Teaching across a range of responses to develop the concept of telling-time

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Executive summary

This case study outlines the procedures that were implemented to help a pupil develop an initial understanding of time and how to read clock faces. The teaching methods applied allowed the skill of telling time to be taught in more intensive settings in order to develop a broader understanding of time. The specific methodology is discussed within this case study and the progress for the specific pupil that it was implemented with.

Introduction

Telling the time can be a difficult concept to understand but a skill which is so important for many aspects of an individual's life. Time is crucial for everyday living, we may have set dinner times, we have scheduled work hours, we set our alarms for a set time, we arrange to meet friends at suitable times, train rides and flights are scheduled around time. If one can develop an understanding of time and how to read it from the many clock faces within one's environment, a certain level of independence is possible and more importantly one can take some control of one's own life (DiPipi-Hoy, Jitendra & Kern 2009).

The pupil discussed in this case study attended Park House School and was in Key Stage 3. The pupil used 2-3 word utterances to make requests, had an ability to read and write common words and as a pre-requisite to time telling, they could identify and label numerals. Time-telling was added to the pupil's IEP because they demonstrated a keenness to know and understand their own daily and weekly timetable, they would frequently ask their tutor to go through the timetable with them. This pupil follows a daily written timetable, the pupil can read what they are doing throughout the day but cannot read or follow the time. The purpose of this case study was to teach this pupil how to tell the time, so they could start

to independently read and follow their own timetable without adult guidance.

Method

The initial aim of this procedure was to help the pupil learn how to identify times to the nearest hour 'o'clock'.

There were three responses that we expected and measured:

1. Point – when presented with three digital or three analogue faces and asked "point to/find X o'clock" the pupil was expected to point to the correct clock face
2. Tact (label) – when shown a digital or analogue clock and asked, "what time is it?" the pupil was expected to say "X o'clock"
3. Match – when presented with three digital or three analogue faces and asked "match X o'clock with X o'clock" the pupil was expected to match the faces, analogue to digital and vice versa

Resources:
Initially, we only prepared clock faces depicting times on the hour. We prepared images of analogue clocks and digital clocks using the 12-hour format rather than 24-hour.

Baseline:
A baseline score was obtained for each time between 1 o'clock and 12 o'clock and for each of the expected response above. Data was recorded on a trial-by-trial basis - after each response. The baseline results required a large amount of data to be collected. It was conducted over three sessions, so the pupil could have a break in between sessions.

During the baseline, the pupil did not receive reinforcement or correction after they responded, instead mastered skills were interspersed, and correct responding to these instructions was reinforced to maintain motivation.

Teaching procedure:
Following the collection of baseline data, we selected two times that would be our target for teaching. For this pupil we selected 11 o'clock and 12 o'clock. The pupil made consistent errors across these two times, during baseline.

The teaching procedure implemented was based on the principles of multiple-exemplar training/multiple-exemplar instruction (MEI) (Greer & Ross, 2008). The aim of this procedure is to teach enough examples and allow the individual to practice the correct response with a variety of stimuli and across different response types in order to promote generalisation (Cooper, Heron & Heward, 2019). In this instance, the resources remained the same to keep the

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resources clear, however we aimed to teach across different responses within the teaching sessions, hence the different expected responses, outlined above.

The pupil was exposed to one time teaching session per day. Within that session all responses were taught for the two-target times. Each response was taught 10 times (5 analogue and 5 digital) for each time, so in total 60 trials were conducted within one teaching session.

The instructions used to evoke the expected responses were delivered as outlined above. If the pupil responded correctly a '+' was recorded on the data sheet and the pupil received social praise after every correct response. If the pupil responded incorrectly a ''-" was recorded on the data sheet, the instruction was repeated and a prompt delivered and time given for the pupil to follow the prompt, the instruction was repeated again and the pupil was expected to respond independently (no praise delivered). Following the two repetitions of the instruction, the next trial was introduced. In addition, mastered skills were interspersed invariably, and the pupil was given access to his preferred item (iPad/computer) after an average of 1-minute of remaining at the table and responding.

Once a pupil achieved 90% across 3 consecutive sessions for both target times across an expected response e.g. match, this was considered mastered and data for that response was no longer collected; trials of the mastered response were still interspersed but not as intensively. The sessions continued on a daily basis until mastery was achieved across all expected responses for both times.

Post-test:
Following the mastery of all responses across both 11 o'clock and 12 o'clock, we conducted a post-test to test whether the ability to point, tact and match the clock faces had generalised to the other o'clock times. The same procedures outlined for the baseline session were implemented for the post-test.

Results

All of the time teaching sessions that the pupil was exposed to were successful, the pupil remained motivated and engaged throughout the sessions, despite them being longer in duration than typical intensive teaching sessions and with a history of displaying task-avoidant behaviours.

The baseline data are outlined in Figure 1. and show that across all the times (1 o'clock to 12 o'clock), the pupil could match the clock faces with 25% accuracy, point to the correct face with 67% accuracy and could tact the time with 75% accuracy.

The post-test was conducted following teaching trials to mastery, and the findings are outlined in Figure 1. As you can observe the pupil could match the clock faces with 91% accuracy, point to the correct face with 87.5% accuracy and could tact the time with 83% accuracy.

We observed an increase from the baseline phases and the post-test results, demonstrating that the pupil had developed some skills to identify times to the closest hour across all clock faces without the direct teaching of each specific time.

Discussion

For this pupil the teaching methods used to teach the telling of times closest to the hour (o'clock), significantly increased their correct responding for both analogue and digital times and across a range of responses. The fact that this progress generalised to other times without direct teaching allowed for more effective teaching for this pupil - they required fewer teaching trials overall. This should be factored into future teaching sessions with this pupil to further enhance their learning.

As we have only taught o'clock in this instance, we will continue to use the same teaching procedure for more abstract times such as quarter past, half past etc. We hope to continue to intersperse o'clock as a mastered skill in order for the learner to maintain this skill and aim for the learner to develop a broader understanding of time.

The time was already included in the pupil's daily timetable, but we will aim to create opportunities for the learner to cross-reference the current time on clocks, watches, screens etc. (when close to the hour) and the scheduled session, so the pupil can begin to understand the use of time telling within their everyday life.

We also hope that these teaching procedures can be used with other learners, not just for time-telling but to increase generalisation of a wide-range of behaviours.

Figure 1. Graphic display of baseline and post-test scores

Bar chart displaying the post-test scores in relation to baseline for teaching time-telling
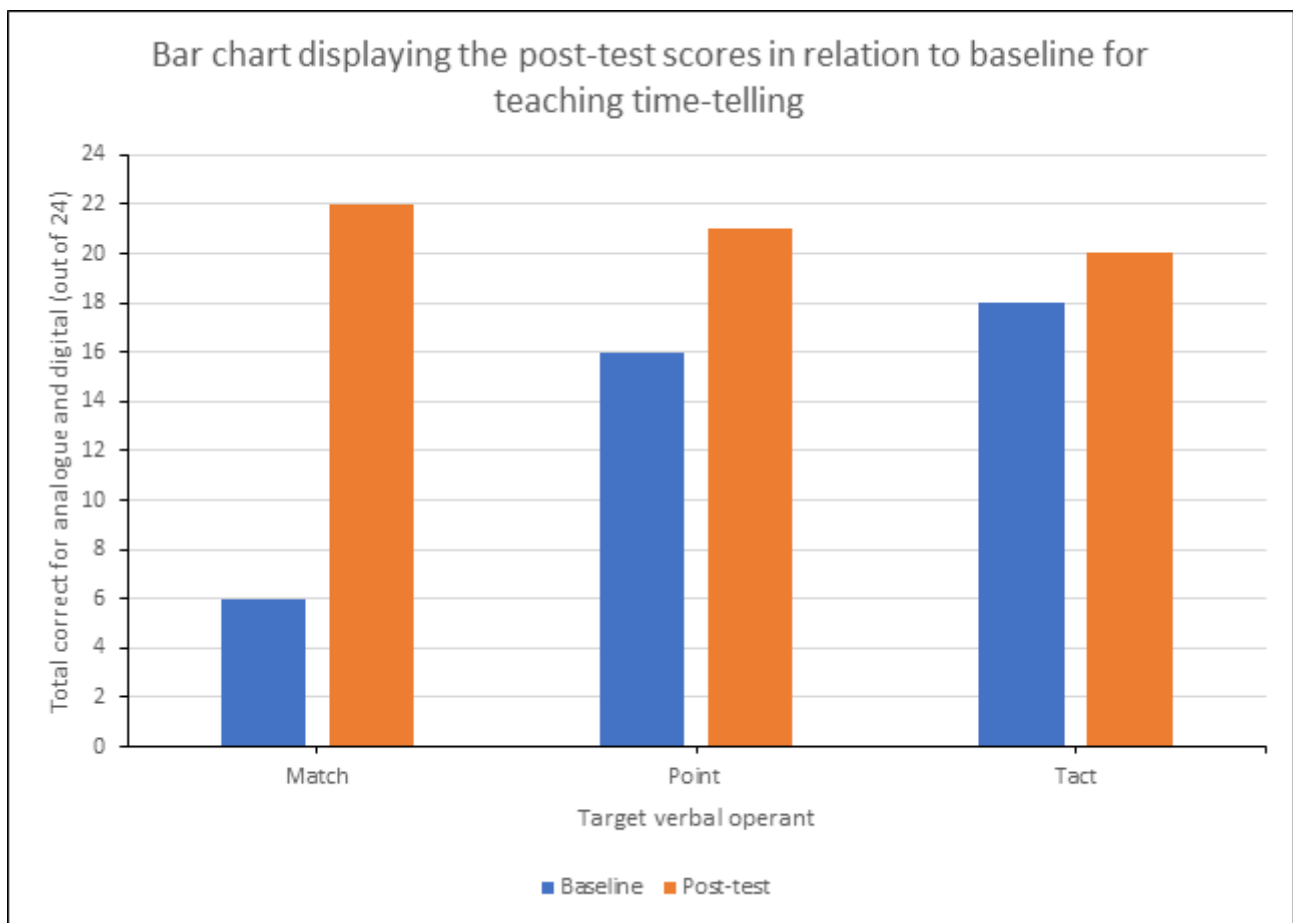
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