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Determining the Effect of Data-Driven Decision-Making Training on the Transformation of Teacher Decisions for At-Risk Students

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Abstract

This study examines the effects of the Data-Driven Decision-Making Teacher Training Program (DDDM-TTP), designed to enhance the quality of classroom teachers' decisions regarding students at risk during the pre-referral process. The research employed a single-group pretest–posttest design. Before and after the implementation of the teacher training program, individual interviews were conducted with the participating teachers. In addition to these interviews, classroom observations were carried out, and teachers were asked to complete the educational assessment request form. The data were analyzed using content analysis, one of the qualitative analysis methods.

The findings revealed meaningful changes in the way teachers conducted the pre-referral process. Prior to the training, teachers' decisions were largely based on intuition and limited observations; however, after the training, teachers began to collect data in a more systematic, planned, and multidimensional manner. They regularly documented indicators related to attention, engagement, performance, and learning processes, and justified their decisions more reliably.

Analysis of the educational assessment forms showed that teachers provided more detailed, observation-based explanations in terms of content, clarity, and alignment with student needs. Moreover, one teacher reconsidered the decision to refer a student to the Guidance and Research Center (GRC) and instead concluded that classroom-based interventions were sufficient after the training.

Social validity findings indicated that both classroom teachers and school counselors found the program applicable, informative, and supportive of their professional development.

In conclusion, DDDM-TTP contributed to teachers' ability to conduct the pre-referral process more consciously, data-based, and professionally, thereby significantly improving the quality of their evaluation and decision-making practices.

Keywords:

Data-driven decision making, at-risk student, pre-referral process

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Introduction

At-risk students are defined as those who have not yet received a formal diagnosis but exhibit significant differences compared to their peers in academic, social, emotional, or behavioral domains and are highly likely to encounter various barriers in the learning process (Pierangelo & Giuliani, 2008). When these students are identified as being at risk, early monitoring and assessment yield more functional and meaningful outcomes compared to delayed interventions, enabling their developmental needs to be addressed in a more effective and timely manner. It is stated in the literature that systematic interventions for at-risk students can improve both academic and behavioral outcomes. However, the effectiveness of these interventions depends on teachers' ability to accurately manage data-based decision-making processes. When Data-Driven Decision-Making (DDDM) is implemented effectively, studies show that teachers are able to analyze data on students' progress, set instructional goals accordingly, and consequently enhance academic achievement (Visscher, 2021). Based on the data they collect, teachers face two main decision options: whether to refer the student for special education services or to support the student with necessary instructional accommodations within the current educational setting. It is important for teachers to meaningfully analyze the data obtained from the student, reflect these data in classroom practices, and make decisions based on the outcomes, in order to ensure that at-risk students receive appropriate and timely support (Moon, 2005; Renshaw, 2013). Therefore, the early identification of at-risk students and the systematic implementation of this process emerges as a key factor in enabling classroom teachers to effectively fulfill their responsibilities in the pre-referral stage (Boyle et al.,2015).

Classroom teachers are the first to notice students' developmental, academic, and behavioral characteristics, and they play a key role in organizing the instructional process based on these characteristics (Çuhadar, 2017). However, research indicates that teachers experience various difficulties in identifying students' needs through classroom observations, planning appropriate interventions, and conveying this information systematically to relevant units (Çuhadar, 2017; Hosn, 1999; Tunç, 2011; Uğurlu & Kayhan, 2018). Studies show that teachers often rely on intuitive approaches during data collection, struggle to plan and document interventions in a structured manner, and face uncertainty in daily practices regarding time management, the use of assessment tools, and decision-making processes (Gül-Kuruyer & Çakıroğlu, 2017; Piro, Dunlap & Shutt, 2014; Sütçü, 2007; Wayman & Jimerson, 2014; Yazıcıoğlu, 2019). Particularly at the primary grade level, the increasing diversity of student needs contributes to greater uncertainty for teachers, which in turn negatively affects the diagnostic process and reduces the quality of referrals. This situation further underscores the importance of teachers conducting the pre-referral process in a planned and systematic manner.

One of the most critical stages determining the quality of referrals made to the Guidance and Research Center (GRC) for educational assessment is the pre-referral process. In this process, the classroom teacher is expected to systematically monitor the student, document the student's progress, and implement instructional accommodations as preventive measures. When these efforts do not result in meaningful improvement, the teacher is required to justify the referral through an educational assessment request form that reflects the data collected during classroom observation and instructional adjustments. Although regulations require the process to proceed in this manner, studies have shown that teachers often struggle to implement the process in a structured way, and that the data regarding the student tend to remain superficial, general, or intuitive (Coburn & Turner, 2011; Gül-Kuruyer & Çakıroğlu, 2017; Sütçü, 2007). This highlights the importance of clearly presenting classroom-based evidence in the form, as it serves as a key document that informs the GRC about the student's current functioning, the interventions attempted, and their outcomes. By providing systematic evidence—such as academic performance, work samples, participation, and behavioral observations—the teacher enables the GRC to make accurate placement and support decisions and prevents unnecessary referrals. This collaborative cycle ensures a coherent and functional flow of information between the school and the GRC, strengthening the alignment between classroom observations and formal evaluation procedures (MEB, 2020).

For students' educational trajectories to progress in a healthy manner, it is critical that teachers adopt a data-driven approach in their decision-making processes. DDDM is the systematic process through which teachers identify learning problems, collect data, analyze and interpret these data, and translate the results into instructional actions (Mandinach & Gummer, 2016). This process structures intuitive decision-making through a data-based inquiry cycle. Data literacy, on the other hand, encompasses the essential competencies teachers need to operate this cycle, including collecting, analyzing, interpreting data, and generating instructional decisions (Mandinach & Gummer, 2013). Thus, data literacy constitutes the cognitive and technical foundation of DDDM, whereas DDDM represents the application of these competencies within classroom practice. Research indicates that professional

development interventions designed to enhance teachers' data use have a meaningful and positive effect on student achievement (Ansyari et al., 2022). This finding strongly supports the critical role of data literacy in strengthening DDDM and demonstrates that both concepts jointly contribute to instructional improvement. Studies on this process, which can directly influence the quality of education, reveal that teachers' levels of data literacy are limited and that systematic training practices grounded in data-based thinking are not sufficiently implemented (Akın, 2019; Aydın & Demirtaşlı, 2020; Henderson & Corry, 2021).

The ability of teachers to effectively carry out DDDM processes is critical both for accurately identifying students' needs and for making quality accommodations in educational settings (Lai et al.,2014; Ruhter & Karvonen, 2023; Van Geel et al., 2016). However, the literature indicates that teachers face various challenges in collecting data, analyzing it, and using it in their instructional decision-making (Piro et al.,2014; Wayman & Jimerson, 2014). There may be several reasons for this, two of which are pre-service and in-service training. The limited inclusion of DDDM-related content in pre-service teacher education programs (Bocala & Boudett, 2015; Mandinach et al., 2015) makes it difficult for teachers to use data-driven practices effectively once they enter the classroom. Therefore, both pre-service and in-service training programs can be structured to develop teachers' data literacy skills. Reinforcing the theoretical knowledge provided in pre-service education with practice-based training during in-service periods may increase teachers' capacity to systematically collect, interpret, and apply student data, thereby helping them make more informed and data-based decisions in the pre-referral process (Jimenez et al.,2016; Reeves et al.,2016).

Recent studies in the literature on how to develop teachers' data-driven decision-making skills have increasingly begun to address data literacy and the DDDM process together (Ansyari et. al., 2022). While some of the existing research focuses on specific dimensions such as assessment literacy (Summers, 2023), monitoring student achievement (Datnow et al., 2018; Denny, 2020; Scheer & Visscher, 2018; Shen et al., 2015; Staman et al., 2017), or the use of academic data (Glover, 2017; Stecker et al., 2005), other studies emphasize the development of collaborative models such as data teams and professional learning communities to support teachers' ability to use data systematically (Kippers et al.,2018). These models aim to provide a comprehensive framework that strengthens teachers' processes of collecting, analyzing, interpreting, and transforming data into instructional decisions. To date, no applied study has been identified on the quality of teacher decisions based on DDDM in the pre-referral process. In particular, how teachers use data obtained from classroom practices and reflect these data in educational assessment request forms during the identification process of students with special needs emerges as an important area of research.

This study focused on developing and testing a program that could address this issue during the in-service period. It examines the effectiveness of the DDDM-TTP designed to support classroom teachers in making their pre-referral process decisions for students they consider at risk in a more systematic and data-driven manner. In the study, the extent to which the training was reflected in teachers' data-based decision-making practices during the pre-referral process, the quality of the educational assessment request forms, the change in the number of students referred to the GRC, and the social validity dimensions were evaluated.

In this context, the main research questions of the study are as follows:

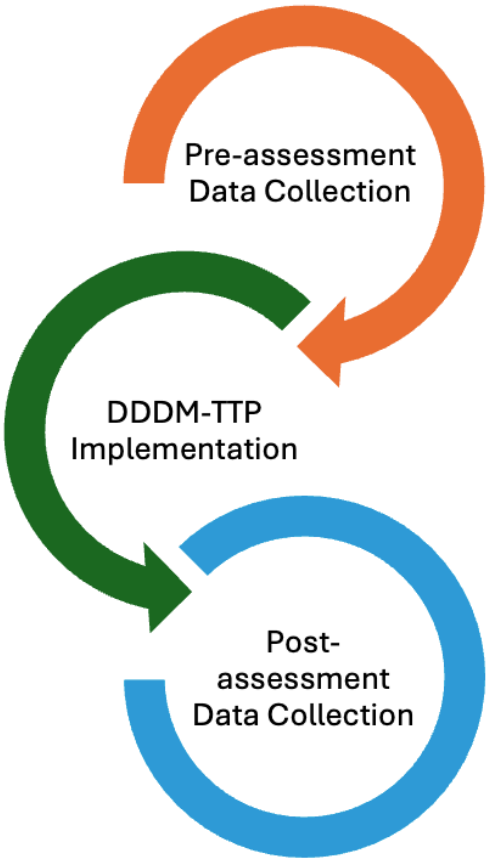
1. How do classroom teachers' practices related to the pre-referral process change following the DDDM training?
2. What changes are observed in the quality of educational assessment request forms after the training?
3. How has the DDDM training influenced teachers' decisions regarding students they had previously considered referring to the GRC?
4. What are the opinions of classroom and guidance teachers regarding the applicability and contributions of the DDDM-TTP?

Method

Research Design

This study was designed using a one-group pretest–posttest design to examine the effect of teacher training on the DDDM (data-driven decision-making) process within the pre-referral stage. In this pre-experimental design, a single group of participants is identified, and the effect of the experimental intervention is tested through procedures conducted with that single group (Gliner et al.,2015). Considering that the instruments used to answer the research questions yielded qualitative findings, the term assessment was used instead of test in reference to the model. The research process is presented in the figure below.

Figure 1.
Implementation of the Research Design



In the research process, a pre-assessment is administered to this group (the experimental group), which includes all participants. Following the implementation, the experimental process takes place, and finally, a post-assessment is conducted using the same instruments employed in the pre-assessment, and the results are recorded. During the pre-assessment phase, semi-structured interviews were conducted with the teachers, classroom observations were documented, and educational assessment forms were completed. After the implementation of the DDDM-TTP, the post-assessment was carried out using the same instruments.

Participants

The participants of the study consisted of four first-grade teachers working in a public school. The sample of the study was determined through convenience sampling due to limitations related to cost and resource availability. In this design, individuals, objects, and cases that are easily accessible are selected as the sample without concern for representing the population (Gliner et al., 2015). Detailed information about the teachers who participated in the implementation is presented in Table 1.

The following criteria were used in the selection of teachers:

1. Being a classroom teacher,
2. Not having previously received in-service training on Data-Driven Decision Making (DDDM),
3. Having at least one student in the class who is considered to be at risk,
4. Willingness to participate voluntarily in the study.

Table 1
Information on the Participating Classroom Teachers

Teacher	Class	Age	Gender	Professional experience	Graduated program
CT1	1/A	38	Female	13	Classroom Teacher
CT2	1/B	54	Female	32	Classroom Teacher
CT3	1/C	50	Female	25	Classroom Teacher
CT4	1/D	34	Female	9	Classroom Teacher

The ages of the participating teachers ranged from 38 to 54, and they had between 9 and 32 years of professional experience. All of the teachers were graduates of classroom teaching programs, meaning they were specialists in their field, and all were female. In addition to the classroom teachers who took part in the implementation phase of the study, the school guidance counselors whose opinions were collected for social validity data were also included as participants. Table 2 presents the demographic information of the guidance counselors.

Tablo 2
Information regarding the guidance counselors who participated for social validity.

Teacher	Age	Gender	Professional experience	Graduated program
GPC1	46	Female	21	Guidance and Psychological Counseling
GPC2	45	Female	30	Guidance and Psychological Counseling

The undergraduate program from which the guidance counselors graduated is Guidance and Psychological Counseling. This indicates that they are specialists in their field. In addition, it is seen that they have 21 and 30 years of professional experience.

Data Collection Instruments

Five different data collection instruments were used in the study (Table 3). These instruments were administered during both the pre- and post-assessment phases; the main data sources consisted of semi-structured interview forms, researcher field notes, and educational assessment forms completed by the teachers.

Table 3

Data Collection Tools

Data Collection Tools	Name of the Data Collection Tool	Purpose
Measurement tool for evaluating the Educational Assessment Request Form	Educational Assessment Request Form Rubric	Aimed to determine the quality of teachers' completion of the Educational Assessment Request Form.
Measurement tool for collecting field data	Field observation records	Aimed to observe teachers' data literacy skills demonstrated during the decision-making process.
Data collection tools for teachers	Semi-structured interview form	Aimed to determine teachers' opinions on data-driven decision making in the pre-referral process.
Data collection tools for students	Early Literacy Test (ELT), Rapid Naming Test (RNT), Working Memory Scale (WMS)	Aimed to reveal the performance of students identified by teachers as being at risk and to verify teachers' statements.
Data collection tools for the training	Semi-structured social validity interview form	Aimed to determine the significance and impact of the DDDM-TTP process on the teachers participating in the study.

Assessment Tool for Evaluating the Educational Assessment Request Form

The Educational Assessment Request Form Evaluation Rubric used in the study was developed by the researchers to assess the quality of the educational assessment forms completed by teachers for students they identified as being at risk. During the development of the rubric, the relevant literature was reviewed, and it was determined that the educational assessment form should not only reflect the student's academic and behavioral performance but also clearly and explicitly present the need for referral. Accordingly, the rubric was constructed with three dimensions—content, clarity, and responsiveness to student need—and each dimension was structured to be evaluated at three levels (inadequate–developing–adequate). The draft rubric was reviewed by two faculty members who are experts in special education and two research assistants, and it was revised based on their feedback to obtain its final version as a data collection tool. The items of the Educational Assessment Request Form Rubric are provided in Appendix 1. Since the DDDM-TTP included a training session on how to properly complete the educational assessment form, teachers were asked to complete the form before and after the implementation, and these forms were evaluated using the rubric.

Instrument for Collecting Field Data

In qualitative research, the researcher must interact with participants for a sufficient period to become familiar with the research setting. The researcher's purposeful involvement in the environment where behaviors naturally occur is defined as participant observation (Yıldırım & Şimşek, 2011). In this study, the aim was to observe the decision-making processes that classroom teachers engaged in for students they identified as being at risk. Teachers were expected to demonstrate behaviors addressed within the DDDM-TTP, including identifying the at-risk student, selecting an appropriate data-collection tool, systematically recording data, analyzing the data, and using the information obtained to inform the student's educational process. During observations, the extent to which teachers employed data literacy skills throughout these processes was examined.

During participant observation, the classroom environment, teachers, and at-risk students were the primary focus, and observations were documented as field notes. Owing to their open-ended structure, field notes allowed for the recording of detailed, objective, observable, and measurable descriptions related to both the process and the resulting behaviors. This approach provided evidence regarding the degree to which teacher behaviors aligned with the expected criteria.

In the study, each teacher was observed five times during both the pre-assessment and post-assessment phases, on different days and during different class periods, and field notes were recorded for each observation session.

Data Collection Instruments for Teachers and for the Training

In the study, two separate semi-structured interview forms were used. The first interview form was administered before and after the training to identify teachers' views regarding DDDM in the pre-referral process and to reveal changes in their knowledge and practices following the training. The second interview form was developed to assess the social validity of the study and aimed to determine the acceptability, usefulness, and practicality of the implementation from the teachers' perspective.

The development process of both forms followed similar steps. First, a pool of potential questions was created by reviewing the literature on the pre-referral process, DDDM, and social validity. Then, expert opinions were sought to ensure the forms were aligned

with their intended scope and purpose. At the initial stage, revisions were made based on feedback from the thesis advisor; afterward, the forms were updated in line with evaluations from two faculty members specialized in special education and four doctoral-level research assistants. In the final stage, feedback was obtained from a Turkish language expert, a special education teacher, and a classroom teacher to assess language clarity and practical applicability, after which both forms were finalized.

Both the DDDM interview form and the social validity interview form were administered by the researcher through one-on-one interviews with teachers during the pre-assessment and post-assessment data collection phases.

In Table 3, the rubric for the Educational Evaluation Request Form, the semi-structured interview form for teachers, and the semi-structured interview forms regarding the training were developed by the researchers. During the development process of the rubric and interview forms, interview questions prepared based on a literature review were submitted for expert review. In line with the feedback received from field experts, the questions were refined and then piloted with teachers who participants in the study were not. Following the pilot interviews, the forms were revised and subsequently finalized after obtaining a second round of expert opinions.

Data Collection Instruments for Students

In the study, the Early Literacy Test (ELT), the Rapid Naming Test (RNT), and the Working Memory Scale (WMS) were used to confirm the status of students identified as at-risk based on teachers' reports.

ELT is a measurement tool used to assess early literacy skills and to identify children who are at risk. ELT is reported to be appropriate for evaluating early literacy skills among elementary-level students. The test consists of seven subtests—Receptive Vocabulary, Expressive Vocabulary, General Naming, Function Knowledge, Letter Knowledge, Phonological Awareness, and Listening Comprehension—which together allow for a comprehensive assessment of students' performance in these areas (Kargın et. al.,2015).

RAN was developed for students from kindergarten to 4th grade and aims to assess rapid naming skills. The RNT includes four subtests—Object Naming, Color Naming, Letter Naming, and Number Naming—and enables the measurement of students' performance in rapid access, naming, and automatized language processes (Ergül & Demir, 2016).

WMS was developed to determine the working memory performance of students from kindergarten to 4th grade. The scale includes four dimensions within the domains of verbal and visual memory: verbal/visual short-term memory and verbal/visual working memory. These dimensions allow for a detailed assessment of students' memory processes (Ergül et. al., 2018). The table presents the scores obtained by the students on these scales.

These instruments are accepted in the literature as standardized tests used for identifying children in the at-risk group. The researchers hold certification for administering these tests. Table 4 presents the scores that the students obtained from the administered tests.

Table 4 presents information about the students identified as being in the risk group in the classrooms where the implementation took place, along with their scores on the ELT, RNT, and WMS standard tests. Based on interviews with the classroom teachers, it was determined that each class had at least one and at most three students in the risk group. An examination of the test results revealed that these students predominantly scored low on the ELT, very slow on the RNT, and medium to very low on the WMS. These findings indicate that the performance of the students identified by teachers as being in the risk group was also confirmed by the results of the standard tests.

Data Analysis

Table 4

Information on Students' Early Literacy Test (ELT), Rapid Naming Test (RNT), and Working Memory (WMS) Scores

Student	Gender	Age	Class	Early Literacy Test (ELT)	Rapid Naming Test (RNT)	Working Memory Scale (WMS)
S1	Male	6	1/A	Low	Very Slow	Moderate
S2	Male	6	1/A	Low–Very Low	Very Slow	Very Low
S3	Male	6	1/B	Good–Low	Very Slow	Moderate
S4	Male	7	1/C	Good–Low	Slow	Moderate
S5	Male	6	1/D	Good–Low	Very Slow	Moderate
S6	Female	6	1/D	Low	Very Slow	Very Low
S7	Female	6	1/D	Low–Very Low	Very Slow	Very Low

In this study, the content analysis method, consistent with a qualitative research design, was used to examine changes in teachers' practices during the pre-referral process as a result of the DDDM teacher training. Data obtained through interview, observation, and document analysis techniques were systematically analyzed in line with the research questions.

Content analysis allows for an in-depth understanding of participants' experiences, the identification of recurring themes and patterns in the data, a comparative examination of different data sources, and interpretation through meaningful categories (Patton, 2014; Glesne, 2011). This approach enabled a holistic evaluation of the factors influencing teachers' decisions in the pre-referral process.

In the data analysis process, interview transcripts, observation notes, and documents were first carefully read, and the statements emphasized by each participant were identified. Based on these statements, codes were generated, and the themes formed by these codes were defined. The themes developed from the common emphases of the teachers were validated by comparing them with information from different data sources.

Interview and observation data were analyzed comparatively, while document data were evaluated holistically in terms of content. Care was taken to ensure coherence and consistency across data sources when presenting the findings.

The coding process was carried out systematically by the researchers. The data were read independently by each researcher, and preliminary coding was performed. The researchers then came together to exchange views on the codes they had generated, reaching consensus on meaningful categories and themes. To enhance the reliability of the process, the findings were also reviewed by independent researchers familiar with the study, and the thematic structure was confirmed. This process demonstrates that the analyses were conducted in accordance with the principles of credibility.

Trustworthiness

In qualitative research, credibility criteria—used instead of validity and reliability—provide an important framework for evaluating the trustworthiness of the study and the accuracy of its findings (Guba & Lincoln, 1982). In this study, various strategies were adopted in the dimensions of credibility, dependability, confirmability, and transferability to ensure trustworthiness.

First, to ensure data triangulation, multiple data collection methods—such as interviews, observations, and document analysis—were employed. Member checking was conducted, and not only the raw data but also the findings derived from the researchers' interpretations were shared with the participants. In addition, expert review was conducted by seeking the opinions of academic specialists in special education and practicing teachers during the development of data collection tools and the creation of training content. Expert opinions were obtained at each stage from the dissertation advisor, dissertation committee members, field specialists, and teachers, contributing to the validity and reliability of the study. Conducting the study during a period when teachers were just beginning to get to know their students, and establishing long-term and natural interactions with the teachers, were other important practices that supported credibility.

During the data analysis process, coding was conducted independently by the researcher and a second expert, and efforts were made to ensure inter-coder consistency. Furthermore, during the implementation process, the researcher was accompanied by independent observers who documented that the process was carried out as planned. In this respect, the aim was to enhance the reliability of the study.

To ensure confirmability of the data, interviews were recorded using an audio device, field notes were taken, and all data were transferred to a digital format. The accuracy of these raw data was also verified by a second expert, and during the analysis, direct quotations were included to distinguish the raw data from the researchers' interpretations. Finally, the method, participant profiles, research setting, and process were described in detail to support the principle of transferability for studies to be conducted under similar conditions.

This study was conducted in accordance with the ethical principles fundamental to qualitative research (Creswell, 2021). Prior to the study, ethical approval was obtained from the Scientific Ethics Committee, and official permission was granted by the Provincial Directorate of National Education. The participating teachers and the students' parents were informed about the aim, process, and scope of the study, and written informed consent forms were obtained from all participants. The confidentiality of participants' identities was maintained throughout the study, and codes were used instead of real names in reporting. All information obtained during the data collection process was securely stored by the researcher and was not shared with third parties. Multiple perspectives were incorporated into the analysis and interpretation of the data, ensuring adherence to ethical values.

Pilot Implementation Process

The pilot implementation was carried out in a full-time public school located in one of the central districts of Ankara, with six volunteer classroom teachers. The at-risk students were identified based on the statements of the classroom teachers and school counselors, and this identification was verified through standardized tests (ELT, RNT, WMS) administered by one of the researchers. After obtaining approval from the Ministry of National Education and the university ethics committee, written consent was obtained from the teachers, and the pre-assessment process was carried out through classroom observations, teacher interviews, and educational assessment request forms.

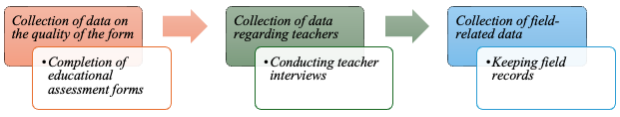
The DDDM-TTP was conducted in a group format in the teachers' lounge, four days a week on weekdays, with each session lasting approximately one hour. Each session was conducted interactively and based on experience sharing, accompanied by presentations prepared by the researcher and individual teacher files. Case studies and practice-based materials were used in the sessions, and teachers' active participation was encouraged.

At the end of the training, the teachers stated that they had gained awareness of the importance of data-driven decision making and had recognized the necessity of systematic data collection. They expressed that the materials included in the content were explanatory and engaging, and that the practice-oriented nature of the training created satisfaction. However, some difficulties were reported in the structural use of certain materials. The reliability of the pilot implementation was evaluated using observation forms by an observer who participated in the process. It was observed that the process generally proceeded as planned and that the teachers were satisfied with the program.

DDDM-TTP Implementation Process

The implementation process of the DDDM-TTP began with a pre-assessment phase to evaluate teachers' existing practices regarding pre-referral decision-making. In this phase, three data sources were used: educational assessment forms completed by teachers, semi-structured interviews with teachers, and classroom observations.

Figure 2.
The Process of Collecting the Pre-Assessment Data of the Study



As shown in Figure 2, each teacher completed an educational assessment form for the students in their class whom they considered to be at risk. In addition, one-on-one interviews were conducted with the teachers, and these interviews were audio-recorded and transcribed. Lastly, a total of five lesson observations were conducted in each teacher's classroom on different days, with the observation time reaching approximately 200 minutes per teacher.

The data collected made it possible to evaluate teachers' pre-training decision-making processes from multiple perspectives. After the pre-assessment phase was completed, the teacher training—planned to consist of four sessions—was implemented within one week at a time suitable for both classroom teachers and guidance counselors. All sessions were held in an environment with suitable physical conditions, allowing teachers to interact comfortably with each other and the researcher, and to follow the presentations. Unique materials were developed for each session, individual files were prepared for participants, and the working processes were structured in advance.

In the first session, teachers' awareness of the definition of "at-risk group" was addressed, their existing knowledge regarding the referral process was identified, and the content components of the educational assessment request form were introduced. Participants completed the materials individually based on their own students and engaged in group sharing activities.

The second session focused on evaluating educational assessment request forms, with teachers analyzing two different sample forms using the rubric. Based on these analyses, teachers discussed the structural adequacy of the forms and related them to their classroom practices.

The third session was structured with a data literacy-based approach to enable teachers to analyze data naturally obtained from classroom practices. Teachers analyzed information-generation processes through various scenarios and developed short scenarios based on their own classroom practices, completing data-generation checklists for these scenarios.

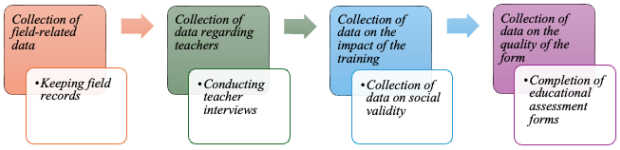
In the fourth and final session, teachers evaluated their decision-making processes based on the scenarios they had developed. In this session, they were encouraged to conduct self-assessments regarding the stages of decision-making and to provide constructive feedback on each other's practices.

At the end of the program, a general evaluation was conducted, and the training process was concluded by presenting participants with certificates of appreciation. This structured training process aimed

to develop teachers' abilities to conduct classroom observation, data collection, evaluation, and referral decisions in a more systematic and data-driven manner.

Following the implementation of the DDDM-TTP, post-assessment data were collected to evaluate its impact on teachers' decision-making processes. In this phase, teachers were given two weeks to apply what they had learned from the training to their classroom practices.

Figure 3.
The Process of Collecting the Post-Assessment Data of the Study



For the tasks shown in Figure 3, five classroom observations were conducted for each teacher, resulting in a total of 200 minutes of observation data per teacher. The observations were conducted during literacy lessons and were supported by two independent observers. One-on-one semi-structured interviews were conducted with the teachers; these interviews were audio-recorded and lasted approximately 33 minutes in total. Additionally, within the scope of the social validity evaluation of the training, individual interviews were conducted with teachers and guidance counselors to assess the applicability and contributions of the program. Finally, teachers were asked to complete the Educational Assessment Request Form again for each at-risk student, and these forms were collected for analysis.

Findings

1. Findings Revealing Changes in Teachers' Views on the Pre-Referral Process After the DDDM Teacher Training

Changes in the Situations Prompting Data Collection

In the pre-training period, teachers generally associated the need for data collection with behavioral problems or academic deficiencies observed in students. In this process, data collection was mostly based on teachers' personal observations and experience-based evaluations. However, after the training, teachers stated that they also included multidimensional factors such as learning difficulties, attention span, and speech disorders in the data collection process. This indicates that teachers moved away from an approach focused solely on identifying obvious disabilities in assessing at-risk students and developed an evaluation perspective that takes into account multidimensional risk indicators.

"Behavioral problems make me wonder if there might be an issue." (CT1, pre-assessment)

"When I don't get academic feedback from what I teach, when I don't see success, I collect data." (CT2, pre-assessment)

"Their participation in class drops, their attention wanders. They lose focus quickly. They don't fully listen to the lesson, even in class." (CT4, pre-assessment)

"I now observe more, especially in children with attention deficits." (CT2, post-assessment)

This finding shows that teachers diversified their evaluation criteria for monitoring students and began to focus not only on problem behaviors but also on multidimensional indicators of learning.

Systematic Nature of the Data Collection Process

Before the DDDM training, the data collection process was mostly conducted by teachers in an intuitive and unstructured manner. After the training, teachers stated that they had made the data collection process more structured and planned. Teachers reported improvement in recording their observations, reviewing them, and making document-based decisions.

"Previously, I proceeded intuitively; now I realize I need to record certain things." (CT1, post-assessment)

"I had never thought of taking written notes. Now I can say it has become a habit." (CT3, post-assessment)

"I have always observed, but now I try to record in a planned way." (CT4, post-assessment)

These statements indicate that teachers have shifted toward basing their classroom observations not only on instant reactions but also on more consistent data.

Change in Justification of Referral Decisions

Before the training, referrals to the Guidance and Research Center (GRC) were mostly based on teachers' observations and personal intuitions; however, in the post-training process, teachers were found to base their decisions more on systematic observations, written notes, and assessment forms. This change indicates that teachers began to develop a professional reflex in their decision-making process.

"I can now make a decision not only with my feelings but also by supporting it with my observations." (CT2, post-assessment)

"When I have the data in hand, I feel more comfortable when making a decision." (CT4, post-assessment)

"Previously, I felt certain things, but that wasn't enough. Now I can speak with documents." (CT3, post-assessment)

This transformation shows that referral decisions have begun to be regarded not merely as an administrative requirement but as a pedagogical responsibility.

From Uncertainty to Clarity in the Decision-Making Process

Before the training, teachers reported experiencing indecision and uncertainty in referral decisions, sometimes finding it difficult to act due to the fear of making an "incorrect referral." In the post-training period, these uncertainties were observed to have decreased, with teachers being able to make clearer and more confident decisions. The data-driven way of thinking made the decision-making processes more reliable.

"Before, I always had a 'what if' in my mind. Now, I am clearer based on the data I have." (CT4, post-assessment)

"Before, I used to think a lot about referrals, wondering if I was right. Now I know on what basis I am making the referral." (CT1, post-assessment)

"When making decisions now, I act not only on what I feel but also on the information I have." (CT2, post-assessment)

This finding indicates that teachers' self-confidence in decision-making processes increased and their sense of professional competence was strengthened.

2. Findings on Changes in Teachers' Processes for Referring At-Risk Students to the GRC

The second sub-problem of the study aimed to examine the processes of referring students considered at risk to the Guidance and Research Center (GRC) before and after the DDDM-TTP.

Teachers who stated that they had at-risk students in their classrooms were included in the study. In the initial interviews, teachers stated that they believed these students needed to be referred to the GRC due to their developmental characteristics, and they reported following the process in collaboration with guidance counselors and students' parents. To objectively support these statements, the students were assessed by the researcher using the ELT, RNT, and WMS and the test results showed that the students scored below the cut-off points for their age and grade levels.

In the educational assessment request forms administered to teachers before the training, all teachers checked the item "to make a placement (official measure) decision regarding the student" for their students. In the re-administration conducted after the training, three teachers checked the same item again. However, the fourth teacher stated that "the official measure to be implemented at school is sufficient" for the student instead of a GRC referral and noted that the observation process should continue.

This indicates that there were individual differences in teachers' decision-making processes. In particular, the change in the fourth teacher's assessment form suggests that the training improved teachers' data-driven thinking and that some teachers tended to opt for in-class support practices rather than a GRC referral. Overall, it appears that the DDDM-TTP program was effective in shaping teachers' educational assessment decisions, although environmental and individual factors played a determining role in the implementation of these decisions.

3. Findings on Changes Observed in the Quality of Educational Assessment Request Forms

In the third sub-problem of the study, the changes in the educational assessment request forms completed by teachers—regarding content, clarity, and appropriateness to student needs—before and after the training were evaluated. This evaluation was carried out using a rubric developed based on expert opinions.

Figure 4.
Changes in Teachers' Educational Evaluation Forms Before and After the DDDM-TTP Training

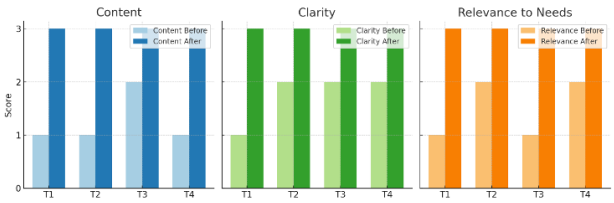


Figure 4 reflects the improvement that teachers showed in their educational assessment forms in three main dimensions—content, clarity, and appropriateness to need—before and after the DDDM-TTP training. The changes in scores over time for each teacher are presented separately, concretely demonstrating the impact of the training.

The data indicate that teachers demonstrated a significant improvement in the content dimension of the forms after the training. Before the training, most teachers used superficial and general statements when describing the student, without including concrete data on the student's strengths, learning needs, or classroom performance. For example, in one teacher's pre-assessment form, only the statement "does not recognize letters" was provided, whereas in the post-assessment form for the same student,

detailed explanations reflecting the instructional process were included, such as "Despite working on sounds for three weeks, the student has difficulty distinguishing the /l/ sound and requires support in blending voiced syllables." This improvement shows that teachers developed the ability to reflect not only the student's current status but also observations based on the instructional process in the forms.

A noticeable change was also observed in the clarity dimension. Before the training, teachers tended to convey information in the forms using complex, context-detached, or overly brief statements, providing texts that made it difficult for the referral committee to gain a clear understanding of the student's situation. After the training, teachers' forms became more coherent and clearer. For example, in earlier forms, general statements such as "lacks attention" were used, whereas after the training, more descriptive, observation-based statements were included, such as "In activities requiring visual attention, the student begins to turn toward environmental stimuli after 10 minutes." This change indicates that teachers reached a level where they could analyze monitoring data and provide more descriptive and contextually relevant information.

In the dimension of appropriateness to student need, teachers' referral requests became more substantiated and justified. Whereas pre-training forms generally contained justifications such as "needs support education," post-training forms included justifications specifying the student's special needs in the learning process, such as "Listening skills are insufficient for understanding instructions given in the classroom; the student can reach comprehension only through one-on-one repetition." This indicates that teachers described the student's support needs based on individual characteristics in a more professional manner.

Considering all these findings together, it is evident that teachers completed the educational assessment forms in a more detailed, clear, and student needs–responsive manner compared to the pre-training period; thus, the pre-referral process was conducted in a more data-driven way. These results demonstrate the potential of the DDDM-TTP training to improve teachers' decision-making and written expression skills.

4. Classroom and Guidance Teachers' Views on the Applicability and Contributions of the DDDM-TTP

Within the scope of the study, the social validity of the DDDM-TTP regarding the pre-referral process was evaluated based on the views of classroom teachers and school guidance teachers. The social validity data were analyzed using content analysis, and the findings related to participants' experiences were grouped under four themes:

i. Contribution of the Educational Assessment Request Form to the Decision-Making Process

Participating teachers stated that the form provided them with an objective and systematic perspective in the referral decision process and helped them see different aspects of the students. It was noted that the form increased teachers' awareness of the student and structured the decision-making process:

"I noticed the deficiencies of the child that I had not realized before... I thought about what I could do." (CT2)

Guidance teachers, on the other hand, emphasized that the form provided a framework guiding the evaluation process and contributed to the elaboration of teachers' observations:

"It gives us a framework regarding the aspects we need to look at." (GPC2)

ii. Appropriateness of the Form for Recording Student Performance and Needs

Most classroom teachers stated that the form was suitable for recording students' performance and needs. However, one teacher stated that the form was insufficient for evaluating psychological characteristics:

"Okay, for behavior yes... but not sufficient in terms of their psychology." (CT1)

Guidance teachers stated that although the form was sufficient for academic descriptions, it could be inadequate in upper grades and behavioral situations, and therefore the content of the form should be expanded:

"Generally, identification is considered at the first-grade level... but in delayed identifications, this can be a bit lacking." (GPC1)

iii. Impact of the Training on the Quality of Form Completion

Participating teachers stated that the training they received significantly improved the quality of form completion. This improvement was particularly associated with increased awareness regarding detailing classroom observation results and writing them in a clear manner:

"Previously, I used to give very simple answers... now I have realized that I need to provide more detailed ones." (CT3)

Guidance teachers also stated that the training created significant awareness among teachers and improved their attitudes toward data collection:

"There has been improvement among teachers in terms of collecting data, making observations, and recording them." (GPC2)

iv. Necessity of the Training in the Pre-Referral Process

All participants emphasized that data-driven decision-making in the pre-referral process is necessary for teachers. Classroom teachers stated that the training was instructive not only in making observation-based decisions but also in systematically recording and using data:

"If there is no efficiency, it is my opinion... but with data, I have a basis to defend it." (CT1)

Guidance teachers emphasized that the training should be provided not only before referral but also in the early stages of teaching, thereby reducing the risk of misidentification:

"If it is given to teachers who will start teaching first grade right at the beginning of the school year, it would be perfect." (GPC1)

It is observed that participants' most emphasized points regarding the implementation were its contribution to the instructional process and to professional development/awareness. This situation reveals the effectiveness of the training for teachers at both practical and cognitive levels.

Discussion

The DDDM-TTP implemented in this study brought about significant changes in classroom teachers' decision-making processes prior to referrals to the GRC.

Firstly, it is noteworthy that there has been a significant transformation in teachers' general views regarding the pre-referral process. Before the training, teachers mostly based their referral decisions on students' behavioral problems or academic deficiencies, whereas in the post-training period, they began to base these decisions on multidimensional indicators. This change toward systematically collecting data and conducting observations in areas such as learning difficulties, attention deficits, and language development indicates that teachers have adopted a more analytical and planned approach in student evaluation processes. This situation reveals that teachers are now structuring their decisions not only intuitively but also based on formal data. Schelling and Rubenstein (2021) also refer to a similar transformation, stating that it has a direct impact on teachers' professional decision-making competence. Previous studies indicate that teachers frequently rely on intuitive judgments; however, such intuitions are not always reliable (Ingram et al., 2004; Earl & Louis, 2013). The findings of the present study show that teachers have begun to support their intuitions with systematic data analysis, and that data provide a reference point for confirming—or, when necessary, questioning—their intuitive interpretations.

In connection with this, the change observed in teachers' referral decisions is also noteworthy. Before the training, some teachers had planned to refer certain students to the GRC; however, after the training, they re-evaluated these decisions and stated that, for some students, it would be more appropriate to support the process through in-class adaptations. This indicates a change not only in teachers' decision-making skills but also in their awareness of justifying these decisions and taking responsibility for the decisions made on behalf of students. Teachers' adoption of a "preventive intervention" approach instead of "direct referral" clearly reveals the practical implications of the DDDM-TTP in the field. This finding is consistent with the necessity emphasized by Tunç (2011), Young and Gaughan (2010) and Kizir and Şahin (2020) for structuring assessment and educational adaptations in the pre-referral process. In conclusion, the DDDM-TTP supports teachers in conducting their decision-making processes in a more conscious and structured manner.

Furthermore, the improvements observed in the quality of the educational assessment forms completed by teachers constitute an important finding in terms of demonstrating the documented effects of the training. According to the literature, teachers often tend to focus on data that confirm their existing assumptions (Bertrand & Marsh, 2015; Ingram et al., 2004). Post-training forms were noted to contain clearer, more comprehensible, and student-specific details, both in terms of content and expression. It is understood that teachers have begun to view assessment forms not merely as a legal requirement but as a tool for the educational decision-making process. This finding reveals that the DDDM-TTP has transformed teachers' document preparation processes into a more functional format that serves educational purposes. As emphasized in the studies of Gül-Kuruyer and Çakıroğlu (2017) and Öğülmüş (2021), the quality of such documents plays a critical role in the appropriateness of referral decisions.

In terms of the social validity of the implementation, it is observed that both classroom teachers and guidance teachers hold positive views. Guidance teachers stated that the improvements in teachers' observation and data collection processes contributed to the GRC procedures. Classroom teachers, on the other hand, expressed that the training process was functional and responsive to their needs in terms of both content and delivery, emphasizing that case examples particularly contributed to their understanding of the process. In this context, it is evident that the implementation was

not limited to the referral process but also extended to classroom instructional practices. It is well established that data use is inherently a social process, and teacher interactions shape how meaning is constructed from data (Coburn, 2001; Marsh et al., 2015). These findings regarding the implementation process indicate that the training resonated in real contexts and led to meaningful changes in teachers' professional practices. Therefore, it was concluded that the DDDM-TTP contributed to teachers' awareness and competence in both referral and in-class assessment and intervention processes.

Finally, certain assumptions were taken into account in the evaluation of the study. It was assumed that the responses given by teachers during the pre-test and post-test phases were accurate and sincere. In addition, it was accepted—based on both teacher opinions and the measurement tools administered by the researcher—that the students identified by teachers as being in the at-risk group did indeed belong to this group. The study was conducted with the participation of only four classroom teachers, and in line with the qualitative research design, in-depth data were collected. This limits the generalizability of the findings. The data were analyzed based on interviews, classroom observations, and educational assessment forms. The data collection phase for the follow-up process of the study could not be carried out due to the COVID-19 pandemic; therefore, findings regarding the long-term effects of the training could not be reported.

Recommendations

In line with the research findings, the Data-Driven Decision-Making Teacher Training Program (DDDM-TTP) appears to play a preventive role, particularly in the early identification of at-risk students and in enhancing the functionality of the pre-referral process. Therefore, the DDDM approach should be included in both pre-service and in-service training programs in a way that integrates it into all decision-making processes of teachers, beyond just the pre-referral process. In addition, it is recommended that multidisciplinary teams to be established in schools coordinate student monitoring from the time of enrollment until graduation. Regarding the study, monitoring the impact of the DDDM-TTP on teachers' practices with the support of coaching, differentiating the content according to teachers' needs to evaluate its effectiveness in the classroom, and examining its reflections on student achievement as one of the indirect effects of the program will provide valuable contributions for future research.

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Ethics Committee Approval:

This study was ethically reviewed and approved by the Ethics Committee of Educational Research under the Rectorate of Gazi University. The Ethics Committee decided that the research was ethically appropriate at the meeting held on 24.04.2019 with decision number 04.

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Appendix-1.
Educational Assessment Request Form Evaluation Rubric
Educational Assessment Request Form Evaluation Rubric

This rubric was developed to examine the quality of the educational assessment forms completed by teachers during the referral process of students to the Guidance and Research Center (RAM), focusing on three dimensions: content, clarity, and need-responsiveness.

Scoring will be carried out by qualitatively rating the levels of the educational assessment request form in each specified dimension as follows: 3 – Adequate, 2 – Partially Adequate, 1 – Inadequate.

Dimension	Level		
	3	2	1
CONTENT (refers to the expression of the statements written for the items included in the educational assessment form)	All items D, E, F, G, and H were completed by the teacher.	Three or four of the items D, E, F, G, and H were completed by the teacher.	Three or fewer of the items D, E, F, G, and H were completed by the teacher.
	The adjustments made in item "E" were explained in detail.	The adjustments made in item "E" were described in a vague, limited way or in a manner that does not generate forward-looking ideas.	The adjustments made in item "E" were left blank, or the statements provided were not appropriate for describing the adjustments.
	In items "F and G," all evaluation rows were marked in a way that supports the reader in making an accurate assessment. Appropriate for the age group Each developmental domain shows a hierarchical sequence	In items "F and G," the evaluation rows were marked in a way that may lead the reader to make an incomplete assessment. Age-appropriate skills are partially missing Only some developmental domains show a hierarchical sequence	In items "F and G," all evaluation rows were left blank or marked in a way that does not provide performance indicators for the reader. Age-appropriate skills are absent or very limited Does not cover each developmental domain Does not show a hierarchical sequence
	The classroom teacher clearly detailed the reasons why the student needs support from the special education and rehabilitation center.	The classroom teacher explained the reasons for the student's need for support from the special education and rehabilitation center in a vague, limited way or in a manner that does not generate forward-looking ideas.	The classroom teacher left the reasons for the student's need for support from the special education and rehabilitation center blank or used statements that were not appropriate for describing the need.
CLARITY (refers to the language used in the educational assessment form)	The teacher used observable and measurable statements in items E and H.	The teacher used observable and measurable statements in only one of the items E or H.	Observable and measurable statements were not used in items E and H.
NEED-RESPONSIVENESS (refers to how the educational assessment form addresses the student's referral needs)	The skills marked as "partially" or "no" in item F were clearly stated as intervention measures in item E.	The skills marked as "partially" or "no" in item F were expressed in item E in a vague, limited way or in a manner that does not generate forward-looking ideas.	The skills marked as "partially" or "no" in item F were not mentioned in item E.
	The items marked as negative in item "G" were clearly stated as intervention measures in item "E."	The items marked as negative in item "G" were expressed in item "E" in a vague, limited way or in a manner that does not generate forward-looking ideas.	The items marked as negative in item "G" were not mentioned in item "E."
	The skills marked as "partially" or "no" in item F were clearly stated as needs in item H.	The skills marked as "partially" or "no" in item F were expressed in item H in a vague, limited way or in a manner that does not generate forward-looking ideas.	The skills marked as "partially" or "no" in item F were not mentioned in item H.
	The items marked as negative in item G were clearly stated as needs in item H.	The items marked as negative in item G were expressed in item H in a vague, limited way or in a manner that does not generate forward-looking ideas.	The items marked as negative in item G were not mentioned in item H.