What Do We Know About Evidence-Based Practices?

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Abstract

Many teachers have various problems in finding solutions to their students' problems in the classroom. One of the challenges that teachers face is to make decisions about how to teach and manage students' behavior. Due to research to practice gap, finding appropriate interventions and implementing them in the classroom might be difficult for teachers. Evidence – based practices (EBPs) are offered to close the gap between research and practice. The purpose of this study was to discuss how EBPs are determined and to provide practitioners guidance to implement them in their classrooms. Barriers to implementing EBPs and resources for EBPs were also discussed.

Keywords: Evidence-based practices, research to practice gap; special education

1. Introduction

In education, the issue of the gap between research and practice is an important concern and many practitioners think that educational research does not provide practical solutions and that research - based interventions do not offer meaningful outcomes for teachers (Deshler, 2003; Vanderlinde & van Braak, 2010). There are some reasons why there is a gap between research and practice such as limited connection between researchers and practitioners (Greenwood & Abbott, 2001), limited accessibility to research material (Carnine, 1997), and inadequate usability of research material (Vanderlinde & van Braak, 2010). These reasons cause practitioners to find no relevance between theoretical research claims and what is practically the case.

In order to close the gap between research and practice and provide effective instruction for students, the No Child Left Behind Act of 2001 calls for "scientifically- based research." Moreover, the Individuals with Disabilities Act of 2004 emphasizes using scientifically- based instruction to increase the outcomes of students with disabilities (Cook, Tankersley, Cook, & Landrum, 2008). Therefore, many teachers wish to identify and utilize the best practices so as to meet their students' needs. However, "best practice" is a broad term which includes practices that are believed to be effective based on teachers' experiences, thoughts, feelings, as well as scientifically-based research. On the other hand, some "best practices" might not be effective (Cook et al., 2008), as they have poor research support. For example, some ongoing practices, such as modality training and social skills training are implemented at high levels in the classrooms, even though they have limited research support (Carter, Strnadova, & Stephenson, 2012).
The report of the National Research Council (NRC, 2002) emphasized the necessity for using the scientific methods in education just as the other fields of science do (such as geophysics and political science).

Researchers emphasize the importance of evidence-based practices (EBPs) to overcome the research to practice gap (Cook, Smith, & Tankersley, 2012) and provide teachers with effective practices. EBPs have grown in prominence and importance in education during recent years (Carter & Wheldall, 2008). Research has shown that the use of EBPs can reduce inappropriate and unmanageable student behaviors (Simonsen, Fairbanks, Briesch, Myers, & Sugai, 2008). However, many teachers are not familiar with the practices being suggested to them (MacSuga & Simonsen, 2011). Also, even though the significance of implementing EBPs are stated, teachers often have some problems in figuring out what EBPs are and how they can be determined (Cook, Tankersley, & Landrum, 2009).

Occasionally, practitioners prefer to use inefficient methods because these practices are the ones that they feel confident in, they have knowledge about, and which they have learned of as being the best by other educators (Kauffman, Conroy, Gardner III, & Oswald, 2008). Also, some teachers have misguided beliefs that hinder the use of research - based practices. These include believing that (a) measuring student performance is unnecessary, (b) students need to have internal motivation to learn, (c) every child has a different learning style and so on (Heward, 2003). Thus, these thoughts sometimes do not lead them to desired student outcomes.

On the other hand, research should be a guide for teachers to make classroom decisions. It is critical to use research-based practices; however, recommended practices need to be suitable for teachers in order to successfully implement them in the school settings (Dammann & Vaughn, 2001). Teachers need to search for practices that have a good methodological quality and scientific standards. Therefore, understanding the difference between research-based practices and EBPs can help teachers discover appropriate teaching practices for their classrooms. Also, figuring out this difference may assist teachers to decrease concept complexities that hinder meeting students' needs.

There are multiple ways to obtain research-based information, such as qualitative, experimental, and quasi- experimental studies. A research-based practice can include a single study that has not been replicated (Kretlow & Blatz, 2011) and which may have a small number of participants as well. Furthermore, some of the research-based studies might not examine the effectiveness of a practice; instead, they might investigate correlations or explain the views of teachers regarding an instructional practice. For example, think about a research study that examines students' perspectives about a particular program by means of conducting interviews with them. According to the results of the study, students thought that the program was beneficial for them. Even though the study is research-based, it has limited evidence whether the program cause a difference in the students' performances. Researchers must conduct an experimental control designs to test the program effectiveness.

Differently, EBPs require researchers to conduct an intervention, examine its effectiveness, or find out functional relationship between variables (Tanklersley, Harjusola- Webb, & Landrum, 2008). Experimental research designs usually allow researchers to obtain evidence and demonstrate the effectiveness of the study or practice. Additionally, the effectiveness of all interventions is not the same since some interventions can affect the outcomes of the participants more significantly than other interventions. Therefore, the methodology of EBPs should both be of high quality and show significant effect- size (Cook et al., 2009).

2. Determination Evidence-Based Practices

EBPs can be simply defined as the most effective practices for increasing student outcomes. Cook and Cook (2011) defined EBPs as "practices that are supported by multiple, high-quality studies that utilize research designs from which causality can be inferred and that demonstrate meaningful effects on student outcomes" (p. 73). This definition clarifies that there is a process, along with some standards, that identify best practices. In order to determine EBPs, several high quality research studies need to be able to support the practices which have produced significant differences in students' outcomes (Torres, Farley, & Cook, 2012).

The What Works Clearing House (WWC, US Department of Education, 2002) is a source of EBPs related to students "with learning disabilities, in early childhood special education, and with emotional and behavioral disorders" (Cook & Odom, 2013, p. 136). Additionally, while the WWC focuses only on well-designed randomized and controlled trials, the Division for Research of the Council for Exceptional Children (CEC) looked at quality indicators of various methodologies including single-subject research methodology and group experimental designs (Odom et al., 2005) to address the need for EBPs in special education.

EBPs can be distinguished by the research design used in supporting studies, quality and quantity of studies, and effect-sizes obtained (Cook, Tankersley, & Landrum, 2009).

2.1 Research Design

The research design of the studies need to include a systematic way of examining the effectiveness of given practice in order to be considered as evidence based. EBPs require researchers to construct randomized control trials by conducting experimental designs and quasi-experimental designs. Also, a practice can be validated by single subject research to be considered as evidence-based (Horner et al., 2005). For single subject research design, researchers examine an intervention's effectiveness by determining the causal or functional relationship between dependent and independent variables (Tankersley, Harjusola-Webb, & Landrum, 2008).

In special education, group settings are not homogeneous or have a limited number of participants. Thus, the use of control and comparison groups is not always suitable. Single-subject research is a significant scientific methodology that has an enormous role in conducting EBPs in special education (Horner et al., 2005). Even though the name of the methodology is single subject, it seldom has only one participant (Torres et al., 2012). Single-subject research design provides evidence and enables researchers to examine whether an intervention produces effective outcomes for students and it allows researchers to evaluate the performance or the behavior of all participants across settings, behaviors, and subjects. The single subject designs frequently evaluate target behaviors, systematically implement interventions, and measure the effectiveness of results (Tanklersley et al., 2008).

2.2. Quality

Another element in determining EBPs is the quality of research. According to Carnine (1997), quality of research can be measured by considering three factors: trustworthiness, usability, and accessibility. A

trustworthy study would be qualified as having a practitioner's trust (i.e. they think that the research findings deserves his/her confidence). In order to draw meaningful conclusions about intervention, it is important for it to be trustworthy. The second kind of quality which could be attributed to a study is that of usability. This means that a study steps should be followed easily and they should be practical regarding to application of study findings in the practical settings (Carnine, 1997). The last quality indicator is that of accessibility. Many practitioners do not have time to interpret research findings and they are impeded by difficulties in trying to locate information (Carnine, 1997). The necessary information of research findings should be easily found by practitioners.

Furthermore, the quality of the intervention can be affected if the researcher does not yield required consideration for research components (e.g. research materials, comparison groups, research procedures). For example, the study quality could be influenced negatively if the researcher selects the experimental group from students who have high achievement level while selecting for the comparison group from students who have low or average achievement levels. The results of the experiment might show that the intervention is effective; however, it would not be clear whether the intervention provided positive outcomes for students or whether the students in the comparison group had the same capabilities as those of the experimental group. Additionally, in order to deduce that a study is evidence-based, implementation fidelity is vital (Cook et al., 2009). If a researcher does not implement the intervention steps appropriately, the results of the study will be invalid and can mislead the educators and other researchers.

2.3. Quality

Quantity of research is another element to decide EBPs. In order to think of a practice as being evidence-based, it needs to be supported by several research studies. Gestern et al. (2005) recommend the study needs to be supported by at least two high quality experimental- control group studies to consider it a practice as being effective. For single-subject research, in order to consider a practice as being evidence-based, the following features should be examined: A practice might be supported by (a) at least five peer-reviewed single- subject studies with admissible methodological criteria and need to report experimental control, (b) the research studies need to be administered by a minimum of three different researchers across different settings, and (c) a minimum of twenty participants need to be involved in at least five studies (Horner et al., 2005). By implementing these criteria, the intervention may provide beneficial changes in students' outcomes.

2.4. Weighted Effect-Size

Lastly, EBPs must be supported by studies that meet minimum effect-size criteria (Brigham, 2010; Cook & Cook, 2011). There are many effect-size statistics that are related to group designs (Brigham, 2010) such as Cohen's d, Pearson's r and R2, and Cohen's f2. Analysts look for a significant positive outcome for a group consisting of a large number of students. Gersten and his colleagues (2005) suggested that the magnitude of effect should be notably greater than zero. Also, when researchers describe the effect sizes of a group with a large number of participants, they should consider the effects of the study on participant outcomes (Cook et al., 2009). For determining EBPs, it is essential to evaluate the outcomes of participants

at the same time as assessing the effect size of the study. For single-subject research, researchers use visual analysis or quantitative methods to estimate the effect size. Visual analysis can be conducted by using nonparametric methods such as "Percentage of Nonoverlapping Data (PND), Percentage of All Nonoverlapping Data (PAND), or Percentage of Exceeding the Median (PEM)" (Kratochwill et al., 2010, p. 22). For quantitative methods, researchers can use parametric methods such as regression models and multilevel models (Kratochwill et al., 2010). In short, the methodology of studies supporting EBPs should both be of high quality and show significant effect size (Cook et al., 2009).

3. Implementing Evidence - Based Practices

Educators need to evaluate various aspects of research studies in order to determine EBPs. Additionally, after verifying the practices as being evidence-based, the implementation of the practices should also be considered by teachers. In order to implement EBPs successfully, educators need to think about other factors that influence the outcomes of intervention. It is important to know the characteristics of students, environment, and instructor to make decision about the effectiveness of EBPs (Torres et al., 2012).

First, before applying EBPs, teachers need to know the characteristics of their students. They should consider grade level, language, and disability of students (Torres et al., 2012). For example, if the grade level of the intervention is not appropriate for the student, the results of the intervention might not be effective. Also, students' background and their needs can affect the outcomes of the intervention. Teachers also need to consider the cultural background of students so that they may make the appropriate changes in the intervention if possible. Disability category is another significant feature in the selection of appropriate EBPs. Thus, teachers need to take the needs of the students into account so as to choose the best practices with regards to their needs.

Second, environmental characteristics are also important factors to address for students' needs when implementing EBPs. Teachers need to know whether the class environment, time, resources, and materials are appropriate for the implementation of EBPs (Torres et al., 2012). Before implementing the practices, teachers can make some arrangements in the classroom for the purposes of the intervention (such as finding resources and materials or organizing class schedule). On the other hand, when making arrangements, it is critical not to alter the vital elements of the practice. Teachers should preserve the necessary components of the EBPs in order to maintain the effectiveness of the practice (Cook et al., 2008).

Third, teachers' experience, teaching methods, and their philosophies are other significant elements that affect the implementation of EBPs. For example, teachers' ability has an important role in conducting an intervention or a new program. Additionally, experienced teachers might have more information about resources or can manage students' behaviors better across many different situations apparent in the classroom (Torres et al., 2012). Furthermore, effective teaching is another factor in implementing EBPs successfully. Without effective teaching, the impact of the practices on students may be limited.

There are some components that may be taken into consideration for the better application of EBPs. These components include: increasing academic engagement; teaching key vocabulary before incorporating the practice; observing student capabilities and performance; and evaluating instructional settings (Torres et al., 2012). Moreover, Cook et al. (2008) emphasize that teachers need to be enthusiastic when providing

instruction in order to engage students in activities and increase students' academic levels. If teachers use these effective teaching techniques along with EBPs, student outcomes may become significant. Failing to provide effective instruction coupled with academic engagement and enthusiasm might yield unrewarding results.

Additionally, it is not guaranteed that every EBPs will work for every student. Some students might be "treatment resistors" (Torres et al., 2012). If a teacher encounters this kind of situation, it might be beneficial to change the practice or make some arrangements during the intervention so as to accommodate students' needs. Teachers need to realize that the ongoing practice might not be beneficial for all students. Therefore, they need to monitor students' progress regularly to examine the effectiveness of the practice. The importance of monitoring students' progress to determine the effectiveness of a practice should not be disregarded. Teachers need to assess students' outcomes by using curriculum - based assessment, portfolios, or other curriculum based- measurements since the sole use of EBPs will not be successful in evaluating students' outcomes (Cook et al., 2008).

Another important issue is implementation fidelity. Torres et al. (2012) state that if the students do not respond to the intervention at desired levels, teachers should examine whether the intervention was implemented in an adequate amount of time; the practice was applied as designed; and whether the teacher used effective teaching methods and made the intervention to fit around students' needs. Teachers need to implement the intervention procedures step-by-step in order to achieve positive student outcomes. For instance, if the results of the measurement indicate that the practice does not provide sufficient outcomes, the teacher needs to reconsider whether s/he implemented the practice with fidelity. Teachers can determine the important steps of the practice and create implementation fidelity data to check whether the intervention was applied as designed. If teachers implement the practices appropriately, then, they may achieve trustworthy results and gain appropriate feedback from the intervention outcomes. However, if teachers have ensured that they implemented the practice as designed and that there is still no positive gain in student outcomes, then they should try to incorporate appropriate adaptations that meet students' learning needs, and make adjustments in the educational settings (Cook et al., 2008).

4. Barriers to Implementing Evidence-Based Practices

Even though teachers might have positive perceptions of applying EBPs, they seldom implement these practices in their classrooms (Burns & Ysseldyke, 2009) because they have encountered some barriers in implementing those EBPs. Some of the barriers are lack of professional development and experience, and inadequate accessibility to information.

Professional development has an important role in identifying and evaluating EBPs. Knowledge of a practice plays a significant role in implementing EBPs. For example, the study of Stormont, Reinke, and Herman (2011) indicated that teachers who have graduate degree have more information about EBPs than teachers who have only undergraduate degree. In addition to professional development, novice teachers have inadequate confidence to implement research- based practices because they have difficulties in interpreting the results of those studies; therefore, they have problems in implementing them in real school settings (Jones, 2009). Moreover, Kutash, Duchnowski, and Lynn (2009) stated that teacher training and

support during the implementation of the intervention are essential to achieve the expected results as inadequate effective training and lack of adherence to fidelity are the ones that count as barriers when implementing EBPs.

The inadequate accessibility to information is another major barrier to implementing EBPs. Because there is limited readily - accessible information of effective practices, schools have problems in reaching EBPs. Thus, many teachers could not find resources that are required to implement EBPs because they generally could not find enough time to look for resources and did not have the opportunity to access research studies (Williams & Coles, 2007).

5. Resources for Evidence- Based Practices

Even though many teachers have some barriers to applying research studies in practice, there are some resources that help teachers interpret EBPs and implement them in their classrooms. Since the Internet is one of the most useful sources for practitioners to obtain information about research practices (Powers et al., 2010), made known resources from the web might be beneficial. For example, there are four websites which include research summaries, rating lists of practices along with supplemental resources and products (Kretlow & Blatz, 2011). These web sites include: What Works Clearinghouse, Best Evidence Encyclopedia, Promising Practice Network on Children, Families, and Communities, and Current Practice Alerts Teaching LD: Information & Resources for Teaching Students with Learning Disabilites. Even though these websites do not guarantee that these practices will work in one's classroom, they show teachers how these practices fared during previous practices implementations (Kretlow & Blatz, 2011).

In addition, there are some web-based technical aid centers that supply resources for EBPs for the purpose of managing students' behaviors; these include: the Center of Effective Collaboration & Practice (CECP), the National Comprehensive Center for Teacher Quality (TQ Center), the IRIS (IDEA and Research for Inclusive Settings) Center, and the Technical Assistance Center on Positive Behavioral Interventions and Supports (PBIS) (Regan & Michaud, 2011). Practitioners can receive assistance from these resources and can enhance their instructions by implementing evidence - based practices in their classroom. It is beneficial to know how to find information that is scientifically - based and practical.

6. Conclusion

The gap between research and practice is a complex and ongoing problem in education. Many teachers are not familiar with EBPs that can lead them to success. Implementing scientifically validated research practices should be one of the main components in teaching. Therefore, understanding and determining EBPs are crucial and need intensive attempts to implement them in the classroom. In determining EBPs, educators should consider four key indicators: viz., research design, quality, quantity, and effect- size. By implementing these practices with effective teaching, they may induce beneficial gains in student outcomes. Particularly, implementation fidelity is has a vital for achieving meaningful student outcomes. Teachers should ensure that they follow all the steps of the practice that they are implementing. Additionally, teachers need to understand that EBPs allow freedom for teachers to make necessary adaptations so as to better fit

their teaching abilities. Also, even though many teachers cannot access research studies, there are many web-based resources for teachers that could help them to determine effective practices and manage student behaviours.

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