

Who Gets What, and Why? Measuring Outcomes of Assistive Technology Trials.

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## **INTRODUCTION**

In determining the effectiveness of assistive technology for an individual in order to make recommendations for equipment funding, anecdotal reports and literature suggest that many assistive technology services use equipment trials as an important part of the decision making process. However a review of the literature highlights the lack of documented evidence of the use of outcome measures to objectively evaluate these trials. Objective evidence is increasingly essential to demonstrate the effectiveness of assistive technology to funding bodies to justify resources and can help to inform the professional decision making process in recommending appropriate technology for an individual.

## **BACKGROUND**

TASC Consultative Services (Technology solutions for computer Access, Seating and Communication) is a division of Technology Services of The Spastic Centre in NSW, and provides specialist clinical information for people with complex assistive technology needs across NSW and the ACT. TASC consultants work in a collaborative-consultative model with local support teams to provide advice and information, comprehensive technology assessments, assistive technology trials, and to make recommendations to funding bodies for equipment provision.

Clients receiving an assistive technology assessment through TASC generally then participate in an equipment trial prior to final technology recommendations and completion of funding applications. This

is in line with the SETT framework (Zabala, 1995), followed by TASC and many assistive technology services, in that the Tools (technology) must be considered along with the Tasks that the individual needs to perform, and the Environments in which they need to perform the Tasks. Assistive technology trials are essential in allowing the client to use the technology (Tool) in all their related Tasks and Environments in order to determine the appropriateness of the technology for their individual needs and goals.

The trial period for equipment loaned through TASC is limited to two weeks due to equipment resources. Equipment trials are conducted by the local team (including the client, family, school and therapists where appropriate) with support from TASC consultants. Historically, the outcomes of these trials were reliant on subjective reports and clinical observations from the local team. The consultants had no method of objectively determining if equipment trialled was appropriate for an individual. In addition expectations for the individual's use and application of the technology to the environment and tasks during a trial was often unclear, resulting in difficulty in evaluating the equipment's success, or potential for success, for the individual. Consultants were being requested by local teams to support funding applications for technology without having adequate means to evaluate the trials and to justify requesting resources from funding bodies. A need was identified for more objective measures to allow TASC consultants to evaluate assistive technology trials more effectively.

In order to determine appropriate outcome measures for evaluating equipment trials, a focus group was formed (including a research fellow of The Spastic Centre), and a literature review undertaken to identify possible measures. Key elements identified by the focus group were that the measure needed to be: generic to be able to evaluate a range of technology interventions, relevant to a diverse client group in age and disability, simple to administer, cost effective and sensitive to show specific individual changes, especially in short time frames for equipment trials. As a client-centred service, it was felt the most important construct to measure was whether equipment being trialled was effective in helping individual client's achieve progress towards identified goals, and that the service was not attempting to evaluate

specific pieces of technology or compare individuals.

## GOAL ATTAINMENT SCALING

Goal Attainment Scaling (GAS) was identified as a suitable outcome measure to meet TASC consultants' needs to evaluate individual equipment trials. Goal Attainment Scaling is:

- An individualised, criterion referenced measure (King, McDougall, Palisano, Gritzan and Tucker, 1999).
- A device designed to evaluate services according to the attainment of a number of client-specific goals (Kiresuk and Lund, 1979).
- A technique that generates a meaningful numerical indicator of goal attainment that allows comparison of diverse treatment modalities (Kiresuk and Lund, 1979).
- A technique that allows for setting a range of outcomes including both better and worse than expected (Kiresuk and Lund, 1979).
- Valid even when clients have different goals. The GAS score allows comparison of clients' relative success in achieving their unique set of goals (Ottenbacher and Cusick, 1993).
- An outcome measure that can be applied to a wide variety of settings and with the potential to be a client/family-centred approach to evaluation (Young and Chesson, 1997)

Ottenbacher and Cusick (1990) state that goals for a GAS have two major criteria: they must be observable and recordable behaviours, and they must be time limited. They identified eight steps to complete a GAS for a client:

1. Select an overall objective as the long-term aim.
2. Identify specific problem areas that should be addressed, weight their importance and reduce them to observable components.
3. Specifically identify the behaviours or events that will indicate improvement.

4. Determine who, how and where the desired information will be collected.
5. Select the expected level of performance.
6. Identify the most favourable outcome, least favourable, and intermediate levels of performance.  
Each is assigned a numerical value above and below to expected level of zero.
7. Check that the outcomes are a continuum of behaviour, and there are no overlaps or gaps.
8. Ascertain client's current status and determine future dates to evaluate progress.

The GAS procedure involves completing a specific table-style form that summarises the goals and predicted levels of outcomes and is used to rate the client's performance (see Appendix 1). Scores are then converted to a GAS t-score using either a formula (Kiresuk and Sherman, 1968) or the Conversion Tables (Cardillo, 1994). The t-score is a standardised score where a score of 50 represents the mean (expected level), and a difference of 10 from the mean is one standard deviation (below or above expected level).

## **PILOT STUDY**

Following identification of GAS as a suitable outcome measure, the focus group developed a pilot study to trial the instrument and determine its clinical utility for evaluating technology trials. All consultants underwent an initial training session with the research fellow and were provided with literature detailing the assessment. Goal attainment guides were developed (see Appendix 1) and protocols determined for the implementation of the instrument. All clients completing equipment trials through TASC were to participate in the goal attainment process with consultants and local teams and a database was developed to track results. In addition, a shared file was set-up on consultant's computers to record Goal Attainment Scales set with clients to enable consultants to share ideas and help with GAS formulation. The research fellow was also available for consultation where required.

## RESULTS

Since commencement of the pilot study, the following results have been obtained over an 18-month period:

- 30 Goal Attainment Scales were sent to clients trialling technology and 20 were returned completed following trials
- 51 individual goals were written as scored scales:
  - 41% of goals related to clients trialling communication devices
  - 35% of goals related to clients trialling alternate computer equipment e.g. mouse, keyboard, software
  - 18% of goals related to clients trialling environmental control devices
  - 6% of goals related to clients trialling switches to access a range of technology
- Of the 20 Goal Attainment Scales returned:
  - 65% of clients reached above the expected level of performance for the trial period (t-score greater than 50)
  - 15% of clients reached the expected level of performance for the trial period (t-score of 50)
  - 20% of clients did not reach the expected level of performance for the trial period (t-score less than 50)

? Examples of Goal Attainment Scales can be found in Appendix 2

## DISCUSSION

Goal Attainment Scaling has been found to be a clinically useful tool for TASC consultants to objectively evaluate whether assistive technology was appropriate for individuals following an equipment trial. Where clients reached the expected or above the expected level of performance objective data was available to support requests to funding bodies. In cases where clients did not reach the

expected level during a trial period, the technology was reviewed and further equipment trials arranged where appropriate. Reasons provided for clients not reaching the expected level included: technical difficulties with the equipment; physical deterioration of the client during the trial; physical access to equipment too fatiguing for the client; and non-functional use of the equipment (related to a child using a voice-output communication device who preferred to use his voice).

The 66 percent return rate of Goal Attainment Scales was disappointing and related to initial trial procedures. Initially the GAS documents were sent with equipment for trial and the local team were not provided with adequate information on the importance of completing the scales and returning these with the equipment at the completion of the trial. This resulted in a review of procedures during the pilot study and consultants now spend more time setting and explaining the scales with the client and the local team prior to the commencement of the technology trials. Follow up calls are made to the client and local team during and at the completion of the trial to determine the client's level of performance and scales are completed with the team on the phone.

The process of implementing GAS has promoted more discussion between TASC consultants, the clients and their local teams to clarify goals and expectations for trials. This discussion has been essential to determine the clients' current functional status and the expected levels of performance (from the client and the local team) for the use of the technology during the trial period. This has enhanced understanding for all parties on the purpose of equipment trials and helped to clarify the roles of all individuals for the successful completion of the trial. It has also enabled more focus for trials by providing specific, objective goals for evaluation to determine the success (or non-success) of the trial.

The implementation of GAS has taken a substantial period of consultant's time to achieve competency in developing scales. Consultants reported difficulties initially in determining a client's functional status and expected levels of performance. There was considerable discussion amongst the team, peer review of scales developed, and close liaison with the research fellow during the initial period of

implementation.

GAS has to be applied in certain conditions to ensure reliable prediction of the level of outcome. Kiresuk, Smith and Cardillo (1994, as cited in Wessels, de Witte and van den Heuvel, 2004, p. 84) report that it has to be applied:

- in a routine manner;
- incorporated in the organisation and its procedures;
- after proper training;
- supported by a peer review committee; and
- after a substantial breaking-in period.

TASC has now established clearer procedures for implementation of GAS and it has been incorporated into service delivery more effectively. Consultants have been able to receive individual advice from the research fellow and have access to GAS rater training through the organisation where necessary. GAS is regularly discussed at team meetings and scales reviewed with peers. This has resulted in consultants now reporting more confidence and competence in goal setting and more successful equipment trials for clients.

## **CONCLUSION**

Goal Attainment Scaling has been found to be a clinically useful tool in objectively evaluating whether assistive technology was appropriate for individuals during an equipment trial. The process has promoted consistency of service delivery for trials and has provided more focus for trials by clarifying goals and expectations of clients and local teams. Objective data has been obtained to support requests to funding bodies and the majority of clients have achieved positive results of expected or above the expected level of performance during their trial periods.

## REFERENCES

- Cardillo, J.E. (1994). Appendix A: Summary score conversion key. In T.J. Kiresuk, A. Smith, & J.E. Cardillo (Eds.), Goal attainment scaling: Applications, theory and measurement. Hillsdale: Erlbaum Associates.
- King, G.A., McDougall, J., Palisano, R.J., Gritzan, J., & Tucker, M.A. (1999). Goal attainment scaling: Its use in evaluating pediatric therapy programs. Physical and Occupational therapy in Pediatrics, 19(2), 31-52.
- Kiresuk, T.J., & Lund, S.H. (1979). Goal attainment scaling: Research, evaluation and utilization. In C. Scholberg & F. Baker (Eds.), Program evaluation in health fields (Vol 2) (pp. 214-239). New York: Human Sciences.
- Kiresuk, T.J., & Sherman, R.E. (1968). Goal attainment scaling: A general method for evaluating comprehensive community mental health programs. Community Mental Health Journal, 4(6), 443-453.
- Ottensbacher, K.J., & Cusick, A. (1990). Goal attainment scaling as a method of clinical service evaluation. American Journal of Occupational Therapy, 44(6), 519-525.
- Ottensbacher, K., & Cusick, A. (1993). Discriminative versus evaluative assessment: Some observations on goal attainment scaling. American Journal of Occupational Therapy, 47(4), 349-354.
- Wessels, R.D., de Witte, L.P., & van den Heuvel, W.J.A. (2004). Measuring effectiveness of and satisfaction with assistive devices from a user perspective: An exploration of the literature. Technology and Disability, 16, 83-90.
- Young, A., & Chesson, R. (1997). Goal attainment scaling as a method of measuring clinical outcome for children with learning disabilities. British Journal of Occupational Therapy, 60(3), 111-114.
- Zabala, J. (1995). The SETT Framework: Critical areas to consider when making informed assistive technology decisions. Retrieved June 15, 2006, from <http://sweb.uky.edu/~jszaba0/SETTintro.html>

**APPENDIX 1****GOAL ATTAINMENT SCALE****Client name:** \_\_\_\_\_ **Date:** \_\_\_\_\_**Goal :** \_\_\_\_\_

<b>Level of Attainment</b>	<b>Goal</b>
<b>+2</b> Much better than expected	
<b>+1</b> Better than expected	
<b>0</b> Expected level of performance at end of trial	
<b>-1</b> Less than expected	

-2 Much less than expected	
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**Review date:** \_\_\_\_\_ **GAS score:** \_\_\_\_\_ **t-score:** \_\_\_\_\_

Below expected level (<50)  Expected level (50)  Above expected level (>50)

**Notes:**

## APPENDIX 2 – EXAMPLE GOALS

Computer access goal: For Sarah to be independent in mousing activities

<b>Level of Attainment</b>	<b>Goal</b>
+2 Much better than expected	Sarah uses the trackball mouse to move the cursor to a 5x5cm target independently
+1 Better than expected	Sarah uses the trackball mouse to move the cursor to a 5x5cm target with verbal prompting only
0 Expected level of performance at end of trial	Sarah uses the trackball mouse to move the cursor to a 5x5cm target with verbal prompting and visual cueing (e.g. point to cursor and target)
-1 Less than expected	Sarah uses the trackball mouse to move the cursor to a 5x5cm target with verbal prompting and moderate physical assistance (e.g. guiding)
-2 Much less than expected	Sarah uses the trackball mouse to move the cursor to a 5x5cm target with maximal physical assistance (e.g. hand over hand)

Communication goal: For Ben to be able to answer questions independently in morning circle and be understood by fellow students

<b>Level of Attainment</b>	<b>Goal</b>

+2 Much better than expected	Ben answers 2+ questions in morning circle with the DV4 independently
+1 Better than expected	Ben answers a question in morning circle with the DV4 independently
0 Expected level of performance at end of trial	Ben answers a question in morning circle with the DV4 but needs to be told (verbal prompt) where the answer is (e.g. weather page, days of the week)
-1 Less than expected	Ben answers a question in morning circle with the DV4 but needs to be shown (physical prompt) where the answer is (e.g. weather page, days of the week)
-2 Much less than expected	Ben answers a question in morning circle but does not use the DV4

Environmental control goal: For Anna to be able to independently control appliances in her environment

<b>Level of Attainment</b>	<b>Goal</b>
+2 Much better than expected	Anna uses the Senior Pilot to turn the TV on and change the channel with verbal prompting to find the correct button (two buttons programmed)
+1 Better than expected	Anna uses the Senior Pilot to turn the TV on and change the channel with physical prompting to find the correct button (two buttons programmed)
0 Expected level of	Anna uses the Senior Pilot to turn the TV on and off independently (one button programmed)

performance at end of trial	
-1 Less than expected	<b>Anna uses the Senior Pilot to turn the TV on and off with verbal prompting to find the correct button</b>  <b>(one button programmed)</b>
-2 Much less than expected	<b>Anna uses the Senior Pilot to turn the TV on and off with physical prompting to find the correct button (one button programmed)</b>

Switch goal: For Thomas to be able to independently play a simple cause and effect game on the computer

<b>Level of Attainment</b>	<b>Goal</b>
+2 Much better than expected	Thomas can independently hold and squeeze the grip switch more than 7 times to operate a cause and effect game within 3 minutes
+1 Better than expected	Thomas can independently hold and squeeze the grip switch 7 times to operate a cause and effect game within 3 minutes
0 Expected level of performance at end of trial	Thomas can independently hold and squeeze the grip switch 5 times to operate a cause and effect game within 3 minutes
-1 Less than expected	Thomas can independently hold and squeeze the grip switch 3 times to operate a cause and effect game within 3 minutes

<p><b>-2</b> Much less than expected</p>	<p>Thomas cannot hold or squeeze the grip switch once to operate a cause and effect game within 3 minutes</p>
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