

Teacher styles and Strategies for Improving Dyslexic Students' Learning Skills

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Abstract

This paper proposes that teaching involves problem solving and there are differences between novices and experts. It is evident that teachers use different styles and strategies and they would benefit from exploring these with knowledge of their individual differences. A diagnosis of teacher styles and strategies is made with a view of making recommendations for using these to teach dyslexic students. A conceptual model is proposed as a research tool to develop understandings of teacher styles and strategies and so develop a model to enable teachers to match their styles and strategies of teaching with the styles of dyslexic students. Of note is the Wholist-Analytic (W-A) and Verbal-Imagery (V-I) category of styles which Mortimore (2008) argues is important when matching students' styles to teachers and so may help students achieve. The W-A/V-I model is diagnosed by the Cognitive styles Analysis (CSA) but caution should be taken if this instrument is used to develop dyslexic students' knowledge of a topic (Mortimore, 2008). Analysis of cognitive styles of pre-service teachers suggests there are grounds for matching styles and strategies with dyslexic students' styles as this may be helpful for learners; but this requires detailed exploration. Where students find it difficult to interact socially with other teachers it may be necessary to think about the structures of artificial intelligence models to help learners gain confidence and skills.

Key words: Teaching, Styles, Strategies, Dyslexic Learners

Problem Solving and Teaching Styles

An argument is that teachers will benefit from style/strategy flexibility and Evans & Waring (2009) identified this as an area for development. Self-awareness of styles as well as teachers' ability to modify or choose styles for development has yet to be examined fully. Coffield, Moseley & Ecclestone (2004) explain that weaknesses in problem-solving strategies and styles should be identified by cognitive style instruments which point the way to reflective and meta-cognitive classroom pedagogy.

Problem-solving is defined by Eraut (1994) in terms of levels. While level 1 (novices) use rules, level 2 (beginners) will recognise global characteristics of problems using prior experiences. Level 3, however, consider solving long term goals using well practised procedures. The more expert problem-solver visualises solutions, has analytic approaches in novel situations, learns from experience, and sees situations holistically not rule-based. Clark & Yinger (1988) also discuss that teachers use prior experience and images to problem-solve in class. Carter (1990) explains that experienced teachers will build up routines and use fewer complex decisions but more creative thinking. However, Evans & Waring (2009) advocate that gaining the whole view of how problems are seen by experienced teachers and those of ordered intuitive pre-service teachers is problematic since teachers can have more than one style.

In comparison to reflective thinking, Torff & Sternberg (2001) defined intuitive individuals as thinking and perceiving spontaneously and without conscious reflection. They explain that intuitive conceptions are knowledge structures which may be unavailable in conscious reflection and can help or restrain task performance. Zeichner & Liston (1996) identified that unreflective teachers tend to focus on problems already defined by the school or peers.

However, Magliaro, Wildman, Niles, McLaughlin, & Ferro (1989) report that with classroom experience, teachers' problem solving skills and strategies grow and in some cases where problem-solving is guided by pedagogical beliefs, these beliefs change. By the third year, teachers begin to generalise problem solving strategies across contexts and are more conscious of their strengths and weaknesses.

In another context, Evans & Waring (2009) considered that the inspection of beliefs will help the discovery of style differences among pre-service teachers. However, they point out that this is a research issue because it is not possible to define styles until the role of beliefs in practice is clear. Warwick (2007), on the other hand, identifies that being open-minded is an active desire to listen to more ideas than one, to give full attention to alternative possibilities, and to recognise the possibility of error. Dialogue with individuals in school, collaboration across staff groups, and communication and cooperation with individuals, organisations and agencies beyond the school are also frequent activities for teachers (MacGilchrist, Myers & Reed 2004).

Addressing Conceptual Issues

At the centre of a conceptual model, is the contention that knowledge and understanding of styles should be available and be of importance to teachers. Teachers may need to think about their individual styles and strategies and to discuss how these are used. The model identifies some areas teachers may wish to consider to develop their deployment of styles and strategies. The major areas are discussed.

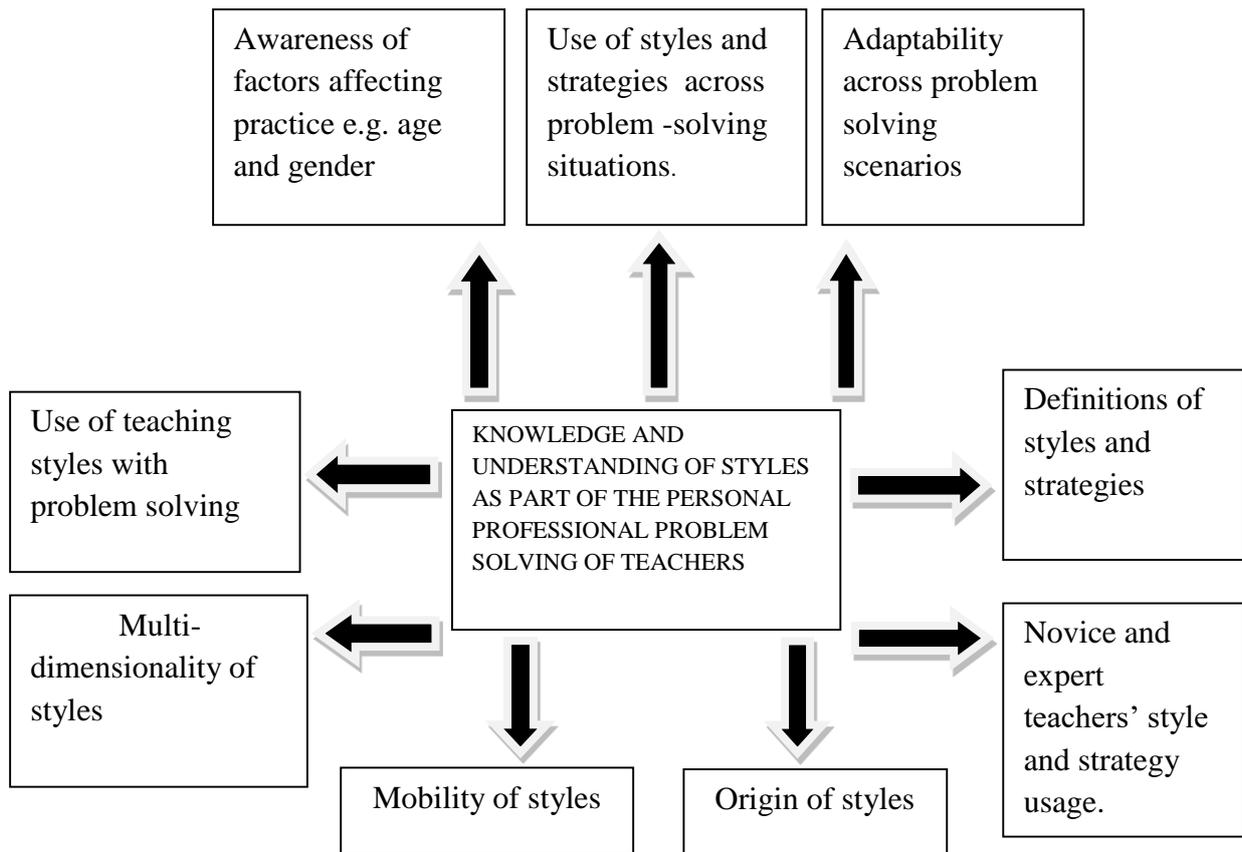


Figure 1: Nine factors influencing knowledge and understanding of teachers’ problem-solving styles. Adapted from Evans & Waring (2009); Perspectives on the Nature of Intellectual Styles; p. 180.

1. Style Awareness

An argument of this paper is that teachers would benefit if they know their styles and strategies of learning and problem-solving. In this way, they may be able to reflect where they could improve in their problem-solving skills. It is advisable that teachers analyse their strengths, weaknesses and directions in which they can make changes. Additionally, it would

be of benefit to them if they learn from other professionals which may encourage the development of appropriate strategies for problem-solving.

The reasons for these arguments are contextualised in the work of others, who view self-awareness of styles as being of utmost importance in learning, questioning of habitual behaviours and improving classroom practices. That is, self-awareness is important in developing what Riding & Rayner (2005) term “self-effectiveness” and in this respect, the authors distinguish between style and strategy. Mortimore (2008) explains that cognitive styles are a fixed characteristic of the way in which people process information but learning styles are helpful strategies learners deploy when coping with a particular task. Cognitive styles and learning styles are connected because the latter is the application of the former.

Kolb (1999) explained that an understanding of learning styles with their inbuilt strengths and weaknesses would help individuals to gain more from learning experiences and so increase the capacity to learn. In terms of learning by tutors in post-sixteen education, Coffield *et al* (2004) explained that tutors increase their self-awareness by knowing their strengths and weaknesses as learners. According to Sadler-Smith (2000,b), self-awareness enables individuals to see and question habitual behaviours and these can be changed if individuals are taught to examine their use and selection of learning styles and strategies. However, Sadler-Smith, does not outline how individuals could scrutinise their selections of styles. Apter (2001) extends Sadler-Smith’s discussion by suggesting that learners gain more when they are aware of the important “qualities” they and other learners have. According to Adey, Fairbrother, William, Johnson and Jones (1999) this sort of self-awareness, will improve self-confidence, facilitate self-control over learning and prevent blaming learning difficulties on own shortcomings. This in turn, will help tutors who are self-aware to choose the most appropriate strategies for tasks from an array of other useful ones.

In another context, Evans & Waring (2009) discussed the issue of self-awareness with respect to teachers in the school system. They discussed that evidence suggests that teachers who are aware of their styles can have a positive effect in the classroom (Evans & Graff, 2008 and Nielson, 2008). However, Evans & Sadler-Smith (2006) as well as Nielson (2008) discussed two reasons for the lack of evidence, showing the effects of “self-awareness” on educational practice. The first is that, the labels used to describe styles are often ambiguous and this makes the choice of measures difficult for anyone who may be interested in style measures and research. The second reason is that, the many measures of styles lack an integrated theory of “styles measurement”.

It is proposed that teachers should try to recognise their own strengths in using styles/strategies, acknowledge those kinds of styles/strategies which are less effective across problem-scenarios, recognise the styles/strategies of colleagues and finally strategies should be able to be used in a team and the strengths and weaknesses of those styles/strategies used to solve common problems.

2. Adaptability and Mobility of Styles

An argument posed is that if teachers are flexible across professional problem scenarios, then it is likely they are effective team players, classroom teachers, curriculum developers etc. Evans & Waring (2009), explained that there is effectiveness in task completion when individuals adapt their “approach” to the requirements of the tasks. It is suggested that, these approaches may be viewed as the application of problem-solving styles which teachers could deploy across problem scenarios. In this case, for more stable styles such as styles not appropriate for the successful completion of any one task, teachers may still be able to cope, given that they have other cognitive capabilities in terms of deploying acquired learnt strategies as desired. Kozhevnikov (2007) identified that some people tend to be more flexible when they apply styles to tasks and that only one particular style can be specific to any context, rather than a combination of styles. Considering flexibility of styles, Miller’s (1991) and Nosal’s (1990) models of styles indicate that cognitive styles operate at different levels and mobility or flexibility of styles is important when teachers are confronted with a number of different problem-solving scenarios.

3. Origins of Styles and the Interaction of Styles with Other Constructs

It is important to discuss the “origins of styles” because such arguments are useful to come to conclusions on the extent to which style(s) are either shaped by the environment one occupies or if it/they are purely inherited characteristic(s). Environmental influences of teachers include his/her peer groups and personal problem-solving experiences but inherited characteristics are discussed in terms of brain neurophysiological evidence. The reasons for exploring the origins of styles are mainly because of the implications to problem solving and strategies, one being a consideration of the extent to which teachers organise the deployment of strategies in problem-solving and learning.

In order to discuss the styles of primary trainees in terms of problem-solving, it is necessary to examine the extent to which the cognitive style construct is related to other types of style models and other constructs such as personality. This is because, when the styles of primary trainees are observed, it should be clear that only particular style(s) are responsible for performance in professional problem scenarios and not some other factor such as personality.

Schools are interested in reaching standards of student performance and this will entail that teachers are good problem-solvers. If they are not, then peers may want to teach newly qualified primary teachers styles and/or strategies for particular problem scenarios. The extent to which this is possible may depend on how “hard-wired” styles are in terms of an individual’s brain physiology. Vigentini (2008) argued that styles have “state-like” characteristics and are modifiable while Kozhevnikov (2007) also asserted that ‘cognitive styles are malleable, can adapt to changing environmental conditions and are modified by life experiences. Kozhevnikov pointed out that the origins of cognitive styles are a combination of acquired conditions as well as innate factors. Therefore, it is reasonable to assume that style has origins in not only intellectual abilities, personality traits and experiences but also from gender type; the individual’s level of maturity may also be influential in styles development. Age difference in problem-solving is seen as important because if primary

trainees are aware that their problem-solving may differ from older counterparts, they may be more able to work collaboratively and develop learning strategies and styles with older teachers through for example, observation or even imitation. The association between age and style in terms of performances with tasks is unclear and more research is required, using broad categories of age ranges to make firm conclusions in any direction. Gender is also considered influential in the development of styles. If there are differences between male and female teacher styles, then they would not be expected to problem-solve professionally in a similar manner. Those tasks female teachers can cope with successfully may be different to their male counterparts and the converse. The case for individual differences is explored by the cognitive control model (CCM).

This model proposed by Riding & Rayner (2005), is pertinent to discussions of the styles of teachers because it attempts to integrate factors other than styles being responsible for performance. The CCM shows how factors such as intelligence, experiences or biography, gender and personality have interactional influences with style(s) and so shape learning and problem-solving. This model is important because it argues a case for factors other than style as being of significance in the problem-solving styles of teachers. When the teacher is considered a problem-solver, not only is his/her style important in the problem-solving process but also other environmental and inherited characteristics. It is concluded that there are many different influences on the styles and strategies teachers show or have. The manner in which styles are assessed is confounded by the plethora of assessment types and definitions.

Style Models

Definitions of styles are generally confused by a lack of an overarching fusion of main models and the bipolarity of style measures are challenged by Hogkinson & Sadler-Smith (2003) as well as by Backhaus & Liff (2007) who advocate that cognitive styles are multidimensional rather than one-dimensional, complex rather than unitary conceptualisations and individuals can be both analytic and intuitive. However, a step beyond these concerns was discussed by Evans & Waring (2009) who considered the link between cognitive style and learning styles in initial teacher training and discussed that the Cognitive Styles Analysis (CSA) proposed by Riding (1991) is a useful tool to show the manner in which information is accessed by teachers and how decisions are made in classroom situations. Riding and Rayner (1998) claim that the CSA can be used to address:- orientation to study, instructional preferences, experiential learning, social behaviour, and managerial performance.

Difficulties associated with choosing this instrument as a styles measure typically surround the plethora of models available and these create confusion of choice for researchers when they are interested in studying an aspect of styles. Some models of styles share common characteristics with other models (Coffield, Moseley, Hall & Ecclestone, 2004). For example, those models in the Cognitive Structure family, including the CSA have some features in common with learning approaches and learning preference models. The CSA model is useful for this research because it is multidimensional and it is possible to link

cognitive styles with the learning styles of teachers. The CSA is used to diagnosing styles of students with dyslexia (Mortimore, 2008). Mortimore points out that there should be caution when using this instrument. For example, when learners score highly on a particular dimension such as imagery, this does not mean all learners will like particular learning strategies e.g. forming mind-maps as opposed to others. Teachers will have to find appropriate ways to present learning tasks and facilitate the acquisition of knowledge of students.

It is argued that teachers may be aware of a particular style they bring to problems but it is conceivable that there are others which he/she cannot point to when asked. Apart from the CSA, other ways in which styles have been elicited were discussed by Evans (2003) with respect to teaching styles. In this case, the interview is a useful research tool. In this respect, semi-structured interviews as well as questionnaires are argued to be workable tools for the purpose of gaining access to the styles of trainee teachers.

To arrive at definitions, the literature of problem-solving in various professional domains is reviewed and it is clear that novices and experts differ in their respective fields such as in science and technology. However, the literature does not address the usage of styles of the W-A and V-I dimensions between expert and novices in a professional problem-solving context such as teaching. Nevertheless, Chi, Glaser & Farr (1988) for example, discussed that expert problem-solvers may derive meaningful patterns to problem-solve or will use schemas to their advantage and these are defined as knowledge structures representing complex events (Klatzky, 1980). Others such as Beach (1990), view decision making in problem-solving as the ‘unfolding of mental representations and then developing a believable mental scenario, rather than analysing alternatives’ (Sternberg & Frensch, 1991 p. 393). It could be that expert and novices differ in the way they develop scenarios. This research makes the assumption that teachers are similar to novices in other professional fields and may show similar problem-solving behaviour. The literature examines the differences and similarities in the fields of science and the social sciences and makes comparisons with the context of education in order to aid the process of arriving at a model for the problem-solving styles of teachers.

Summary of methodology of eliciting styles and strategies of pre-service teachers

To elicit styles/strategies, Karim, Watts & Toplis (2011) argue that the Cognitive Styles Analysis (CSA) and semi-structured interview are useful in this respect, as a mixed method approach. This paper reports on findings of the kinds of styles and strategies trainee primary teachers have who fall into the style categories of the CSA. Ten trainees from a university provider completed the CSA. That is, one Analytic- Verbaliser; two Analytic-Imagers; three Intermediate-Imagers; one Wholist-Verbaliser; one Wholist-Bimodal and two Wholist-Imagers. Verbal protocols of trainees solving three problem scenarios based on the requirements for qualified teacher status (QTS) were taped and transcribed for analysis. Riding’s (1991) CSA does not specify the problem-solving styles of each category or differences between trainee and more experienced teachers.

Results

The analytic verbaliser may have many attempts at problem-solving and reflect on outcomes. The analytic imager will have a tendency to imagine what past successful experiences were like and reproduce these where there is a problem. He/she uses typical problem solving strategies such as seeking causes, exploring ideas, analysing options, although not always supported by knowledge as an experienced teacher. As a trainee, they may also use their beliefs. Intermediate- imagers will use trial and error strategies; use recollection of similar problems; isolate main points of past successful solutions and will use logical reasoning. The wholist- verbaliser tends to produce spontaneous solutions and will also try to get to the source of the problem or isolate difficulties. He/she puts theory into practice and uses own experiences. The wholist-bimodal will try to obtain an overall view of the scenario and examine the school environment and the pupils' background for possible solutions. He/she will use successful strategies by experienced teachers. The wholist- imager will also use experiences to problem-solve and will look at the entire scenario and possibilities to produce solutions.

Styles and Strategies	A-I	A-V
Check and evaluate solutions (Eysenck, 1984)	✓	✗
Reflective (Kagan, Rossman, Day, Albert & Phillips, 1964)	✓	✓
Asks questions and forms new hypothesis/reformulates problem, innovators (De Bono, 1992; Kaufmann, 1989)	✗	✗
Reflects on own teaching as well as others (Evans, 2003)	✗	✓
Thinks through problem-solving verbally	✗	✓
Left-brain oriented (Torrance & Rockerstein, 1988)	✓	✓
Adapt to new problem scenarios (Shank & Abelson, 1977; Kirton, 1989)	✗	✗
Exploratory (seeks novelty- Kaufmann, 1989)	✗	✗
Uses beliefs (Magliaro <i>et al.</i> , 1989)	✓	✗
Uses experiences (Clark & Yinger ,1988)	✓	✗
Abstract-sequential (analytic, objective, logical-Kolb, 1971)	✓	✓
Shares understandings (Soloman, 1987)	✓	✓
Gathers information (MacGilchrist et al,2004)	✓	✓
Uses imagery (Clark & Yinger,1988)	✓	✗
Prefers to work alone (Riding, 1991)	✓	✗
Local Style- likes to work with details	✗	✗

(Sternberg & Grigorenko,1997)		
Talks with people familiar with the problem (Frogler & LeBlanc, 1995)	✓	✓
Sharpeners (Holzman & Klein,1954)	✓	✓

Table 1: Styles and Strategies for Analytic Primary Trainee Teachers

Table 2: Styles and Strategies for Wholists

Styles and Strategies	W-I	W-V	W-B
Abstract-random (sensitive, compassionate and imaginative) – Kolb (1971)	✗	✗	✓
Right brain oriented (Torrance & Rockerstein, 1988)	✗	✗	✓
Innovators (idea generation and solution development)- Puccio & Grivas (2008)	✗	✓	✗
Examines teaching style and learning styles of pupils. Consider changing lesson plans (Evans, 2003)	✓	✓	✗
Use other teachers as models as well as own models (requires research)	✗	✗	✓
Assimilator (Kaufmann, 1989)	✓	✓	✓
Global style, solves abstract problems holistically (Sternberg & Grigorenko, 1997)	✓	✓	✓
Concrete-random (quick, intuitive and instinctive)- Kolb (1971)	✓	✓	✗
Uses experiences (Clark & Yinger, 1988)	✗	✓	✓
Applies theories (learned rules applied to novel problems)- Gagne (1980)	✗	✓	✗
Explores possibilities for solutions (requires research)	✓	✓	✓
Examines causes of problems (requires research)	✗	✓	✓
Talks with people familiar with the problem (Frogler & LeBlanc, 1995)	✗	✓	✓

Table 3: Styles and Strategies for Intermediate –Imagers (I-I)

Styles and Strategies	I-I
Uses imagery (Clark and Yinger,1988)	✓
Logical problem-solvers (Allinson & Hayes, 1996)	✓
Examines own teaching styles (requires research)	✓
Sharpeners (Holzman & Klein (1954)	✓
Reframes problem (Schön, 1986)	✓
Global style (Sternberg and Grigorenko, 1997)	✓
Employs coping strategies (D’Zurilla & Nezu, 1990)	✓
Recalls learned rules (requires research)	✓
Gathers information for solutions (Eysenck , 1984)	✓
Reflective of problem-solving operations (Kagan, 1964)	✓
Reflective of causes of problems (Kagan, Rossman, Day, Albert & Phillips, 1964)	✓
Random problem-solver (Gregorc, 1987)	✓
Prefers to view the problem ‘first hand’ (Frogler & LeBlanc, 1995)	✓
Sequential/logical (Gregorc, 1985)	✓
Collects ideas and stores these for future problem-solving(requires research)	✓

The tables specify the similarities and differences of styles and strategies present ✓ and absent ✗ for cognitive styles measured by the CSA. No trainees are typical novices and show expert problem-solving as Eraut (1994) and Carter (1990) discuss.

Conclusions/Implications

Teaching Styles for Dyslexic Students

According to Mortimore (2008), dyslexic students have problems translating visual information into phonological forms. They do not seem to use phonological mnemonics (memory strategies). They have difficulty maintaining phonological information using instead rehearsal and repetition. They also do not spontaneously attach verbal labels to pictures and they have difficulty remembering lists. For dyslexic students, it is important that

overload in memory is reduced; they should interact with material presented to them, use their imagination and create structures or rules to organise the information to be memorised.

Wholistic learners need to see the big picture before they start studying a topic. It is suggested by Mortimore that students use strategies to help them predict and organise material. In particular, creating frames for answers of topic areas is a way of improving wholist and analytic students' knowledge. Analytics need to be helped to make wider connections and fit details in a frame. However, some analytic learners may benefit from having the wider picture presented to them before they begin studying a topic.

The main conclusion is that there should be examination of the importance of choice of styles and strategies during problem- solving. This involves addressing a need for reinforcement and transference of styles and strategies to new problem contexts among dyslexic learners as well as their teachers. As Evans & Sadler-Smith (2006) point out, analyses of relative strategy weakness and learning could be achieved by selecting appropriate strategies and styles and examining their use. This may help the development of self-awareness of styles/strategies during learning and problem-solving. Developing flexibility of styles and strategies across task levels could be achieved by practice or observation of peers. Evans & Waring (2009) also point out that learners should be encouraged to experiment with a variety of approaches. These could be demonstrated through interventions such as setting similar tasks in different contexts to observe malleability of styles (Hadfield, 2006; Hede, 2003). Evans and Waring (2009) concluded that trainees could be presented with specific scenarios with follow-up examination of selection of styles and debriefing. Training could then be in the form of advice of appropriate style usage for particular scenarios.

Further Research

There could be inconsistencies in relating verbal protocols, that is, pre-service teachers may not be able to articulate concisely strategies of problem solving. To arrive at reliability and validity of the research findings, more data is needed using interviews across age and gender. This will build on other research. Using the CSA, Evans (2003) recorded differences between male and female teachers' teaching styles as well as age influences. They are:

- Analytic-Verbaliser males preferred tutorials to learn material.
- 25-29 year old Wholist-Intermediate teachers mainly used the intuitive style.
- Male Wholist-Intermediate demonstrated wholist approval in the classroom.
- Analytic-Verbalisers showed the most analytic styles.
- Males preferred to present their materials while females preferred to work alone.

Further research could examine differences between male and female teaching styles and the effect these have on teaching dyslexic learners. Further research using all categories of the CSA to produce styles is required to develop a problem solving style questionnaire for teachers. This will help trainees identify areas of weakness in problem solving. More research is also required on gender differences of styles/strategies and categories of the CSA. The extent to which factors influence teaching and learning according to the cognitive control model and factors influencing teachers' problem-solving styles requires further investigation.

To harness artificial intelligence models to deliver and respond emotionally to dyslexic learners may be another area of research.

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