



Guiding Document for Evaluation of Effectiveness of Assistive Technology

Evaluation of effectiveness of AT use is a two-part process. It includes systematically recording data about a child's performance and then reviewing that data to determine if the child's learning is progressing at an acceptable level. IDEA contains no specific legal requirements about method or frequency of data collection for AT nor does it mention evaluating the effectiveness of AT use as a required AT service. The need to evaluate what is being done, however, is inherent in the provision of any intervention. In the development of QIAT, the evaluation of effectiveness was found to be a critical component of quality AT services (Zabala, 2004).

However, IDEA does address the schedule for reviewing a student's overall progress in two ways: during the preparation for the annual IEP; and, in reporting a child's progress to the parents at least as often as parents of typically developing children are informed of progress (34 CFR §300.347(a)(7)(ii)). For parents of typically developing children, reporting is generally in the form of regularly scheduled (e.g., once per quarter or semester) report cards and conferences. However, this scheduled review of data about how a child is progressing when AT is being used, or being used in a new way or new environment, may not allow the team to efficiently and effectively make any needed changes in the intervention.

Gordon's case study in Chapter 5 provides an example of what can happen when the evaluation of the effectiveness of AT use is not addressed until time for the annual review of the . [\[Link to Gordon's story\]](#) Incorporating the core components of evaluation

of effectiveness can prevent the loss of valuable learning opportunities. The following discussion looks at each of the Evaluation of Effectiveness indicators in more depth.

1. Team members share clearly defined responsibilities to ensure that data are collected, evaluated, and interpreted by capable and credible team members.

Intent: Each team member is accountable for ensuring that the data collection process determined by the team is implemented. Individual roles in the collection and review of the data are assigned by the team. Tasks such as data collection, evaluation, and interpretation are led by persons with relevant training and knowledge, and it can be appropriate for different individual team members to conduct these tasks.

Evaluating the effectiveness of AT use is a process shared by all team members rather than the responsibility of any one individual serving a student. It requires clearly defining the goal(s) of using the AT and specifying the change in performance that is expected. Based on the anticipated change, the team determines how progress toward the goal(s) will be measured, as well as when, where, and by whom data will be collected. Evaluating effectiveness of AT use also requires that data are analyzed in a timely manner, shared with the team, and reviewed to identify implications for additional interventions or continuance of the current plan. As part of evaluating effectiveness of the AT, a schedule for reviewing the student's progress is set for the year.

Regularly reviewing data has become much more prevalent in education agencies since IDEA 2004 included the requirement for early intervening services and response to intervention (RTI) (<http://www.interventioncentral.org>). RTI programs review student progress data on a weekly or bi-weekly schedule using it to initiate or adjust interventions to keep student's progress on track. If the student is in an education agency that has implemented RTI, the AT team can work with the RTI program to coordinate data collection and review. The RTI program may also offer a possible source of information and training.

Generally, responsibilities are not determined by job title nor is it expected that any individual team member assumes responsibility for all tasks related to evaluation of effectiveness. Rather, responsibilities are clarified and designated by the team, or a team leader, in order to move forward effectively and collaboratively. As team members reflect on their knowledge of the tasks included in evaluating the effectiveness of the AT, they may realize that they do not have prior knowledge related to all aspects of the evaluation of effectiveness process. If their knowledge is not sufficient, they seek additional information or assistance. Data is recorded for all relevant tasks across the environments in which the AT use is targeted.

Example:

Chafic's team decided that he was a good candidate for voice recognition software. His plan stated that training with the software would be provided at school until competency was established. After the initial training, Chafic would

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use voice recognition software in the resource room for assignments longer than two paragraphs. Chafic would also continue to dictate to a designated scribe in selected classes. The school team shared a data collection tool with the parents so they could also collect data at home. During the six-week training period, his special education teacher and his parents agreed to collect data on accuracy, time on task, and number of words dictated per minute each time that he used voice recognition. Written output in other modes was also collected and reviewed. The parents and teacher planned to communicate via email on progress reflected in the data collected. At the end of the trial period, the team planned a face-to-face meeting to review the data, discuss Chafic's progress, and plan the next steps.

Key Questions

- How will team members determine who is responsible for each aspect of evaluating the AT use?
- How does the team determine who will collect, analyze, and share data?
- How does the team decide how often the data will be collected, analyzed, and shared?
- What training or technical assistance may be needed to develop an evaluation of effectiveness plan or to carry it out?

2. Data are collected on specific student achievement that has been identified by the team and is related to one or more goals.

Intent: In order to evaluate the success of AT use, data are collected on various aspects of student performance and achievement. Targets for data collection include the student's use of AT to progress toward mastery of relevant IEP and curricular goals and to enhance participation in extracurricular activities at school and in other environments.

The student's IEP documents the AT tools and the services that will be provided.

The IEP will communicate whether the AT is being provided to help the student achieve one or more educational goals, to access the curriculum, or to support the student's participation in the general education environment. The implementation plan ensures that everyone on a student's team understands the reasons that AT has been chosen, their personal role in supporting its use, and the expected change in student performance that has been identified. The reasons, roles, and expected changes are the basis for evaluating the effectiveness of the AT use. Evaluation of effectiveness is not a separate stand-alone event, but an ongoing process that is based on the IEP and the implementation plan.

Reed, Bowser & Korsten (2002) identified four primary methods to collect data about AT use. These are interview, review of a product created by the student, observation, and video or audio recording. The choice of how to collect data is based on the type of change expected and the evidence that can best reflect that change. In some cases data is recorded each time a student uses the AT device. In others, data is collected daily, weekly, or on some other reasonable pre-planned schedule. Using a form such as the *Plan for Evaluation of Effectiveness of AT Use* included in Appendix C

facilitates planning. [\[Link to Appendix C\]](#) Figure 1 includes the steps of planning for effective data collection. These questions lead the team through the process of planning for the evaluation of the impact of the AT.

- Step 1:** What is the present level of performance on this goal?
- Step 2:** What changes are expected as a result of implementation?
- Step 3:** What aspects of performance will change (e.g., quality, quantity, frequency, independence)?
- Step 4:** What obstacles may inhibit success (e.g., physical access, opportunity, instruction, practice, student preference)?
- Step 5:** How will the occurrence of obstacles be reflected in the data?
- Step 6:** What format will be used to collect the data (e.g., interview, work samples, observation, audio or video recording)?
- Step 7:** What is the data collection plan (e.g., environments, activity, frequency, person responsible)?

Figure 1. Planning for evaluation of effectiveness of AT use

The targeted performance identified in the IEP and implementation plan is the basis for data collection. The data collected provide information about the student's regular performance in relation to that task, such as initiating communication, producing legible written assignments, recording key facts during a lecture, etc.,

Example:

Derek is an orally fluent third-grader who struggles with written productivity.

His most recent writing assessment indicates that he meets expectations in ideas,

organization, voice, and word choice but struggles with sentence fluency, use of conventions, and presentation. His teacher reports that Derek's handwriting is very difficult to read and that he frequently shows frustration and fatigue when writing. His team determined that he may benefit from the use of a tablet computer with a word processing app. Team members agreed that the tool could be used in many settings where Derek needs to write, but had different expectations about how Derek's writing would change and how that change could be measured when he used the device. The teacher expected Derek to increase the number of sentences in a paragraph, the occupational therapist (OT) expected Derek to increase legibility and speed, and his parents expected Derek to complete written tasks more independently. The team realized that they needed to align their expectations and after reviewing Derek's IEP goals, agreed that progress would be measured on the goal that read, "Derek will write a 3-5 sentence paragraph that meets expectations on the school's third grade writing rubric on four of five assignments." They were particularly interested in noting changes in fluency as well as use of writing conventions and presentation. They agreed to collect written samples weekly to place in his portfolio. They decided to meet in one month to review Derek's samples to determine if he were making progress. If progress were not satisfactory, the team would need to decide whether Derek needed more training, increased time, or some other change in his use of the tablet.

Key Questions

- How is student achievement expected to change as a result of the use of AT?
- What data is being collected?
- What does the analysis of the data show?
- What additional data is needed about student performance to clarify the effectiveness of the use of AT or identify barriers that may need to be addressed?

3. Evaluation of effectiveness includes the quantitative and qualitative measurement of changes in the student's performance and achievement.

Intent: Changes targeted for data collection are observable and measurable, so that data are as objective as possible. Changes identified by the IEP team for evaluation may include accomplishment of relevant tasks, method/manner of AT use, student preferences, productivity, participation, independence, quality of work, speed, accuracy of performance, and student satisfaction, among others.

Specific student behaviors are identified so that the data collected about them matches the intent of the goal. It is only when the correct data is collected that the resulting information can be used to make instructional decisions and it is important that both quantitative and qualitative data are gathered and considered.

Quantitative data refers to actions, behaviors, student responses, movements, etc., that can be measured and counted. In the case of AT use, it might include factors like speed, accuracy, latency, quantity, task completion, or duration. Qualitative data, on

the other hand, can be observed but not easily counted. It might include, descriptions of what took place or the student's stated opinion, preference, or feeling. It may be gathered through interviews, observational and anecdotal reports, video recording, and use of rubrics.

Comparing pre-intervention data, often referred to as baseline data, to the post-intervention data, might also capture change. Such comparison can show whether the intervention (which includes AT paired with instruction) has been effective. It is critical to have both baseline data about the student's performance before using the AT and a clear understanding about how much change might be reasonably expected over a specific period of time.

Many areas that were difficult to quantify in the past have been made easier by research. One example is the Developmental Writing Scale (Sturm, Nelson, Staskowski & Cali, 2010). Their research-based scale detects the smallest developmental progressions as students move from drawing and scribbling to paragraph writing. Another example is the Communication Matrix (Rowland, 2012) (<https://www.communicationmatrix.org>). The Communication Matrix identifies seven levels of development in the earliest stages of communication. Using tools like the Developmental Writing Scale or the Communication Matrix can make it much easier to identify progress in an area otherwise difficult to quantify.

Example:

Shane uses an augmentative and alternative communication (AAC) device to support his expressive communication. His team felt that changes in the number of Shane's spontaneous communications as well as the length of his utterances were important skills related to his device use and they collected data on these skills to determine if there was quantitative improvement. In addition, they collected data on the elements (words) he put in sequence to communicate his message. They identified that Shane used many single word noun labels to identify objects, but these words were rarely combined with verbs, even though appropriate verbs were included in his vocabulary choices on the AAC device. Shane received intensive specialized instruction in expressive language intended to increase both initiation of interactions and use of noun-verb combinations when talking about topics of interest to him. The team then collected data on these skills during three identified times. After reviewing two weeks of data, it was clear that Shane was making steady progress toward meeting these goals in structured activities while less growth was documented in unstructured activities.

Key Questions

- What behaviors can be observed and measured to demonstrate progress toward goals?
- How will the expected change in performance be captured in the data?
- How will progress be monitored over time?
- What other information is needed?

4. Effectiveness is evaluated across environments during naturally occurring and structured activities.

Intent: Relevant tasks within each environment where the AT is to be used are identified. Data needed and procedures for collecting those data in each environment are determined.

It is essential that success be demonstrated on more than one occasion and in more than one environment. In developing the implementation plan and the method for evaluating the effectiveness of the AT use, the team identifies the environments in which the student participates at naturally occurring times. When collecting data in multiple environments and with multiple personnel it is critical that team members identify a shared expectation and agreed upon criteria.

Effective data are sufficiently specific and robust to provide information about what is occurring so that the team can analyze it and make needed changes. When data show the student is experiencing difficulty with a certain part of a task, it may be necessary to develop strategies to address the specific difficulty and then return to the task as a whole.

In some cases, lack of student progress may be related to inconsistent opportunities to use the AT. This may be due to absences, schedule changes, or failure of team members to provide opportunities to use AT. It may be necessary to discuss the opportunities provided by team members and the consistency of implementation as well as student performance.

Example:

The IEP team identified that Kathryn needs to use a switch activated device for basic communication tasks such as asking for help and calling for attention. However, the specific motor ability with which Kathryn would activate a switch has not been determined. The OT met with Kathryn two times per week for five weeks and collected data on motor abilities and switch activations. When the team met, the OT shared the data and Kathryn's need for increased opportunities to use the switch each day. After discussion, the team created a chart listing natural and scripted ways that Kathryn could use a switch in multiple environments, so that they could determine preferred switch site and type, as well as intentionality of switch activations. Each team member identified a time and activity for which they would be responsible to support Kathryn's switch use and collect the necessary data. They met two weeks later and decided they had enough data to determine the switch site, switch type and intentionality of switch use in multiple settings.

Key Questions
<ul style="list-style-type: none">• How does the team ensure that data will be collected across environments?• What are the targeted tasks in each environment?• How many opportunities are needed to complete tasks using AT in each environment?

5. **Data are collected to provide teams with a means for analyzing student achievement and identifying supports and barriers that influence assistive technology use to determine what changes, if any, are needed.**

Intent: To guide decision-making teams regularly analyze data on multiple factors that may influence success or lead to errors. Such factors include, the student's understanding of expected tasks and ability to use AT, but also student preferences, intervention strategies, training, and opportunities to gain proficiency.

The criterion for success that was determined during device selection and goal setting is generally the basis for ongoing analysis of student progress. Data may reveal that there are unexpected barriers in one or more environments, that the original goal was not the most useful or feasible, or that team expectations were greater than the actual progress. Data provide not only information about the student's level of performance but can also help identify essential supports for continued student achievement. In the absence of adequate progress, data can identify causative factors to suggest program adjustments. Student and staff expectations, attendance, lack of practice opportunities, relevant research, and performance of same age peers may all contribute valuable information when reflecting on the appropriateness of goals.

The use of interventions based on research is another requirement in IDEA. It states that the IEP should include, "A statement of the special education and related services and supplementary aids and services, **based on peer-reviewed research to the extent practicable**, to be provided to the child.....". 300.320 (a) (4) (emphasis added) Educators

need to know the research about AT use and need to assess how its use is advancing the student toward attaining his or her annual goals and supporting student progress in the general education curriculum.

Research can provide a better understanding of what should be expected as well as help when choosing specific AT tools and evaluating progress. For example, there are several software programs and apps that pair pictures or symbols with words. They were developed specifically for use in teaching reading to students with disabilities. However, Erickson, Hanser, Hatch, and Sanders (2009) studied the practice of pairing picture symbols with words and found that it slows down the rate at which students learn to read the word. If the goal is only to provide access to limited, specific content, then the use of paired picture symbols might increase comprehension of content that otherwise would not be accessible. However, if the goal is to further the development of literacy skills, pairing pictures with text is likely to slow down the rate at which a student develops those skills. In either case, making decisions about the use of these AT tools requires consideration of relevant research.

Research also provides valuable information about the length of time data should be collected. For example research on improving reading comprehension through use of text-to-speech (TTS) indicates that a four or five week trial will not be enough to show the potential impact. Several research studies demonstrated that long intervention periods and extended training are linked to improved outcomes when using TTS (Strangman & Dalton, 2005; Olson, Wise, and Ring, 1997; Olson and Wise, 1992; and

Elbro, Rasmussen, and Spelling, 1996). Gersten and Edyburn (2007) recommended a minimum of nine weeks of training with extended training being desirable. Similarly, Dimmitt, Hodapp, Judas, Munn, and Rachow (2006) found at least 11 weeks was needed to show increases in passage comprehension. Hodapp and Rachow (2010) found that in a second year of training, as long as limitations in teacher's ability to support the use of TTS did not interfere, students accessed twice as much text with TTS as they did with paper texts. In addition, students maintained their level of comprehension when using TTS even when the difficulty of comprehension questions increased significantly.

Example:

Jenna was expected to participate in history class by answering a minimum of three questions posed to her by her teacher. The team analyzed her performance data after the first two weeks of school and found that Jenna had only answered one question each week. They realized that the vocabulary words specific to the history chapter were not programmed into her AAC device for those weeks. Jenna was supported by a paraprofessional who was new to the role and did not have experience with AAC devices. Due to busy schedules, the teacher and paraprofessional had been unable to collaborate to enter the vocabulary. The team arranged professional development and scheduled additional time for team members to collaborate and program the device. The school administration provided classroom coverage during training. Jenna's post-training performance was reviewed two weeks after the training. She was now answering all three of the

questions posed each day, but was only 50% accurate in her answers. The team decided to have the speech language pathologist (SLP) observe in the class. The SLP noted that Jenna was sometimes slow in finding the answer she wanted and in those cases often answered incorrectly. They decided to have the paraprofessional go over the new vocabulary on Monday morning and collect data for two more weeks to see if Jenna would become more proficient in finding the vocabulary words she needed. The new data showed that Jenna was making excellent progress and no more changes were needed at that time.

Key Questions
<ul style="list-style-type: none">• What performance criteria have been identified and agreed upon?• How will the data identify barriers that should be removed?• How will the data identify supports that need to be included?

6. Changes are made in the student’s assistive technology services and educational program when evaluation data indicate that such changes are needed to improve student achievement.

Intent: During the process of reviewing evaluation data, the team decides whether changes or modifications need to be made in the AT, expected tasks, or factors within the environment. The team acts on those decisions and supports their implementation.

Flexibility in the provision of AT services is needed in order to support student progress. Evaluation of effectiveness data are collected in an ongoing manner and reviewed periodically in order to be responsive to changes in student need, achievement, environment and/or tasks. In the absence of sufficient progress, the team analyzes the data to decide what changes are needed such as additional scaffolding or adjustments to AT services or AT tools. Changes may also include specific intensive instruction to overcome an identified barrier. Some changes in student performance may result in a need for the IEP team to be reconvened to adjust the IEP goals. Analyzing data helps to pinpoint specific training or supports the student needs in order to support adequate progress in relationship to the predetermined criteria.

A consistent process of data collection, review, and sharing supports the team in determining the effectiveness of AT tools, services, and strategies. When the team analyzes the student performance, team members can make necessary adjustments and avoid errors such as assuming the student has skills that are not present, assuming the student does not have skills that are actually mastered, or prematurely abandoning the AT device.

Example:

Mary Ellen showed minimal, unsatisfactory gains in comprehension as a result of using reading software that included text-to-speech. The team had expected a significant increase in comprehension as demonstrated on classroom quizzes. In reviewing the data, the team realized that her performance could be related to insufficient opportunities to use the program across settings since she

was only using it in language arts. The team extended the trial period and identified additional environments (social studies and health classes) and natural opportunities in each of those classes (reading assignments at least three out of five days each week) in which the AT for reading could be used. The team agreed to meet again in one month to review the data gathered during the extended time frame and determine if the increased opportunities had been sufficient to increase Mary Ellen's comprehension.

Key Questions

- How is the performance data shared with all team members?
- When do periodic progress reviews take place?
- How are changes in the student's program determined in response to data?

7. Evaluation of effectiveness is a dynamic, responsive, ongoing process that is reviewed periodically.

Intent: Scheduled data collection occurs over time and changes are made in response to both expected and unexpected results. Data collection reflects measurement strategies appropriate to the individual student's needs. Team members evaluate and interpret data during periodic progress reviews.

In some instances the original data collection strategies planned by the team may not provide sufficient information to show what is happening. When creating and/or modifying the plan for evaluation of effectiveness, the team addresses the desired

student outcomes as well as current skills in observation and data review. In developing the original evaluation plan, the team also determines the circumstances that will trigger the need to reexamine or initiate new data collection activities.

Example:

During the IEP meeting, Stuart's team agreed to meet monthly to review data and make necessary changes in his AT use in response to the data. Stuart's goal was to complete math assignments with 90% accuracy using a talking calculator. At the first meeting, the data revealed that Stuart's accuracy on assignments had gone from 45% to 75%, but that his test performance had not changed. A plan was developed to observe Stewart during testing to provide additional data about his use of the calculator. The observational data showed that Stuart did not understand fractions and spent more than half of the test time struggling with the problems related to fractions then hurried through the rest of the test making mistakes. The special education resource teacher worked directly with Stuart to teach fractions. The team met again in one month to review his progress. His understanding of fractions had increased and his test performance was on target. His use of the talking calculator was not changed.

Key Questions
<ul style="list-style-type: none">• What processes will the team use to analyze and respond to data?• What circumstances will generate a need to reevaluate the effectiveness of current tools and strategies?

Evaluating the effectiveness of the AT that has been provided is an essential part of AT services. Unfortunately errors can occur in several ways such as when: the team does not identify specific performance or behavior as a target for change; AT is provided without a performance goal in mind making it difficult to determine progress; an easy and environmentally appropriate means of data collection has not been identified; or a regular schedule for reviewing data is not planned. Effective teams identify observable, measurable behavior that can be recorded to show changes in performance. Educators face a demanding schedule and must meet the needs of many students. When planning for data collection, it will be more workable if the educators who will be recording it participate in all of the decisions.

If progress is not as expected, it is important to remember that it may not be the AT tool, but failure to teach needed skills or provide enough time to master skills, that results in poor performance. One of the most common errors is deciding that the student has the “wrong” AT without first collecting effective data, analyzing it, and making changes to that student’s program based on that analysis.