The Effects of Novel Token Economies on Academic Responding of an Adolescent diagnosed with an Autism Spectrum Disorder

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Submitted for the CABAS® Master Teacher Rank

July 2017

Abstract

The current study investigated the effects of novel token economies to improve academic responding for an adolescent male diagnosed with an autism spectrum disorder. Academic responding was defined as increasing Learn Units correct and presented and daily educational objectives achieved. A reversal design was used to analyse the effects of using a novel token economy system for every reinforcer exchange to increase the number of learn units presented and the educational objectives achieved daily. Results demonstrated that the novel token economies did increase academic responding through increase learn units presented and educational objectives met daily by the participant. Implications and future research directions are discussed.

Key terms: autism spectrum disorder; novel token economy; learn units

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Motivation has long been a problem for a range of individuals with a variety of disabilities, Koegel and Mentis (1985) reviewed the research conducted on motivation in children diagnosed with an autism spectrum disorder and found that many were described as being extremely unmotivated in demand situations and test conditions. Clark and Rutter (1979) stated that due to individuals diagnosed with an autism spectrum disorder experiencing repeated failure in tasks they rarely contact reinforcement schedules and in turn this can decreases their motivational levels in demand situation, hence developing a stereotype of autism being linked to low levels of motivation. However as more research is conducted in this area this has been found to not be the case. Keogel, O'Dell and Keogel (1987) conducted a study to contrast this theory; they found that children diagnosed with an autism spectrum disorder achieved higher percentages of correct responding in verbal responding when a motivation contingency was implemented.

One method to address levels of motivation is the use of a token economy system:

> "Token economies are used as a method of strengthening a behaviour, or increasing its frequency, because the tokens are a way of "paying" children for completing tasks and the children can then use these tokens to buy desired activities or items" (Miltenberger, 2008, p.498).

The idea of the token economies have been around since 1965 when Ayllon and Azrin first developed the concept for chronic psychiatric patients and since then the research in this area has been vast. The populations that token economies have been used with have been extended to individuals with brain syndromes (Murphy, 1976), psychomatic disorders (Wooley, Blackwell, & Winget, 1978), individuals

diagnosed with an autism spectrum disorder (Hung, 1977; Tarbox, Ghezzia & Wilson, 2004) Hemodialysis patients (Carton & Schweitzwer, 1996) and delinquents (Hobbs & Holt, 1976). Token economies have been implemented to target a large range of behaviours, such as academic responding (Mirzamani, Ashoori, & Sereshki, 2011; Clark & Rutter, 1979), social behaviours (Heaton & Safer, 1982) and parent training programmes (Salzinger, Feldman, & Portnoy, 1970).

Hobbs and Holt (1976) utilised a token economy to increase peer interaction, rule following and task completion in 125 adolescent males committed to an institutional correction facility. They found that not only was the use of a token economy effective to increase these behaviours it also demonstrated maintenance of the behaviour with the long term effects being in place 12 months after the initial behaviour change. This study is particularly encouraging due to the sample size and the range of participants used, however it does highlight some ethical considerations, such as the target behaviour selection was in the interests of the administration staff rather than the clients themselves.

A large sample of the literature on token economies is quite dated and therefore many ethical issues have been identified, but as research has continued findings have been expanded. Mirzamani, Ashoori, and Sereshki (2011) evaluated the effects of a token economy on academic achievements in students with learning disabilities in a science class and found that the token economy was more effective than social reinforcement. Tarbox, Ghezzia, and Wilson (2004) studied the use of token reinforcement to increase attending behaviour during discrete trial instruction for both academic behaviour and communications skills with young children diagnosed with an autism spectrum disorder and found that this was an effective tactic but only when the back-up reinforcer was available and accessed immediately.

This vast amount of research across different populations and behaviours further supports the effectiveness of the token economies and highlights the importance of this system; Matson and Boisioli (2009) claim that the token economy has been "One of the most important technologies of behaviour modifiers and applied behaviour analysts over the last 40 years…" (P.240) However as with any research there will always been limitations and the research over the years has also highlighted a range of problems with the use of a token economy. Kazdin and Bootzin (1972) outlined four obstacles after reviewing the research in this area; firstly maintaining the behaviour change that initially resulted from the token economy and generalising the results, also the staff training that was needed in order to implement the token economy effectively to ensure the results were accurate. They also outlined the problems relating to the client responsiveness to the systems in place and how to overcome any client resistance demonstrated.

Another variable to consider is the age of the participants, Heaton and Safer (1982) conducted follow up studies and found that adolescents who participated in a successful token economy study did not maintain these results by the end of the school year. This could be due to the longevity that the token economy system was in place.

From reviewing the research conducted in this area it is clear that a token economy can be hugely successful for a range of populations and behaviours, however it has been claimed that the effects are not always maintained and this could be due to satiation effects. The current study aims to evaluate the effects of a novel token economy on increasing academic responding for an adolescent diagnosed with an autism spectrum disorder.

Method

Participant

One 18 year old male participant took part in the study; he had a diagnosis of an autism spectrum disorder. The participant was in the sixth form class and followed an individualised curriculum focussing on life skills and communication. The participant was a speaker, listener, a reader and a writer. He was able to follow simple vocal and written instructions and write sentences with appropriate grammar and punctuation. The participant was selected to take part in the study due to his history of motivational problems. He showed a highly variable level of responding to both academic and social tasks across teachers due to problems relating to the motivational context. The participant had a token economy system in place for the majority of his school life but would often refuse tokens despite wanting the reinforcer that was to be exchanged at the end.

Setting

The study took place at a CABAS® day School in England. The school is open for 43 weeks a year Monday to Friday 9.30am to 3.45pm for the pupils; the school follows the CABAS® approach to instruction and has a 1:1 teaching ratio. At the time of the study there were 54 pupils at the school divided into 12 classes based on verbal ability and key stage. The participant was in a sixth form class containing two other pupils with two teachers, a lead teacher and a supervisor. The baseline and treatment sessions were carried out in the sixth form classroom, the sixth form common room and daily living skills room. The classroom consisted of three work stations for pupils, two class computers, stationary cupboards, an interactive whitebeard and a class whiteboard. The common room contained a small kitchen area, an eating area and a free play area consisting of books, music, DVDs and an air

hockey table. The daily living skills room resembled a small studio flat with bedroom, kitchen and living area.

Materials

Materials for the baseline sessions were the pupil's usual token economy system; a small money box, a collection of one and two pence British coins, a tick sheet and a shop menu stating how much each activity or item would cost. A timer was used in baseline to prompt the pupil to exchange his coins. During treatment a range of token economies were used; such as small blocks to fill a container, puzzle pieces, race tracks and tokens to complete music CDs.

A data sheet, data graph and pen were used for data collection purposes.

Definition of behaviour

The target behaviour was to improve academic responding. This was defined as an increase in the number of Learn Units (Greer & McDonough, 1999) correct and presented to the pupil and the number of educational objectives achieved daily. The Learn unit was defined as "…a countable unit of teacher and student interaction that leads to important changes in student behaviour" (Greer & McDonough, 1999, p.6)

The independent variable was the use of Novelty of the token economy system. For the purpose of this study Novelty was defined as a new token economy that was unfamiliar to the pupil. It was further defined as changing the token system presented to the pupil after every reinforcer exchange and to not be represented for three days of instruction.

Data collection

Data were collected and reported as Learn Units (Greer & McDonough, 1999) and educational objectives met by the pupil daily, data collection procedures were identical in baseline and treatment sessions.

Procedure

During baseline sessions the pupil earnt pennies on a variable schedule of three (VR3) for academic responding, the pupil was prompted to count his pennies and exchange them for an item or activity from the shop menu on a variable schedule of 10-30 minutes. This system continued through the day using the pennies, money box and shop menu.

During treatment sessions a different token economy system was presented to the pupil after every reinforcer exchange. Once the token economy system was used it was removed from the token economy box for three instructional days. Token economy systems ranged from race tracks, filling containers with boxes and puzzle pieces; many of the token boards/systems in treatment were related to subjects that were of interest of the pupil, such as music, crisps and DVDs. Once the pupil had earnt all his tokens or completed the board he could select an item or activity from the shop menu, as in baseline.

Design

The study utilised a Reversal Design (ABAB).

Interobserver agreement

Interobserver agreement was carried out for 30% of all baseline sessions, scoring 100% agreement and for 62% of all treatment sessions with 100% agreement. Interobserver agreement was carried out by the experimenter observing the instructional sessions and ensuring the correct treatment was being applied and that it was implemented correctly.

Results

Figure 1 show the number of Learn Units presented daily and the average number of learn units presented daily during baseline and treatment. Results showed that during baseline data ranged from 9 learn units to 123 learn units with an average of 60 learn units presented daily. During treatment sessions the average learn units

presented increased to 110 daily, ranging from 9 to 203. A return to baseline showed a decrease in learn units presented with an average of 78 and a range of 43 to 164, the final return to treatment showed data ranged from 78 to 133 learn units presented daily with an average of 98 learn units presented daily.

Figure 2 shows the number of correct learn units presented daily and the average number of correct learn units presented daily to the participant. Results showed that baseline data ranged from 8 to 164 correct learn units daily with a mean average of 82, treatment data showed a slight increase with a mean average of 88 correct learn units with a range of 4 to 177 correct learn units daily. The second baseline showed a decrease from the treatment condition with a mean average of 52 correct learn units with a mean of 21 to 132 correct learn units daily. The final baseline condition showed a slight increase with a range of 72 to 81 correct learn units with a mean average of 67 correct learn units a day.

Figure 3 showed the number of educational objectives met by the participant daily and the average number of educational objectives met daily during baseline and treatment conditions. Results showed that baseline data ranged from 0 to 1 objectives met daily with a mean average of 0.1, this increased in treatment conditions with a mean average of 0.8 ranging from 1 to 3 objectives met daily. Data for the return to baseline showed a slight decrease in the mean average to 0.5 (range 0-2) followed by an increase in the final treatment condition with a mean of 1.2 objectives met daily and a range from 1 to 2 objectives met daily.

Discussion

The main purpose of this study was to investigate whether producing novel token economy systems would increasing academic responding for a student who has a history of low levels of motivation and a tendency to become punished by the token economies in place; results showed that the study was effective across all three

variables with significant gains demonstrated in total learn units presented and objectives met daily. Interestingly there was not a significant increase in the number of correct learn units achieved by the pupil; there was a slight increase from the first baseline to the first treatment condition but once the novel token economy was removed for the second return to baseline condition data were significantly lower than the initial baseline and levels of responding did not return in the second treatment condition; this could be due to the participant being aware of change of contingencies and removing the treatment could have lowered motivation further. Although the number of correct learn units did not significantly increase we did see an increase in objectives met daily by the participant, indicating higher levels of motivation.

An increase in the number of learn units presented daily during treatment conditions was encouraging and anecdotally it was noted that the participant would return to the instructional table after a reinforcer break quicker than baseline sessions therefore allowing the teacher to present further learn units, it was also noted that the pupil would respond quicker to the learn unit antecedent and showed reduced levels of non-compliant behaviour; a replication or extension of this study could collect data on these areas to provide further evidence that novelty of a token economy would decrease latency of responding.

Data across all three dependent variables are highly variable across the daily sessions; this is due to the participant's weekly timetable and some daily sessions having larger portions of the day with scheduled instructional sessions compared to offsite visit sessions. A replication or extension of this study could consider only recording data for a period of the day where sessions would remain the same across all days.

An interesting variation of the current study would be to include a social reinforcement only condition; Mirzamani, Ashoori and Sereshki (2011) found that

token economies were more effective than social reinforcement and including a social reinforcement condition in the current study could provide support for this study. Although much of the research suggests token economy are effective in many areas they can be time consuming to resource, especially in the case of this current study where many token boards needed to be made frequently to keep it novel so if social praise was found to be as effective as the token economies to increase academic responding then this would reduce both time and cost elements. A further limitation of some token economies over other methods, as highlighted by Kazdin and Bootzin (1972), is the staff training that is required in order to ensure it is implemented correctly. Due to the nature of the setting of the current study where a large amount of staff training is carried out in the classrooms on a daily basis it allowed, not only for staff to be trained in the procedure but also for support and IOA to be carried out throughout the study.

Research conducted by Heaton and Safer (1982) identified that the age of the participants could be a variable that affects the effectiveness of a token economy; as is true for the participant in the current studies many individuals who take part in the research may have a long history of token economies in place or be recipients of Applied Behaviour Analysis (ABA) services and could become satiated on certain approaches; an interesting replication of this study would include multiple participants of varying ages and instructional histories to see if these results would be replicated and maintained across a range of participants and therefore eliminate the limitations of a single subject design .

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Figure 1

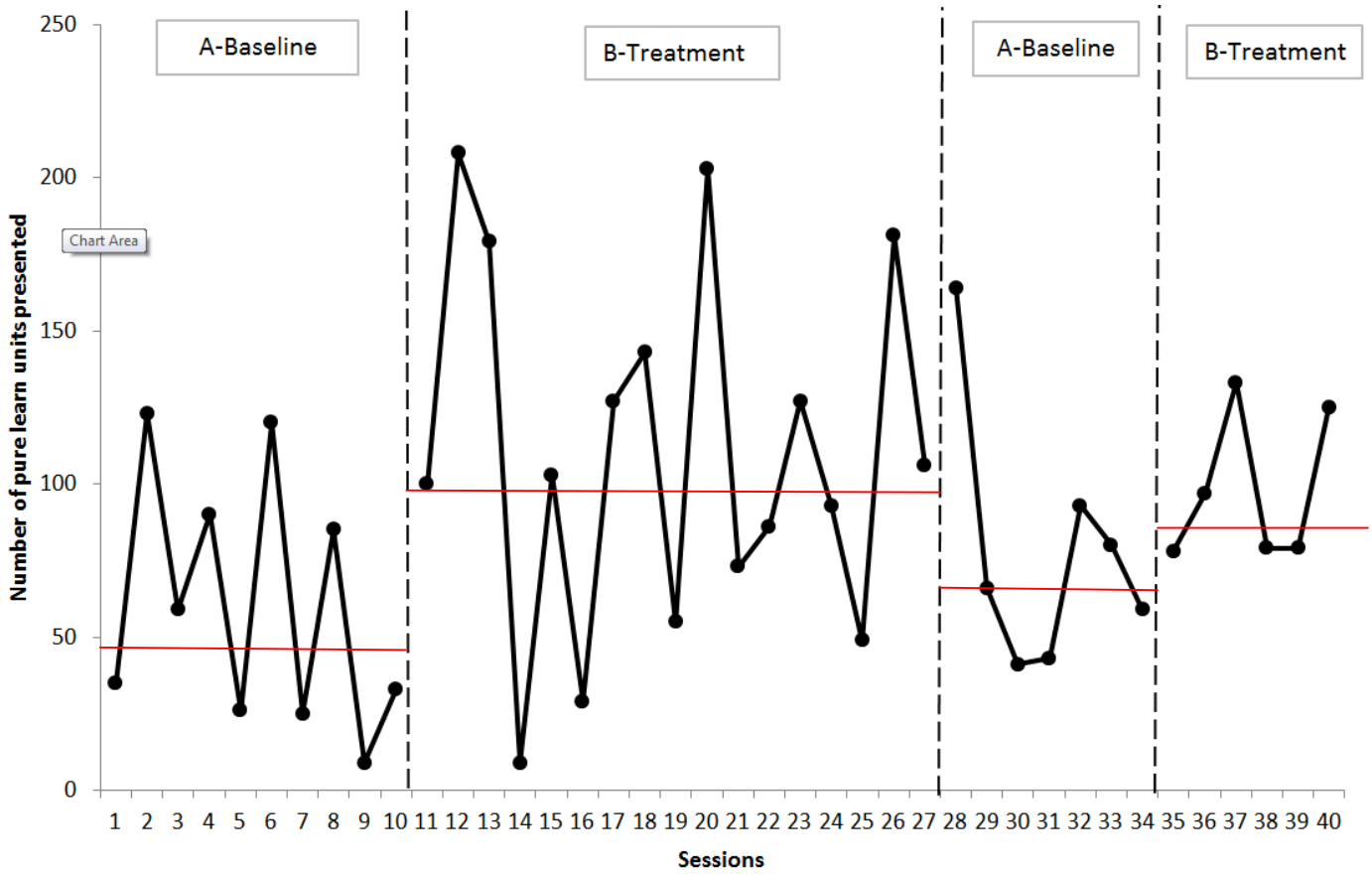

Figure 1: Graph to show the total number of Learn Units presented daily during baseline and treatment. Red line represents the mean average.

Figure 2

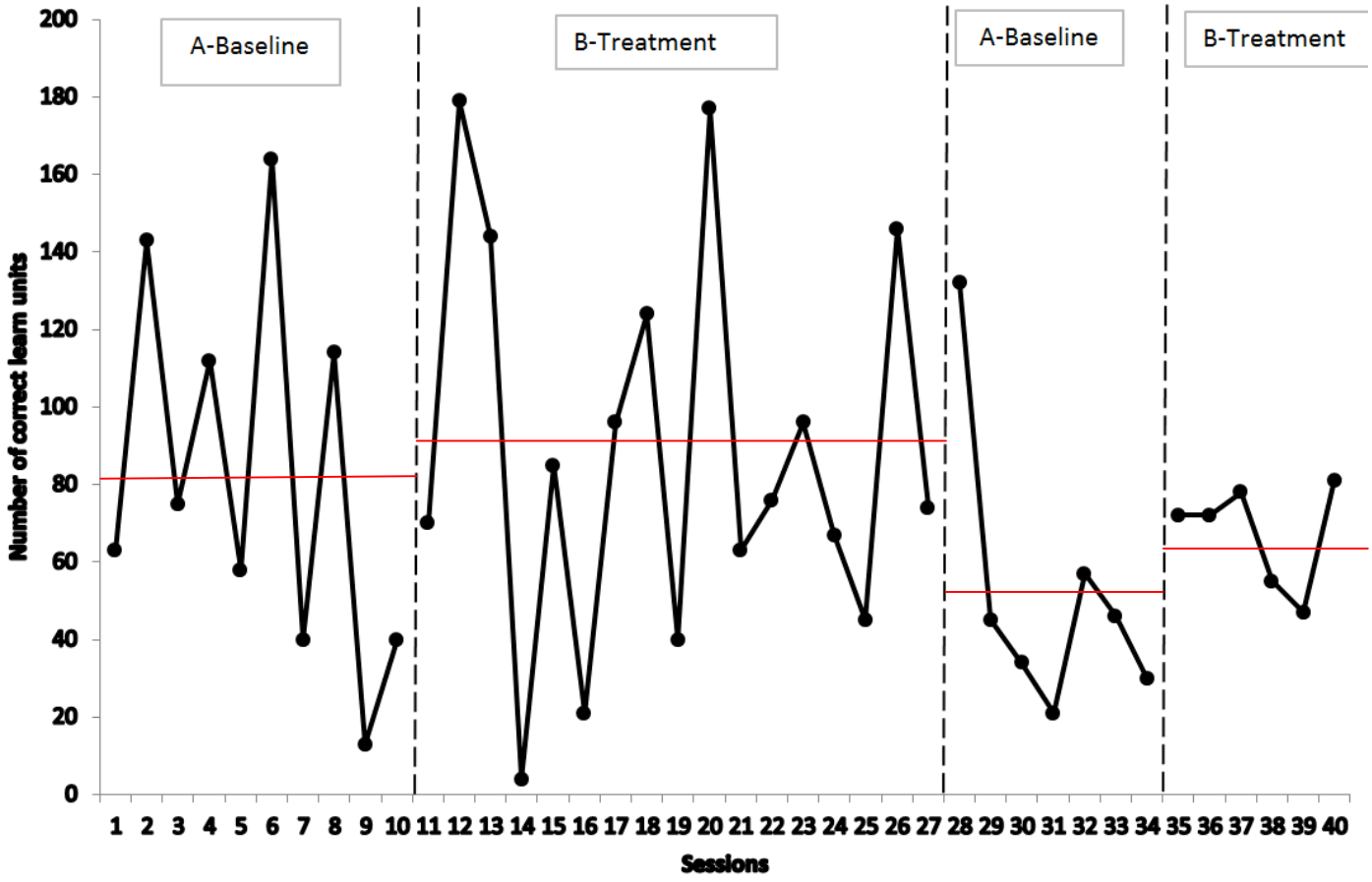

Figure 2: Graph to show the number of correct Learn Units presented daily during baseline and treatment. Red line represents the mean average.

Figure 3

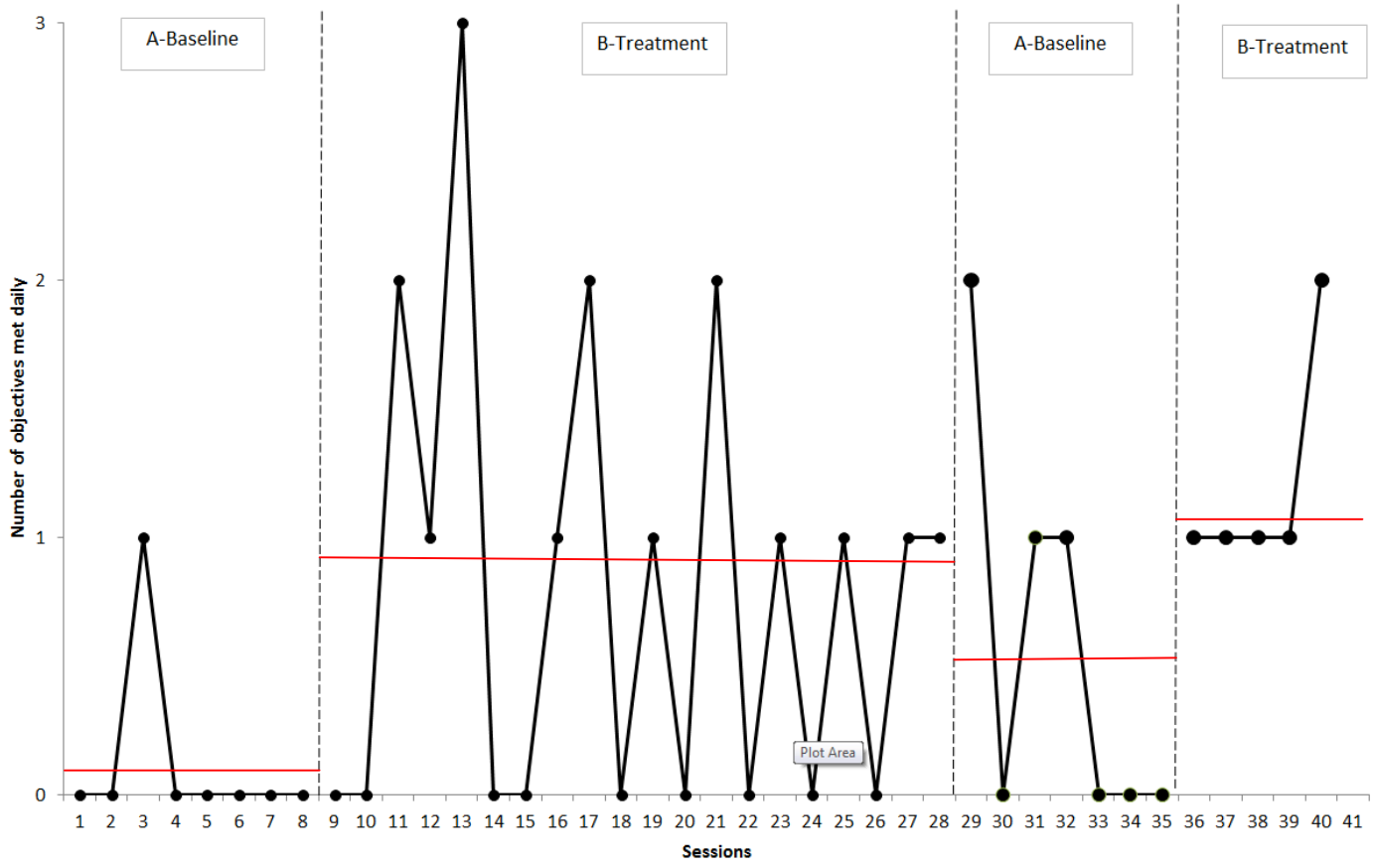

Figure 3: Graph to show the number of educational objectives met daily during baseline and treatment. Red line represents the mean average.