Graphing Made Easy: Practical Tools for School Psychologists

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Click here for the Figures cited in this handout.

Trainers in specialist level school psychology programs are always looking for new tools, materials and resources to assist the "practitioners of tomorrow" to develop the skills they will need to respond to an ever-changing educational environment. School psychologists today need to be fluent in a wide range of skills from traditional assessment activities utilizing standardized assessment techniques to the provision of consultation based services such as pre-referral intervention, functional assessment and implementing multi-tiered response to intervention (RTI) models of assessment (i.e., NASP 2003). Given these diverse and expanding role requirements, we are always seeking tools that are handy, easy to use and directly relevant to the practitioner (in other words, things that make our job easier and make us look good).

Two graduate students at SUNY—Oswego (second and third authors) developed a set of graphing templates that allow for the easy charting of academic and behavioral data. This handout provides some background on graphing and graph templates and also describes each of the templates that are available here. We also include a preview of an online section called "tricking it out" that has general information on personalizing and customizing student graphs. Each of the templates discussed here will be available for download and free use from the NASP website. We hope that these tools will be useful to school-based professionals.

Rationale for Graphing Data

This handout highlights the importance of graphing as a key component of consultative-based modes of service delivery. In light of the new language of the reauthorized IDEA and the paradigm shift within the field, it is increasingly important to have clear, concise means by which to interpret evaluation and intervention related data. Using graphs to display data can create an opportunity for the school professional to better present findings to others in ways that encourage and enhance problem-solving models. Graphs are excellent tools for communicating student results with teachers, parents, multi-disciplinary teams and of course Chairpersons for Committees on Special Education. Further, once created, graphs can easily be included in reports, printed for meetings, or e-mailed to relevant stakeholders.

Visual summary of performance. Upah and Tilly (2002) highlight three main purposes for which graphs are useful. First, graphs provide a means for visually summarizing information about student performance, projected performance and actual performance as it changes over the course of an intervention. As related to Response to Intervention (RTI) and the multi-tiered assessment model advocated by
researchers and supported by NASP (2003), a visual representation of progress attained versus that which is projected is a clear, concise method for displaying response to intervention. Graphs provide a standard basis for comparison between students. They are a fast, easy way to determine quickly and effectively whether or not a student’s performance is consistent with that of his or her peers, and whether an individual’s response to instruction and intervention is consistent with that of others receiving the same program.

**Supporting intervention.** Second, sharing graphed results during the intervention phase may help to shape positive perceptions of intervention effectiveness and student progress. When members of an intervention team are offered visual corroboration that an intervention is producing results, they are more likely to support the intervention and the process. “Such reinforcement helps to maintain the participation of those people in the treatment program, which is critical if objectives are to be achieved,” (Sulzer-Azaroff & Mayer, 1991, p.128). As school psychologists, part of our role is to give parents, teachers and administrators a reason to “buy in” to the goals set for our students. Graphing provides a means for establishing a common language that we can all understand and interpret. This may encourage a forum for open discussion of intervention evaluation and modification if necessary, lending way to the continued support of stakeholders.

**Accountability.** Third, graphing provides a “measure of professional accountability demonstrating how behavior change is functionally related to the intervention being implemented” (Upah & Tilly, 2002, p.491). Within the RTI model for SLD assessment recently outlined by Gresham et al. (2004), it is critical to determine whether a student’s lack of progress has persisted despite several well-implemented quality interventions, or if the lack of progress is environmentally related (termed an “instructional casualty”). Graphs become key in establishing response to intervention, in that they may allow teachers and school psychologists to determine when modification of an intervention is necessary, or when a new intervention design is most appropriate. While graphs are only as accurate as the information used to construct them, these tools are excellent for illustrating student progress and intervention effects.

**Graphing Made Easy**

Microsoft Excel comes equipped with a template function that has allowed us to create these time efficient and user-friendly tools for busy school based professionals. A template constructed in Microsoft Excel is a task-oriented Spreadsheet that has the necessary and appropriate categories pre-formatted. Once the desired template is selected (e.g., CBM) the user is only required to open the file, insert data in the preset columns, and then click on the preset “graph” tab at the bottom of the spreadsheet. The graph will then “pop up” for the user to view, print, or paste into a report. In addition, the entire file can be saved to a disc, desktop, or e-mailed to another professional or parent.

An example template for graphing curriculum based measurement (CBM) information is included at the end of the handout in Figure 1. When the CBM template file is opened the user sees the pre-formatted spreadsheet. Columns A, B and C in the spreadsheet are labeled for the inputting of required data—assessment dates, correct read words and number of errors. Once the student monitoring information is included, the user clicks on the “graph” worksheet tab at the bottom of the spreadsheet and the information is automatically graphed (Figure 2). Note that the graph in Figure 2 lacks student identifiers as well as labels for baseline and intervention phases. Customizing graphs will be briefly described below (with more detailed directions available online), but first we provide additional examples as well as a brief description of the templates available online.

**Intervention testing procedure.** In addition to graphing academic monitoring information we have also designed a graphing template to illustrate the effects of a number of brief interventions sequentially implemented. This intervention testing procedure (Daly, Martens, Dool, & Hintze, 1998) has also been referred to as brief experimental analysis (Daly, Martens, Hamler, Dool, & Eckert, 1999; Jones, &
The template illustrated in Figure 3 is designed for input of data collected from a generic BEA using Motivation, Repeated Reading, Listening Passage Preview, and Listening Passage Preview With Error Correction as interventions. Once data from each of these phases are input, then a graph is generated by simply clicking on either the graph 1 or graph 2 worksheet tabs. Graph 2 presents the dates of analysis (see Figure 4) on the “x” axis, while graph 1 presents the number of trials instead. The intervention labels can also be easily modified on the template and corresponding graph. For example, if the user wanted to substitute a new intervention for motivation this can be done by clicking on the “data” worksheet tab and substituting the title for the new intervention where motivation is currently preset. The graph will change accordingly.

**Charting behavioral data.** In addition to academics we have also constructed templates for charting behavioral information. For example, online we have posted the template for the Daily Behavior Report Card (DBRC). This template includes up to three behaviors and a corresponding graph is also provided. We have also posted online a sample DBRC that may be photocopied and implemented. A complete listing of the templates that are available on the NASP website follows the Resources below.

“Tricking it out” - Customizing and Personalizing Your Graphs

Many of the detailed suggestions for customizing graphs are explained online. One example of these easy-to-follow directions for adding a trend line is included below.

**To add a trend line:**
1. Click on the series for which you would like to see a trend line (e.g., correctly ready words, errors per minute, etc.). There will be highlighted dots (black) on the series you choose.
2. Click on Chart on the top tool bar, and then click on add a trend line; you may instead right click and choose “trend line” from the menu.
3. Choose linear
4. Click OK

The online “tricking it out” section has information on how to: a) save and download templates from the website; b) cut and paste graphs into word documents (i.e., reports); c) add, remove and modify existing colored lines to designate baseline and intervention phases, instructional or benchmark levels (CBM or DIBELS graphs); d) format a graph axis; e) add text (i.e., student names); f) change the color of series lines and the background of the graph; and g) print, copy, or e-mail your graphs. This document also provides information on modifying existing templates to suit the needs of the individual user. The online document also provides the interested reader with instructions on how to make a graph from the beginning without a template. Lastly, there are also instructions on how to construct a graphing template in MS Excel.

**A Word of Caution**

Data privacy issues in this era of easy-to-access electronic information must always be considered. It is critical that school psychologists strive to limit access to student and teachers’ classroom data, refrain from using student last names, follow basic confidentiality practices, and assist educational faculty and staff with the interpretation of progress monitoring graphs. Reviewing district policies on the use and release of student information and meeting with building administration to develop privacy guidelines for use in your school(s) are worthwhile activities.

**Resources**


Templates Available Online

**Academic Monitoring**

- *Curriculum Based Measurement*. This template can be used to monitor an individual student’s progress over time. While preset to monitor data over 28 days, the time frame may be modified to suit individual needs. This template can be used to graph CBM in reading, writing, or mathematics.

- *Curriculum Based Measurement-Grade Level*. This template is designed to chart CBM results for up to 30 students. This graph is great for comparing the performance of a target student to that of his or her classmates.

- *DIBELS™*. This template is designed to chart individual student’s assessments on the four most commonly used measures of the DIBELS™ (LNF, PSF, ISF, NWF). The graph is designed to illustrate results at the beginning, middle and end of the year consistent with DIBELS™ benchmarks.

- *DIBELS™ Grade Level*. This template is designed to chart up to 29 students initial scores on the four measures of the DIBELS™ discussed above. This is an excellent graph for screening purposes in order to identify students at risk of reading failure. This template has four different spreadsheets and graph tabs in order to view students’ initial assessment scores on each of the four measures.

- *Brief Experimental Analysis*. This template allows the user to illustrate the effects of several academic interventions. Interventions included on the generic BEA template include Motivation, Repeated Reading, Listening Passage Preview and Listening Passage Preview with Error Correction.

**Behavior Monitoring**

- *Daily Behavior Report Card (DBRC) for 1 behavior*. This template is designed to chart daily ratings of one behavior from the DBRC for up to five weeks. The graph is useful for illustrating teacher ratings of one primary behavior of concern over time.

- *Daily Behavior Report Card (DBRC) for 3 behaviors*. This template was created to chart DBRC ratings recorded by the teacher for up to three behaviors for up to 6 weeks. The behaviors that are currently recorded in the template include completed assigned work, complied with adult requests, and interacted
appropriately with peers. The behaviors can be modified by the user to fit the individual needs of the student.

- **Time on Task.** This template was designed to chart “percentage of time on task” observations for a target student and a peer across time. While currently formatted for 10 observation intervals, the template may be altered to suit the needs of the individual user. This graph could also be used for similar observations like percentage of time in seat, academically engaged or even to monitor test or quiz scores (with percentage based scores).

- **Frequency.** This template was designed to chart any monitoring information that is frequency-based. This might include monitoring/charting call-outs, bus referrals, etc.

- **The Behavior Observation System for Schools (BOSS; Shapiro, 1996).** This template allows for the input of BOSS behaviors for a target student and a peer across time. These behaviors include percentage of actively engaged time on task (AET), passively engaged time on task (PET), off task motor behavior (OFT-M), off task verbal behavior (OFT-V) and off task passive behavior (OFT-P).

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