 1 and wait time 2 respectively. In some studies, wait time 1 has been called student wait time, because the length of the pause is controlled by the student responses. In a similar manner wait time 2 has been called teacher wait time; since the length of the pause is controlled by the response of the teacher (Tobin & Capie, 1981). The relationship between the two types of wait time is illustrated in Figure 1.

When responding to queries or in conversation, people rarely talk continuously. They usually express a thought or part of a thought, with brief periods of silence between phrases. Typically the pauses between teacher and student remarks are short. Rowe found that wait times averaged approximately 1

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second. She also found that significant improvement in the intellectual performance and interpersonal climate of classrooms could be produced by training teachers to increase the length of these pauses to 3 seconds or longer. Other researchers have found similar outcomes in the presence of these longer wait times (DeTure, 1976; Swift & Booding, 1983; Tobin, 1979). Wise and Okey (1983), in a meta-analysis of 12 strategies that teachers can employ to enhance achievement in science, found that the effective use of wait time produces the greatest increase.

Even though 3 second pauses in classroom interaction have been shown to be important, most efforts to train teachers to effectively utilize wait time have met with scant success. It appears that teachers who are trained to pause cannot do so consistently. Furthermore, many teachers seem unable to overcome the urge to avoid any periods of silence during their class discussions.

In view of the two factors cited above, marked improvements in classroom interaction when 3 second pauses are observed on one hand and marginally successful pause training programs on the other, it was determined that a more effective method for monitoring wait time is required.

Swift, one of the present authors, invented an electronic device that provides automatic, continuous monitoring of pauses in classroom dialogue. The device consists of voice activated

Wait Time 3

switches, a variable timer and a system of red and green lights. The wait time feedback device is diagrammed in Figure 2. A red light is activated when a person is speaking, while a green light signals whenever sustained silence occurs. The duration of the red light at the end of a question, response, or other pause can be regulated to control wait time length. When 3 seconds have elapsed, the green light is activated to signal that it is appropriate for another participant to enter the discussion.

Laboratory testing of the device proved successful and led to field testing in experimental applications in middle school science classrooms. Forty science teachers were placed in one of four groups consisting of ten participants: a comparison group, a group that received written instructions on pausing and questioning techniques, a group that utilized wait time feedback devices in their classes, and a group that received both written instructions and wait time feedback devices. The results of this wait time feedback intervention are shown in Table 1.

Baseline data gathered from all teachers revealed no significant pretreatment differences. Means for wait time 1 and 2 for the experimental groups were 1.27 and .55 seconds respectively. For the comparison group teachers means were 1.10 and .55 seconds. After using the wait time feedback devices for 12 weeks the participants were able to extend their mean wait times to 2.62 seconds for wait time 1 and 1.36 seconds for wait

time 2. Pause measurements were calculated using an automated computer device (Gooding, Gooding & Swift, 1982).

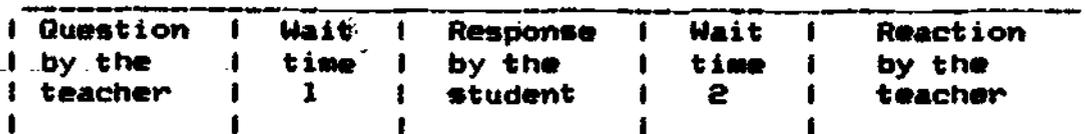
As a result of these findings the wait time feedback devices have undergone further field test trials. Thought Technologies Ltd. has contracted to produce wait time devices, making these instruments available to schools for professional development programs. The authors are also in the process of designing a comprehensive faculty professional development program which will include wait time feedback training as a core component of the development plan.

Table 1

Analysis of Variance Results for Mean Wait Times in Seconds

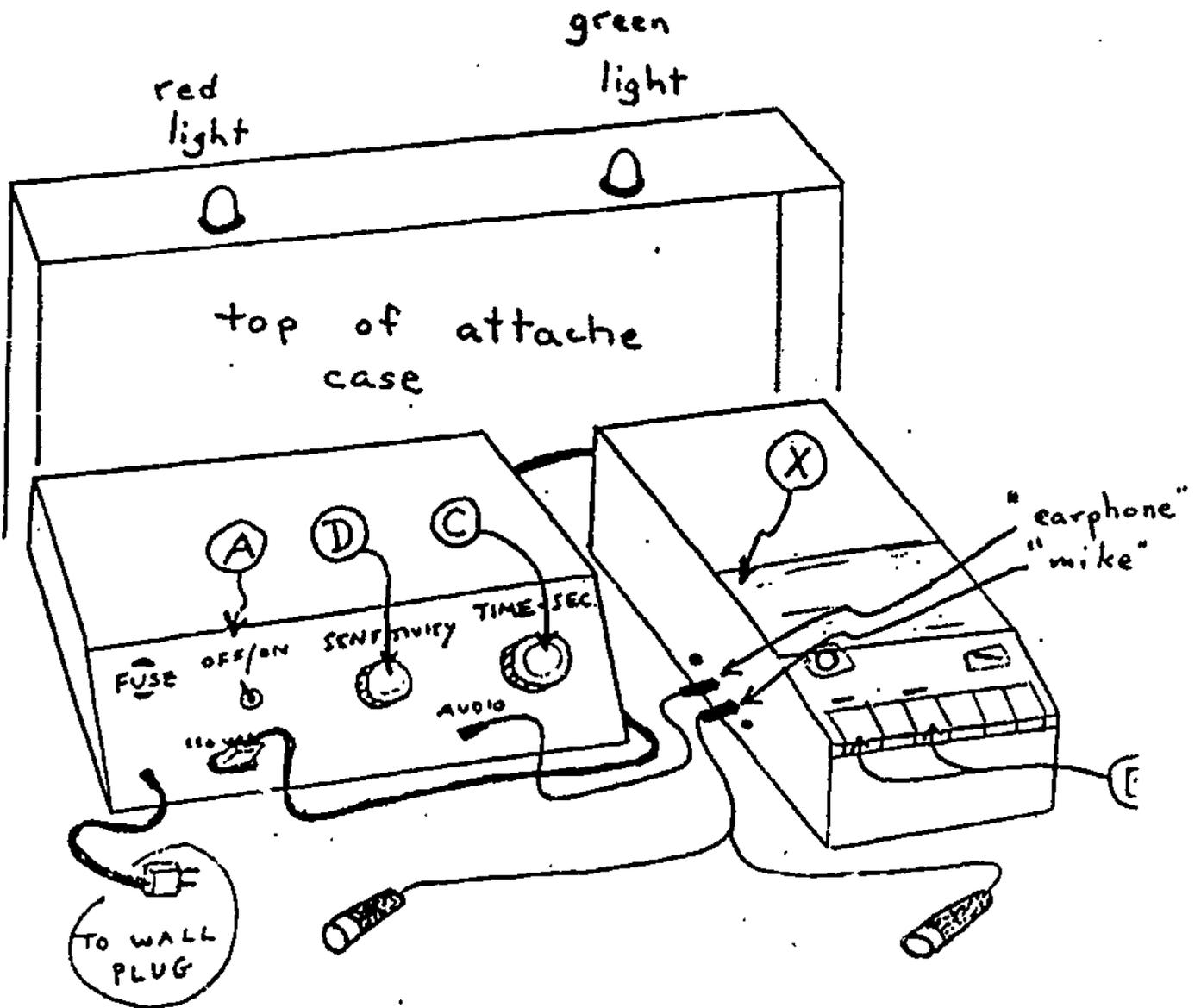
	Group 1 Mean	Group 2 Mean	Group 3 Mean	Group 4 Mean	F	p
Wait Time 1	1.19	1.35	2.62	1.80		
			Between Guides		3.449	.065
			Between Feedback		27.889	.000
			Interaction		1.630	.007
Wait Time 2	.54	.68	1.36	.97		
			Between Guides		1.342	.248
			Between Feedback		26.619	.000
			Interaction		6.196	.014

Figure 1. Wait time 1 and 2



Note that student responses usually occur in bursts of words with short pauses between bursts.

Figure 2. Diagram Illustrating a Wait Time Feedback Device



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