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David Mioduser^a; Malka Margalit^a; Meira Efrati^a

^a School of Education, Tel-Aviv University, Ramat-Aviv, Israel

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Teachers' Interpretation of ADHD Behaviours in Children: an issue in the development of a computer-based teacher training system

DAVID MIODUSER, MALKA MARGALIT & MEIRA EFRATI
School of Education, Tel-Aviv University, Ramat-Aviv, 69978, Israel

ABSTRACT *This study is part of a research effort aiming to identify teachers' perception and interpretation of behaviour disorders, towards the development of a computer-based training tool. Its main goal was to examine differences in perceptions of behaviour disorders among three groups of educators: (a) novice special educators (undergraduate students of special education during their inservice training), (b) experienced special educators, and (c) headteachers of special schools. A questionnaire was developed based on the descriptors of the DSM-IV of four common children behavioural difficulties: Attention Deficit Disorders with Hyperactivity (ADHD), Conduct Disorders (CD), Oppositional Disorders (ODD), and Learning Disorders (LD). This was administered after a subject's working session with the Teacher Training Interactive Problem Solving System (TTIPSS) computer training system. Significant between group differences were found for the ADHD, CD, and OD subscales, but not for the LD subscale. Teachers viewed the different disorders as partially interrelated. In contrast to the experienced teachers, the novice teachers tended to utilise a more generalised approach, ignoring distinctive aspects of the behaviour difficulties. The results suggest directions for the further development of the computer training system regarding its accommodation to different levels of expertise of prospect trainees, and the set of recommended tools and features for supporting the analysis and diagnosis of behaviour disorders.*

Introduction

This study is part of a research effort aiming to identify teachers' views of behaviour disorders, towards the development of an experimental version of a computer-based training tool. A promising trend in the design of computer-based training focuses in the development of case-based systems (Kolodner, 1993). In these systems the training session proceeds as a trainee/computer dialogue about a case. An essential component of such a system is its knowledge-base, containing comprehensive information about cases and about the trainees' problem solving conceptions, knowledge, and skills. Thus a key step in the development of the knowledge-base is

the formal modelling of teachers' knowledge and strategies (Major, 1995; Wood & Pateman, 1991).

In this study we focus on teachers' perceptions of behavioural disorders as part of the development process of Teacher Training Interactive Problem Solving System (TTIPSS), an interactive computer-based training tool (Mioduser & Margalit, 1997). Data collected following the teachers' interactions with a preliminary prototype of the computer system served as basis for the modelling of the teachers' knowledge and perceptions. The computer system is aimed to be included in training programs for teachers with different levels of expertise regarding the treatment of behaviour disorders. Correspondingly, the main goal of this study was to examine differences in perceptions among three groups of educators: (a) novice special educators (undergraduate students of special education during their inservice training), (b) experienced special educators, and (c) headteachers of special schools.

Among the most common behaviour disorders of children are problems related to aggression, hyperactivity, and inattention (Beare, 1991; Day, Bream, & Pal, 1992; Goodyear & Hynd, 1992). At least one child in every classroom can be expected to demonstrate attention deficit disorder with hyperactivity (ADHD) (Rosenberg, Wilson, Maheady, & Sindelar 1992).

It should be noted that even though it refers to common phenomena, the concept of behavioural disorder remains complex, multifaceted, and difficult to understand. One way of conceptualising disruptive behaviours is as an interaction between students, teachers and a specific educational context. Any attempt to introduce significant change into these interactions requires awareness not only of the student's behaviour, but also of the teacher's perceptions of current and expected difficulties. In addition, the fact that children's difficulties frequently co-occur with learning disabilities (Goodyear & Hynd, 1992), makes the differential diagnostic and remedial approach a frustrating task for educators. Research also suggested that disruptive classroom behaviours exert a strong influence or "halo effect" on teachers' ratings of others' behaviours (Skiba, 1989).

Behaviour rating scales are routinely used in schools in the identification process of children's maladjustment (Lee, Elliott, & Barbour, 1994). Teachers' ratings have shown to be useful aids in the diagnostic process for many forms of behaviour disorders, particularly the externalising disorders, which are often most salient in the classroom settings (Pelham, Gnagy, Greenslade, & Milich, 1992). The currently predominant diagnostic approach for attention-deficit hyperactivity disorder relies on the DSM-IV criteria (APA, 1994). Such criteria reflect a considerable body of past research including specific investigations performed in field trials, as well as controversial attempts to differentiate among behaviour difficulties (Hinshaw, 1994). Two parallel symptom lists emphasise symptoms of inattention, poor concentration, and disorganisation versus features related to marked overactivity and behaviour impulsivity. These symptoms must lead to clear impairment in school, home, and peer group and are often accompanied by secondary features of aggression, learning difficulties and underachievement, and peer rejection (Hinshaw).

On this background it appears that the development of accurate perceptions of

children's difficulties and the acquisition of focused evaluation means should be of central concern in teacher training processes. The investigation into teachers' conceptualisation of behaviour disorders may clarify their bias and help in planning teacher training activities and means such as the TTIPSS system.

Teachers acquire theoretical knowledge about children's difficulties during their studies in teachers' colleges and universities, but only the daily confrontation with classroom reality helps them to shape this information into workable schemas leading to individualised planning and acting. With the aim to create daily real-life experiences during training sessions, valuable strategies have been developed based on the use of simulations (Murphy, Kauffman, & Strang, 1987). Simulations, as working models of real phenomena, offer the opportunity to relate to the simulated phenomena at different levels, for example, to make decisions and act, to reflect on the decisions made, to run a whole process repeatedly, to look at different variables affecting the phenomenon one at a time (Edelson, 1996; Mintz, 1988). Moreover, computer technology gives the simulation tools a series of essential features, for example, interactivity, inclusion of large bases of data and cases, inclusion of on-line support and tutoring tools, use of alternative representational means (text, video, audio, graphing), and inclusion of expertise and problem-solving models based on human experts' knowledge.

The working environment in this study is TTIPSS. This system is being developed according to the methodology that characterises the building of knowledge-based systems or intelligent tutoring systems (Wenger, 1987). In its current version it comprises a base of case studies that emerged from experienced teachers' descriptions of conflictual classroom events involving students with identified behaviour disorders, such as attention behaviour disorders with hyperactivity (ADHD) and conduct disorders (CD). Each case is comprehensively represented in the system at different levels: the behaviour disorder event, the case description, additional information about a wide range of issues from four sources (child, teacher, psychologist, parents), and a large repertoire of treatment options. In a typical session trainees are first provided with the description of a student's difficult behaviour, then they proceed along different stages of the diagnosis-treatment process. They are encouraged to identify the components of the problematic event, to generate hypotheses about its causes, to request additional contextual indicators that may help in understanding the nature of the child's problems, and form an assessment and treatment plan tuned to educational goals and the child's unique needs (see Figure 1).

The trainees interact with the system through dialogue-like transactions. Interface features allow varied modes of interaction with the comprehensive information-base of the case, according to the trainee's goals at every stage. Figure 2 shows an example from the information gathering stage, at which the trainee retrieves answers from varied sources about key questions regarding the child's behaviour.

The first version of TTIPSS was developed as a research tool for gaining knowledge about the trainees' needs, level of expertise, and diagnostic and training strategies. This knowledge is intended to serve as the basis for the formulation of training features to be incorporated in a subsequent version of the system (for a

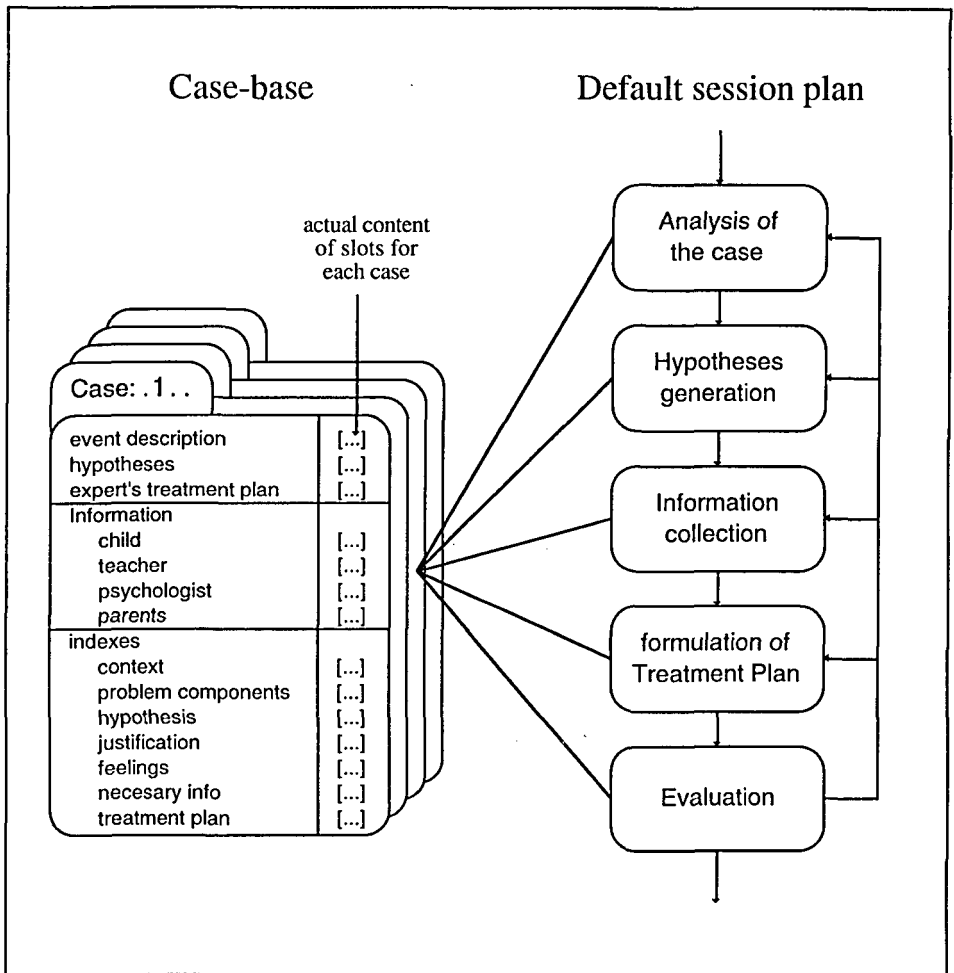


FIG. 1. Schematic Representation of Structure and Basic Session Plan of TTIPSS

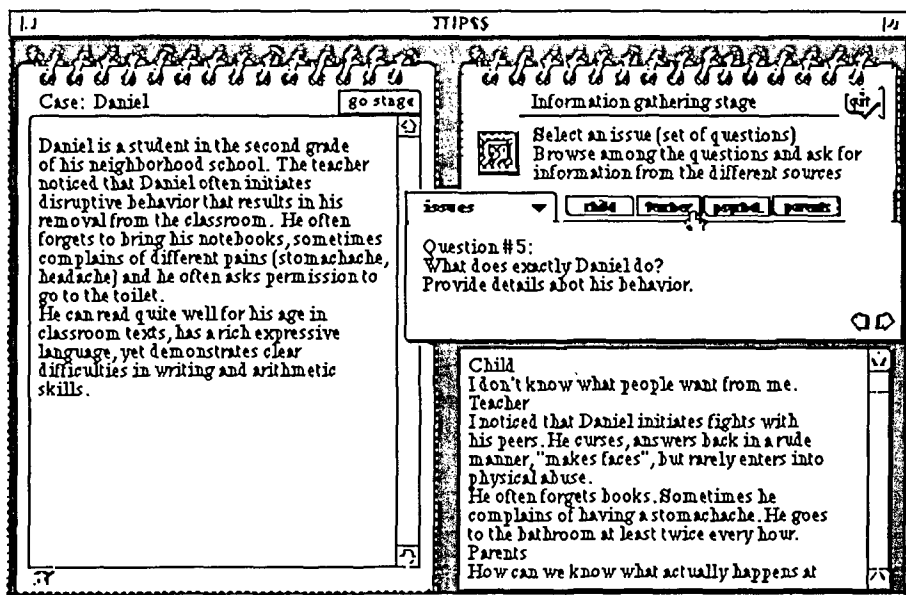
detailed description of the rationale and features of the system see Mioduser & Margalit, 1997).

Method

In this exploratory study teachers' views of different behaviour difficulties as related to their experience and role was examined.

Participants

The participants in this study were 49 female subjects: 11 special education undergraduates from the School of Education, Tel-Aviv University, who did their practical training in special schools for children with behaviour disorders and




On the left part of the screen the description of the case is shown. The stage is the "Information gathering" stage. The trainee may browse among 30 questions referring to different aspects of the case, asking for answers from four sources: child, psychologist, teacher observations and parents. The selected questions and answers are appended, through the data collection process, in the bottom/right of the screen. The trainee may go any time to any stage of the diagnostic/treatment planning process (clicking on the "go stage" button), or continue with the training dialogue (clicking on the  button).

FIG. 2. Sample Screen of the TTIPSS Working Environment at the Information Gathering Stage

learning difficulties; 23 special education teachers for self-contained special classes for behaviour disorders and learning disabilities; and 15 headteachers for special schools of children with learning and behaviour disorders whose difficulties were severe enough to prevent their mainstreaming in regular systems. The students had four months of practical training for two days a week and studied theoretical courses in different areas of special education. The two groups of educators had a teaching certificate in special education and their working experience ranged from four to 30 years ($M = 17.57$, $SD = 8.32$) in various educational systems. No significant difference was found either in educational background or duration of work experience between the two groups of educators.

Instruments and Procedure

A children's behaviour scale (Margalit, Efrati, & Al-Yagon, 1995) was developed as a rating scale for teachers to identify the most frequent disorders. The questionnaire was based on the descriptors of the DSM-IV of four common behavioural difficulties and consisted of 55 descriptors on a 5-point scale from "Not true at all" (1) to "Very

TABLE I. Correlation coefficients among scales

	CD	ODD	LD
ADHD	-0.06	0.47**	0.40**
CD	—	0.44**	0.26
ODD	—	—	0.27*

true" (5). The four components of the instrument were: Attention Deficit Disorders with Hyperactivity (ADHD) (20 descriptors such as "Often leaves seat in classroom or in other situations in which remaining seated is expected") with Cronbach's Alpha reliability of .90; Conduct Disorders (CD) (16 descriptors such as "Often initiates physical fights") with Alpha reliability of .86; Oppositional Disorders (ODD) (8 descriptors such as "Often argues with adults") with Alpha reliability of .75; and Learning Disorders (LD) (11 descriptors such as "Often has difficulty in reading comprehension") with Alpha reliability of .78.

The instrument was administered to each participant immediately after their working session with the TTIPSS computer system. During the session the participant worked on a ADHD case study through different diagnostic and treatment planning stages—analysis of the event, generation of hypotheses about the causes of the disruptive behaviour, collecting information about the case from different sources (child, teacher, parents, psychologist), and generation of a treatment plan.

Results

In order to examine the interrelations of the four scales Pearson product-moment correlations were obtained. The correlation coefficients between the four scales are presented in Table 1. ADHD was significantly related to ODD and LD, but not to CD. The Conduct Disorder scale was significantly related to both ODD and LD scales. The only scale that was correlated to all the other three was Oppositional Disorders.

In order to examine the teacher's perceptions, a MANOVA was performed with the three groups of professionals as the independent variables, and the four behaviour difficulties categories (ADHD, CD, ODD, and LD) as the dependent variables. Significant between group differences were found ($F(8, 72) = 7.49, p < .01$). Univariate analysis revealed significant differences for the Attention Deficit Disorder subscale, the Conduct Disorder subscale, and the Oppositional Disorder subscale, but not for the Learning Disorder subscale. Table II presents means, standard deviations, and F ratios with Duncan comparisons between groups (Wilks effect size = .42). The results demonstrate that the group of students provided the lowest scores in the ADHD and ODD scales, and the highest scores in the CD scale. No significant difference was found in the LD scale.

TABLE II. Means, (standard deviations), and univariate comparisons of groups, with Duncan comparisons

Scale	Teachers Group A	Students Group B	Headteachers Groups C	<i>F</i> (2, 46)	Duncan comparisons
ADHD	3.85 (0.56)	2.73 (0.55)	4.09 (0.50)	19.28**	B < A,C
CD	2.57 (0.59)	2.93 (0.56)	2.15 (0.55)	5.82**	B > A,C
ODD	3.50 (0.50)	2.83 (0.40)	3.29 (0.75)	4.30*	B < A
LD	3.06 (0.62)	2.84 (0.75)	3.15 (0.50)	0.74	

Discussion

The results of the study demonstrate that teachers viewed the different disorders as partially interrelated. The target descriptor—ADHD—was found to be related to both Learning and Oppositional Disorders and not to Conduct Disorders. The Oppositional Disorders descriptor, on the other hand, was viewed as interrelated with all other categories. These results demonstrate both the cross-categorical conceptualisation of children's difficulties and/or the halo effect of these difficulties, which blurs the way of pinpointing intervention planning for children's specific problems. The developmental model of behaviour disorders acknowledges the relations between the different externalising pathologies, and views ODD as the basis of children's CD behaviours (Lahey & Loeber, 1994). CD behaviours were found less prevalent and tend to have their onset at later ages than ODD and ADHD. Teachers viewed children with ADHD as demonstrating, in addition to their core difficulties, also Oppositional and Learning Disorders.

The comparisons of novice teachers to both groups of expert teachers further clarify the identification issue. In contrast to the experienced teachers, the novice teachers (students) tended to utilise a more generalised approach, ignoring distinctive aspects of the behaviour difficulties. It is commonly accepted (Skiba, 1989) that teachers' reactive responses to disruptive and aggressive behaviour may initiate stress and lead them to generalised perceptions of symptomatology. Yet inexperienced future teachers may feel threatened by the children's disruptive behaviours, an emotional reaction that may affect their perception of other behaviours which will become less specific.

The analysis also showed that teachers' experience and status in the school system have a clear impact. Novice teachers have a greater and more pronounced difficulty in differentiating between the categories of difficulties (Scruggs & Mastropieri, 1986). It should also be noted that Learning Disorder was viewed differently, that is, not contributing significantly to the differentiation among groups. It seems that all three groups viewed LD as moderately related to many of the children's problems.

The results of this study have clear implications for college/university personnel concerned with teacher preparation programs. Teachers need knowledge and skills in the area of children's maladjustment. Appropriate training plans should include

consideration of many factors affecting teachers' ability to deal with problematic events, such as their perceptions of behaviour difficulties and their diagnostic skills (Bullock, Ellis, & Wilson, 1994).

The development of TTIPSS represents an effort in that direction, encouraging college students to explore and examine their perceptions and misconceptions while analysing a case and devising a treatment plan. The results of this study are highly relevant for the further design of the case diagnostic section of a typical working session with TTIPSS, which includes the stages "analysis of the case" and "formulation of hypotheses" about reasons for the observed behaviour (see Figure 1). Briefly stated, the following are some immediate implications for the development of the computer system.

1. The differences in perception among the three populations implies that differential training paths should be allowed to accommodate to the different levels of expertise of prospect trainees. For example, undergraduate students showed low scores in the ADHD and ODD scales, which refer to disorder symptoms far less evident than those of conduct or learning disorders. Following this result the tools offered to the trainees for their own building of the description of the case should be expanded and refined. The sets of characteristics or indexes (see Figure 1) offered by the system for the analysis of the case should be expanded to include more fine-grained descriptors, thus supporting the recognition of less evident or subtle symptoms and behaviour components.

2. The results indicated that the different disorders were perceived as interrelated, which led to difficulties in pinpointing the unique aspects of the behaviour manifestation. This implies that the system should offer trainees appropriate tools for decomposing the situation into identifiable factors, so that these can be evaluated in terms of their weight or relevance to the disorder under consideration. Moreover, supporting a more precise categorisation of the behaviour characteristics may contribute to counterbalance the "halo effect" on teachers' perception of other difficult behaviours. An example of a system's planned feature in this regard is a mechanism by which, as a response to the trainee's inputs during the analysis of a case, the system searches its case-base and retrieves and presents: (a) cases with similar configurations of behaviour variables, and (b) hypotheses about causal relationships between these variable values and categories of behaviours. By this feature the trainee obtains a referential framework for a more informed analysis of the case.

3. The rating scale (Margalit *et al.*, 1985) has the potential to be a valuable training tool, besides its original function as diagnostic scale. The comprehensive set of descriptors could be incorporated in the system along with the tools offered to the trainees as an aid for the analysis, the information gathering, and the hypotheses formulation stages of the diagnostics process.

This study, focusing on teachers' perceptions of behavioural disorders, is part of our research towards the development of knowledge-based training tools. With the aim to provoke an increase in teachers' differential awareness and reliable assessments of children's maladjustment, two further steps should be taken. First, more and additional observations into the trainees' actual behaviour should be conducted. Second, appropriate training plans must be generated to enable them to monitor

their own reasoning and misconceptualisations. It is the responsibility of those involved in teacher training to ensure that information and training regarding appropriate differential assessment approaches are incorporated into college learning and inservice training.

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