

# Work patterns and stressors

of experienced and novice mathematics teachers

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In this article, we report findings from a study in which the daily lives of novice and experienced secondary mathematics teachers in Victoria were tracked. Two novice and two experienced teachers were also interviewed. Data collection focused on the activities the teachers undertook in and out of working hours, and their reactions to them. The range of tasks was found to be extensive, and stretched well beyond formal school hours. There were similarities and differences in the activities and work patterns of the experienced and novice teachers, and in what they found stressful. Administrative tasks were more likely to be the cause of stress for the experienced teachers; teaching-related activities for the novice teachers.

## Background to the study

In recent years much attention has been paid, both in the popular press and in scholarly publications, to the scope and stresses of teachers' work (e.g., Committee for the Review of Teaching and Teacher Education, 2003). The vast range of teaching and non-teaching tasks that make up teachers' daily work are typically highlighted, as well as the many complex educational, psychosocial, cultural, and emotional issues with which teachers have to grapple on a regular basis. Earlier investigations into teachers' work shaped the study described in this article. Within the limits imposed by our modest sample size, our

aims were to identify the tasks mathematics teachers undertake in and out of working hours; to compare the work patterns of experienced and novice mathematics teachers; and to explore factors associated with teacher stress.

## The study

### The sample

Our sample consisted of 14 secondary teachers, six males and eight females, from six Independent schools in Victoria. All described themselves as mathematics teachers and taught mathematics for at least 50% of their teaching load. Teaching experience for the males ranged from 8 to 32 years and for the females from 1.5 to 25 years. We defined 'novice' teachers as those with fewer than two years teaching experience. Two females, but no males, fitted this definition.

### Method and instruments

The study took place over a three-week period early in the second half of the second semester of the 2004 school year in Victoria and comprised one week of intensive data collection, followed by interviews conducted over the following two weeks.

### *Biographical information sheet*

Just before the week of monitoring, we asked participants to complete a background infor-

mation sheet to provide biographical data (e.g., gender, age group) and work details (e.g., subjects and grade levels taught, years of mathematics teaching experience).

### The Experience Sampling Method

Our data gathering relied heavily on the Experience Sampling Method [ESM], developed well over 30 years ago by Csikszentmihalyi and his colleagues (e.g., Csikszentmihalyi, Rathunde, & Whalen, 1993). On receipt of a signal, sent five to seven times daily over a period of one week, participants record their daily lives and experiences by completing specially designed Experience Sampling Forms [ESFs] in which they report what they are doing, who they are with, their thoughts, and their feelings. The ESM has been used with a variety of people, including children, teachers and university students, to provide descriptions of the patterns and quality of their lives.

In our study, the SMS text messaging facility of mobile phones was used to signal participants to complete ESFs. The 14 participants were sent SMS messages six times a day for one week between the hours of 7.30am and 9.30pm on weekdays, and between 10am and 9.30pm on weekend days – a total of 588 messages. A typical SMS message read: “DLMT study. 2.50pm Tuesday. Message 4. Complete ESF now, please” i.e., the SMS message included the time it was sent, the day of the week, and the message number for the day. Excerpts from the ESF that was used are shown in Figure 1.

### Interviews

Interviews were conducted with a pair of novice and experienced teachers at each of two schools. The interviews were semi-structured and included questions such as: “Tell me about your typical working day”, “Do you work at home (i.e., out of hours)?”, and “Please describe your reactions to the ESFs... Were any of the questions intrusive?”

## Analyses

The information collected from the ESFs was transferred to Excel spreadsheets for analysis. The types of activities participants reported being engaged in were initially coded into categories developed by Campbell and Neill (1994). Other coding categories emerged during the analyses. The final set of categories is shown in the results section. The audio-taped interviews were transcribed.

## Results and discussion

### Activities in which the teachers were engaged

The wide range of activities that the teachers reported being engaged in are represented by the data from the four interviewed teachers summarised in Table 2. Mathematics teaching comprised an important part of what they did but, in addition, they clearly had many other responsibilities.

There were nine main categories, each further subdivided into sub-categories, into which the activities reported by the 14 partic-

**EXPERIENCE SAMPLING FORM [ESF] (excerpts)**

Name: \_\_\_\_\_

Date: \_\_\_\_\_ Time received/read: \_\_\_\_\_ Time filled out: \_\_\_\_\_

As you were contacted:

Where were you? (e.g., teaching Year 12 mathematics class; in staff room)	
What were you doing? (e.g., photocopying for Year 10 mathematics class)	
Was what you were doing directly work-related? Circle response	Yes No

In the table below you are asked to describe your mood when you were contacted. Two words, emphasising the extremes of a continuum are given for each line. Tick the appropriate column which best describes your mood along that continuum. (The full list consisted of 10 sets of adjectives)

	Very	Quite	Neither	Quite	Very	
Irritable						cheerful
Interested						bored
Stressed						relaxed
Distracted						focused
Satisfied						dissatisfied

If you had the choice when you were contacted, what would you prefer to have been doing?  
\_\_\_\_\_

Figure 1. Excerpts from Experience Sampling Form [ESF]

ipating teachers when signalled were sorted. The nine main categories, and the respective response frequencies were:

1. teaching (17.9%)  
— mostly (80%) in mathematics classes;
2. preparation (15.1%);
3. professional development (0.2%);
4. administration (12.8%);
5. other school-related activities (9.9%);
6. domestic activities (23.4%);
7. social activities (5.2%);
8. travelling (7.6%); and
9. other (7.8%).

We defined working hours from 8.30 am to 4 pm on weekdays. Of the 588 SMS messages sent, 266 (45.2%) were sent during working hours. When the teachers' responses were divided into "in" or "out" of working hours, an interesting pattern emerged. The data are illustrated in Figure 2 and reveal that teachers were more likely to be involved in "preparation" out of school hours (18% of responses) than during the school day (12% of responses). A large slice of the school day appears to have

been spent on administrative activities (22% of responses). From the graph it can be seen that various school and teaching related activities also took place out of working hours.

The subcategories of 'preparation' were: lesson preparation, marking, and other. The in/out of working hours break-up for the subcategories of 'preparation' are shown in Figure 3. Lessons, it can be seen, were more likely to be prepared in working hours, marking out of hours.

### Teachers' feelings and mathematics teaching

Teachers' feelings when they were contacted were inferred from their responses to the adjective pairs (see "mood" item in Figure 1) and from other data gathered via the ESFs and interview. Adjective data for the two categories: "teaching mathematics" and "administration" are summarised in Table 1. The five response categories shown on Figure 1 were collapsed into three: positive, neutral, and negative. The positive and negative percentages shown in Table 1 were calculated by combining the "quite" and "very" categories for each adjective pole.

As can be seen in Table 1, when teaching mathematics, the bulk of the teachers' responses to each adjective was overwhelmingly in the positive direction (more than 50% of responses). They typically reported themselves to be satisfied, alert, happy, cheerful, active, interested, clear, and focussed. In other words, they generally expressed high engagement and pleasure in the task of teaching mathematics. Only the relaxed/stressed adjective pair elicited different responses, showing the lowest positive response rates of all adjective pairs for both "teaching mathematics" (35.5%) and "administration" (27.1%). It was also noteworthy that there was generally a much lower positive response rate to each adjective pair (apart from focussed/distracted) when attending to administrative tasks than when "teaching mathematics".

The very different response pattern to relaxed/stressed suggested to us that teacher stress warranted further investigation. The frequency of such responses for the four interviewed teachers has been included in Table 2.

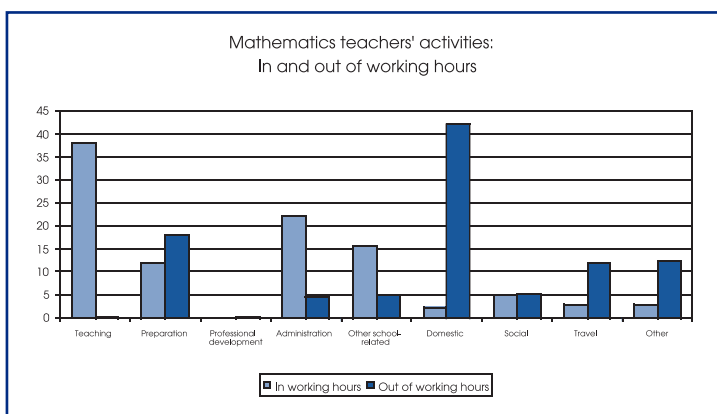


Figure 2. Teachers' activities in and out of working hours.

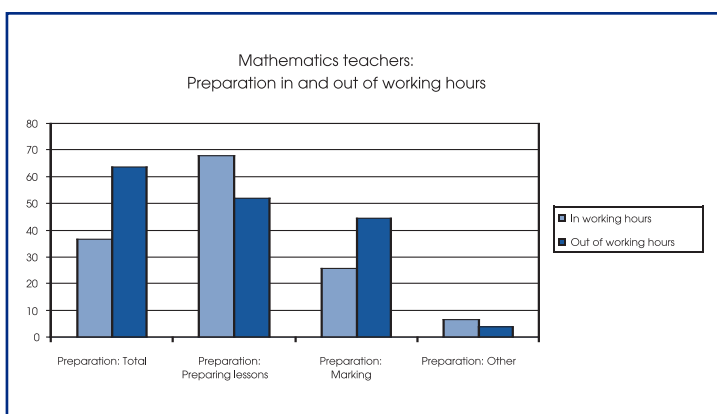


Figure 3. Preparation activities in and out of working hours

The settings and situations considered to be stressful for these four teachers are described later in the article.

### Biographical information about four teachers interviewed

A summary of the background information provided by the four teachers interviewed (3 female, 1 male) is shown in Table 2. Also shown is the number of ESFs completed by each teacher. It should be noted that for the entire sample of 14, the response rate to our SMS messages was 96% (out of 588 possible responses); for the four teachers whose data are discussed here, the response rate was 93%.

### Experienced and novice teachers

As can be seen from Table 2, the two novice teachers, Susan and Lyn, had heavier teaching loads than their experienced peers, taught a wider range of subjects, but had fewer administrative responsibilities. The number of times the teachers responded that they were stressed showed no pattern by level of teaching experience. The activities that caused stress did, however.

### When teachers were stressed

Here we provide an overview of the activities in which each of the participants was engaged and what they were thinking about when they responded that they were stressed.

Table 1. Response frequencies to adjective pairs when teaching mathematics and attending to administrative tasks.

Adjective pair	Positive (%)		Neutral (%)		Negative (%)	
	Teaching	Admin	Teaching	Admin	Teaching	Admin
Satisfied/dissatisfied	61.8	49.3	23.7	26.1	14.5	24.6
Alert/drowsy	90.8	69.6	3.9	10.1	5.3	20.3
Happy/sad	61.3	37.1	28	54.3	10.7	8.6
Cheerful/irritable*	61.8	38.6	15.8	35.7	22.4	25.7
Active/passive	86.8	47.1	6.6	18.6	6.5	34.3
Interested/bored	71.1	54.3	13.2	17.1	15.8	28.6
Clear/confused	90.8	77.1	6.6	20.0	2.6	2.9
Relaxed/Stressed*	35.5	27.1	32.9	28.6	31.6	44.3
Focused/distracted*	73.7	73.5	15.8	11.8	10.5	14.7

\* The adjective pair was presented in the opposite order on the ESF

Table 2. Summary of the backgrounds of four interviewees

Name	Andrea <sup>1</sup>	Susan	Paul	Lyn
School	Broadland <sup>1</sup>	Broadland	Huntermville	Huntermville
Years of teaching experience	24	1.5	24	1
Subjects taught	Mathematics only	Mathematics, Information Technology [IT]	Mathematics, Personal Development	Mathematics, Psychology, Industry & Enterprise
Lessons taught per week	20	26	20	26
Responsibilities	Head of Mathematics, Sport [Saturday], Community service	Head of Middle Years IT curriculum	Head of House [pastoral], Associate Dean of Students, teacher mentor	Tutor, coach of sporting team
No. of ESFs completed	42	31	42	42
No. of stressed responses <sup>2</sup>	6	10	9	5

1. Pseudonyms have been used for the names of the teachers and the schools in which they work.

2. Very and quite stressed have been combined

### **School 1 teachers**

*Andrea (experienced)*

On the ESFs, Andrea reported being stressed on six occasions. Interestingly four of these occurred on the same day – Monday. She indicated that all the activities were work-related and were ones that she had to undertake. Rather than directly related to her teaching, the tasks she found stressful were all related to administrative tasks.

When signaled and responding that she was engaged in teaching-related tasks or tasks associated with her role as head of department, the ESF data did not reveal Andrea as stressed. This pattern contrasted with that of Susan, her novice colleague.

*Susan (novice)*

Susan reported being stressed on 10 ESFs. Four were related to her teaching responsibilities in mathematics, the other six to IT teaching.

### **School 2 teachers**

*Paul (experienced)*

Paul reported being stressed on nine ESFs. Two of these were directly related to his mathematics teaching and involved the same grade 12 class. For the other seven times Paul reported being stressed he was engaged in a range of different administrative tasks related to his role as Head of House (pastoral responsibility).

*Lyn (novice)*

Lyn reported being stressed on five ESFs. Each occasion was related to her mathematics teaching responsibilities.

In summary, it seemed that teaching-related tasks were the main cause of stress for novice teachers, while for experienced teachers it was administrative tasks.

## **Concluding comments**

The findings confirmed that teachers' work extends well beyond formal school hours. Preparation, in particular marking students' work, was more likely to be done out of hours. Administration, which took up a large slice of the working day, also intruded into out of work hours. It was noteworthy that when teaching mathematics, the participants' feelings and moods were generally positive, and high levels

of engagement could be inferred – far more than for administration. How the administrative burdens placed on teachers can be reduced warrants thoughtful consideration by senior administrators - both at the school and system levels.

Our modest sample size does not allow us to generalise beyond this study. However, in common with other researchers we found overlap as well as differences in the tasks and work patterns of experienced and novice teachers, and in the activities they appeared to find stressful. Administrative tasks were more likely to be a cause of stress for the experienced teachers; teaching related activities for the novices. The teachers discussed in this article were undoubtedly diligent and hard working. The range of tasks they undertook, whether related to their mathematics teaching or administration, was extensive and extended well beyond formal working hours. They seemed accepting, rather than resentful, of this. In summary, the ESM data, together with the interviews, provided contextualised information about the types of activities that the novice and experienced teachers engaged in, when they undertook the tasks, and which they found stressful.

## **References**

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