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Problems and Solutions in Vertical Addition of Adults Mental Disorders

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Abstract:

This study discusses the problems of adult students (30-40 years old) with mental disabilities in vertical addition learning and proposes several tailored solutions. Through the specific analysis of three students that participated in the study, the difficulties in the process of their mathematical operation ability acquisition are found, such as being influenced by others, and forgetting to carry numbers. In response to these problems, concrete measures have been taken, such as improving students' self-confidence, using auxiliary tools, and concretizing mathematical concepts. Through the implementation of these measures, a noticeable difference in mathematical ability was achieved. The research summarized some teaching experiences, including the rational use of tools, and attention to students' psychology and behavior norms.

Keywords: Adult Mental Disorders, Vertical Addition, Mathematics Teaching, Assistive Tools

1. literature review

The researcher is concerned that the cross-field of special needs education and mathematics has not attracted enough attention. Related studies such as Wang Shimei have studied the problems and solutions of children with a mild intellectual disability attending regular classes[1]; Ding Yuan analyzes the existing problems and the causes of the students with intellectual disabilities in a special needs learning environment, and puts forward corresponding solutions[2]; Xie Guihua studied how to integrate games into the teaching of mathematics in order to stimulate students' interest[3]. In view of the wide use of vertical addition in daily life, this paper chose to focus on vertical addition in basic mathematical operation for teaching analysis. This article will combine the author's teaching experience of the above-mentioned three students to analyze the causes of the problem of vertical addition learning in adult learners with intellectual disabilities, put forward the corresponding concrete measures, test the teaching results, summarize the teaching methods, and supplement the experience and reflection of mathematics teaching for the field of helping the disabled

2. Mathematics operation learning problems of older students with mental disabilities:

The author found that, when teaching mathematics in Rong Ai disability center Hohhot, Inner Mongolia to older students with mental disabilities, they faced difficulties in the process of acquiring mathematical operation ability. In order to make the presentation of specific problems more universal, the author selected three of fifteen students who are good at interpersonal communication for specific analysis:

Shi Yu (alias):

First of all, Shi Yu's calculations are often influenced by others, seen largely through the process of repetition or "echoing". For example, in an attempt to add 4 and 5 (4+5) in a simple operation, the speed of Shi Yu will be slower. When other students say the answer, Shi Yu will choose to echo and give up her original calculation results. In addition, there is a problem of "finger-counting" in mathematical calculations, and mistakes often occur, such as counting from 1 to20. Some numbers in the middle are often forgotten in the process, resulting in a deviation in the final calculation.

Zhao Yu (alias):

The computing ability is outstanding, but some basic mathematical operation principles are often forgotten in vertical addition, for example, when the sum of the ones is greater than 10, he would forget to carry 1 to the front (see appendix 1). He doesn't understand the meaning of carrying a number, so he often forgets to add the carried number to the rest of the equation.

Wang Ke (alias):

He performs well in vertical decimal addition (one-digit plus one-digit and one-digit plus two-digit addition), but the operation becomes extremely slow as the number rises. It was observed that Wang Ke did not calculate accord-

ing to the principle of vertical addition, but chose to rely solely on finger-counting instead, resulting in unsatisfactory performance in vertical calculation of large numbers (i.e. two-digit plus two-digit addition and two-digit plus three-digit addition).

The researcher is concerned that the cross-field of special needs education and mathematics has not attracted enough attention. Related studies such as Wang Shimei have studied the problems and solutions of children with a mild intellectual disability attending regular classes[1]; Ding Yuan analyzes the existing problems and the causes of the students with intellectual disabilities in a special needs learning environment, and puts forward corresponding solutions[2]; Xie Guihua studied how to integrate games into the teaching of mathematics in order to stimulate students' interest[3]. In view of the wide use of vertical addition in daily life, this paper chose to focus on vertical addition in basic mathematical operation for teaching analysis. This article will combine the author's teaching experience of the above-mentioned three students to analyze the causes of the problem of vertical addition learning in adult learners with intellectual disabilities, put forward the corresponding concrete measures, test the teaching results, summarize the teaching methods, and supplement the experience and reflection of mathematics teaching for the field of helping the disabled.

3. Cause analysis of problems:

Shi Yu:

1) First of all, the author believes that "echoing" is due to lack of self-confidence and lower class activity than other students. Because some of the students in the class were better at math, she trusted others rather than herself. Fu Yijun's research shows that there is a correlation between class activity and gender, and women's class activity is significantly lower than that of men, which is consistent with a study done by Drudy and Sheila[4]. It is important to note that Shi Yu is the only girl in the class, which has a detrimental effect on her level of participation. Whenever the class was asked a question, she displayed an initial willingness to answer. However, other students always dominated the discussion, and Shi Yu's willingness was undercut by her lack of confidence and the much louder voices of the boys in the class. At the same time, Shi Yu's ability of calculation is slightly lower than other students. Every time she makes mistakes, she will fall into self-doubt, which leads to her preferring to follow others rather than believe in herself.

2) Secondly, she finds it difficult to concentrate for a long time, making it easy for her to lose focus when finger-counting. When she regains her focus, she will forget what she has just counted. Shi Yu's short-term memory is marginally lower than other students. Zhang Lan's research shows that noise can increase a person's subjective annoyance, which in turn affects a person's short-term memory[5]. Similarly, Shi Yu will become irritated when she is working in a noisy environment, thus reducing her short-term attention.

Zhao Yu:

Zhao Yu forgot to carry in vertical addition. It is likely due to two reasons:

1) Zhao Yu is not clear about some basic mathematical concepts (theoretical knowledge in mathematical calculation), probably because he did not lay a solid foundation at the beginning of learning vertical addition;

2) Zhao Yu forgot to carry 1 in the vertical addition, partly because he had no good writing habits. Sometimes, Zhao Yu had already carried one in the addition process, but because he has a habit of writing the number 1 as a singular dot, he neglected to account for this point when continuing the equation and would often forget to carry it over.

Wang Ke:

Wang Ke cannot add large numbers because he did not master the operation rules of vertical addition. Instead, he constantly reverts back to the basic foundational knowledge he had learned previously, despite being taught newer and more efficient methods. It may be that Wang Ke outperformed his classmates in the previous decimal addition. This made him have a moderate degree of confidence in himself, believing that his existing knowledge was enough to support his subsequent learning, which was not the case. With the teaching of vertical addition, Wang Ke displayed a sense of being out of control, slowly lagging behind the students who were inferior to him before. This compounded his struggle to retain new information as he showed signs of feeling defeated and less willing to try.

4. Specific Measures to Improve the Ability of Vertical Calculation in Mathematics

This section will provide the concrete measures for the vertical addition of the cases mentioned in the previous two sections, and summarize the most effective countermeasures.

Shi Yu:

1. Shi Yu lacks self-confidence and has a low participate rate in the classroom. In order to cultivate the self-confidence of Shi Yu, all of the students were asked to raise their hands to answer questions and the researcher made a conscious effort to pay more attention to her. By raising her hands to answer, the author found that her interest in learning was higher, and she was not afraid even in a

noisy environment to answer the question. Every time there was a mistake, the author would also actively guide Shi Yu to give the correct answer.

2. Regarding the strengthening of memory in adults with intellectual disabilities, in my opinion, it is difficult to develop memory-related abilities if they are not developed at an early age. Regarding the problem of Shi Yu's poor short-term memory and not knowing where to count after being interrupted, the author flexibly adopted a counter (as shown in Figure 1) as a prop to help Shi Yu. With the help of the counter, when Shi Yu was affected by other factors, the counter would help to remind her of her place in the equation, and the calculation capacity of Shi Yu was significantly improved. Also, the operation of the counter is very simple, and the older students with intellectual disability can easily master the operation principle, and can replace the problem of finger-counting by pressing a button.

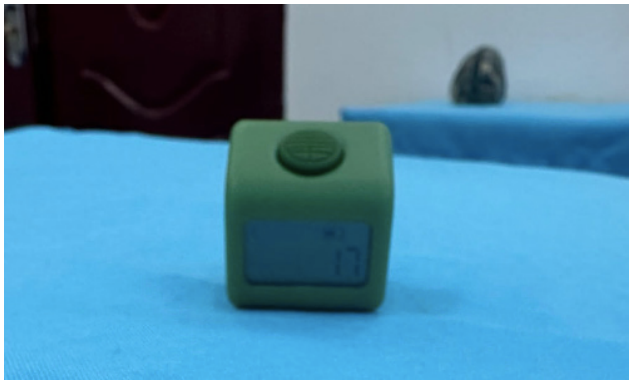

Figure 1

Zhaoyu:

Wang Shimei's research shows that students with mental disabilities have lower perceptual ability than the average person, and have a little difficulty in understanding mathematical concepts. Similarly, it is difficult for Zhao Yu to understand mathematical concepts[1].

1. In order to clarify mathematical concepts for Zhao Yu, abstract concepts must be embodied in a physical form. Through association, the author visualized these abstract ideas with the aid of an abacus (e.g.Figure 2) The use of an abacus is also relatively simple for adult learners with mental disabilities. Each row represents a digit in the equation, and when the number of a single digit exceeds 9, you have to move one more bead in the next row, and the first row is zeroed from the new count. Effective use of this device only requires a basic visual understanding of addition and subtraction.

2. After the introduction of vertical addition, the author corrected the writing habit of Zhao Yu. Previously, when completing a vertical addition operation, Zhao Yu would write the numbers extremely close together, so that they almost formed a single column, which led to his habit of writing a 1 as a dot due to the space constraint. To address this problem, every time a vertical addition was required, Zhao Yu was invited to write on the blackboard. Because of the large area of the blackboard, Zhao Yu did not feel constrained when writing, and after writing the numbers, he knew that he needed to carry "1" into the tens column.

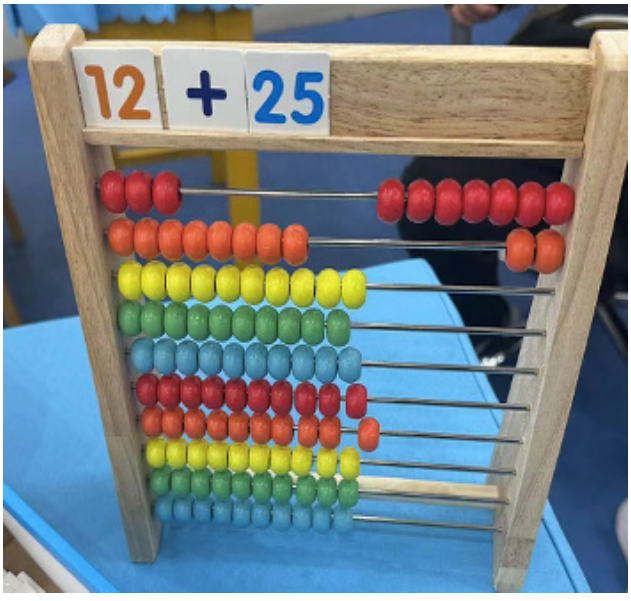

Figure 2

Wang Ke:

Wang Ke's case, although similar to Zhaoyu's because of the ambiguity of mathematical concepts, displays several key differences. When Zhao Yu was made aware of his mistakes and implemented the suggestions of the researcher, the improvement was obvious. However, because Wang Ke is not willing to accept the intake of new knowledge, the author had to change the strategy to make full use of Wang Ke's advantages in small-value vertical addition. Therefore, equations involving large-value vertical addition were subsequently divided into multiple small-value vertical additions. Wang Ke was then told that after completing each small-value addition, those individual values should be placed together in a line. If one of the small-value additions exceed 9, the 1 was carried over to the next small-value equation. Wang Ke also gradually understood the mathematical concept of vertical addition in the calculation, gained a new sense of achievement in the gradual progress, and was willing to accept some new knowledge.

5. Teaching results after implementation of specific measures

Through a year of practice, every student has made an obvious improvement

Shi Yu:

1. After the author's special attention, Shi Yu's self-confidence had significantly improved. When it comes to her participation in class, Shi Yu became very active. Even if the answer was wrong, Shi Yu continued to willingly participate.

2. With the help of the counter, the frequency of mistakes that Shi Yu made was greatly reduced. As Shi Yu continued to improve, her reliance on the counter gradually decreased. The author used small sticks to slowly replace the counter, so that Shi Yu could slowly improve her counting accuracy while decreasing her dependence on its use.

In order to reflect the teaching achievements of Zhao Yu and Wang Ke more intuitively, the author uses the test performance before and after teaching to compare.

Zhao Yu:

Prior to beginning the study, Zhao Yu's conception of mathematics was not very clear, as evidenced by the incorrect answers in the gap-fill question outlining the procedure for vertical addition (Figure 3 shows Zhaoyu's performance in the first examination)

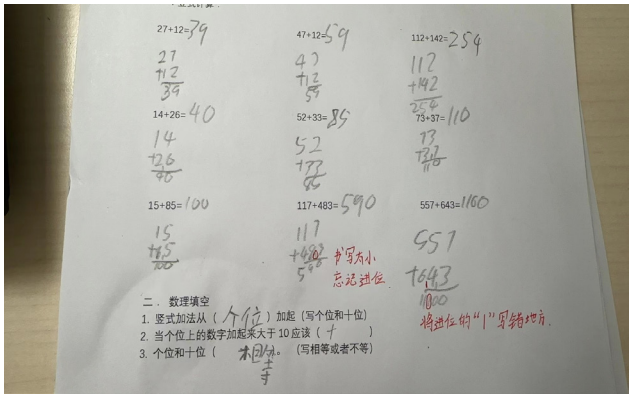

Figure 3

Through Fig. 3, we can observe that Zhao Yu is not completely without mathematical concept, but has some shortcomings. Through the eighth and ninth questions we can clearly see Zhao Yu's problems: in the eighth question, although he did carry over the 1, the writing was too small leading to him overlooking this carry and resulting in an incorrect answer; in the ninth question, the number was carried in the one-digit addition, but not in the ten-digit addition, resulting in another error. In the second part involving the gap-fill, only the first rule was filled in correctly.

With the help of the aforementioned concrete measures, Zhao Yu's examination performance has been greatly improved. (Figure 4 shows the examination performance of Zhao Yu after receiving concrete teaching)

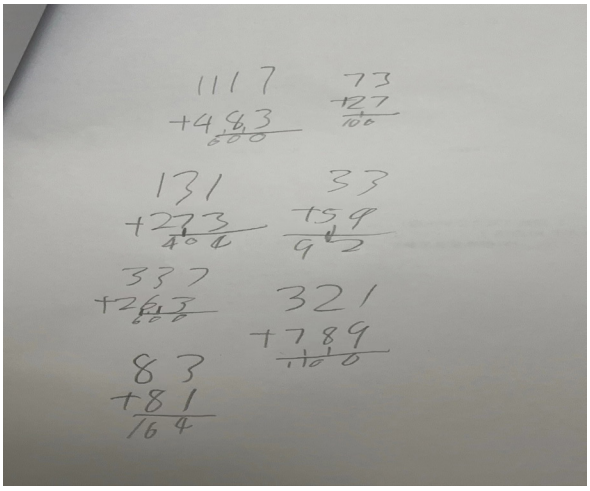

Figure 4

In this exam, the author allowed Zhao Yu to use an abacus for calculations. With the involvement of an abacus, Zhao Yu's understanding of mathematical concepts was greatly improved, with virtually no instances of forgetting to carry a number in any column. After writing and solving the problem on the blackboard many times, Zhao Yu began to carry numbers consistently as the enlarged numbers and increased space between them allowed him to easily identify digits that required a carrying operation.

Wang Ke:

As mentioned above, Wang Ke performed well in the vertical addition of small numbers, so in the first test, I set up vertical addition of large values and small values to better illustrate Wang Ke's problem.

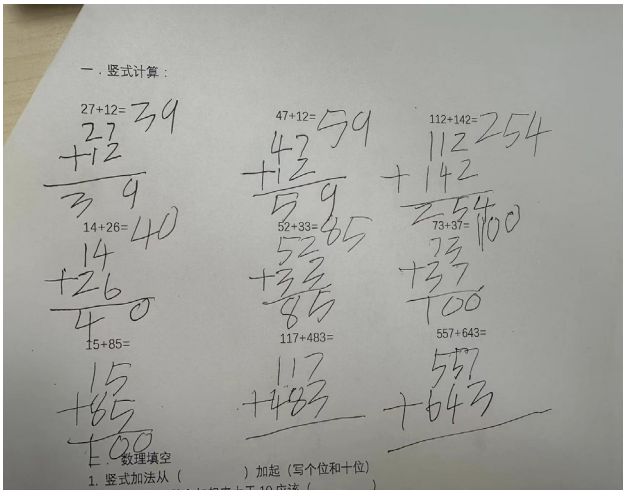

Figure 5

As shown in Figure 5, Wang Ke could easily complete the calculation through finger-counting in the vertical addition of decimal values, but the efficiency is extremely low. Others could finish the exam in about five minutes, while Wang Ke took 10 minutes or more. When faced

with large-value addition questions, Wang Ke struggles to complete them and often gives up. In all of Wang Ke's answers, there are no signs of the carry operation, which when coupled with his inability to answer large-value problems, further verified that Wang Ke did not follow the principle of vertical addition.

Throughout the study, the method of subdividing large-value equations into smaller and more manageable parts helped to alleviate the problem, resulting in a higher frequency of correct answers.

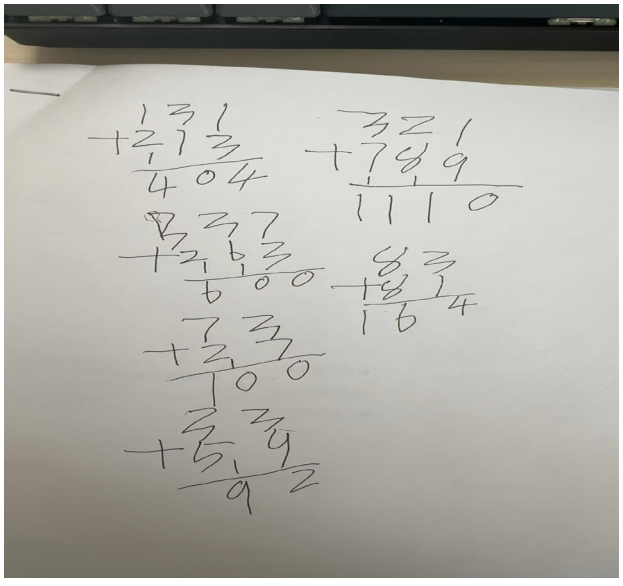

Fig. 6

As shown in FIG. 6, after each large numerical value vertical addition is divided into a plurality of small numerical value addition and the results larger than ten are carried to the next small equation, the accuracy of the large-value vertical addition is noticeably improved. Furthermore, Wang Ke completely eliminated the use of finger-counting, greatly increasing overall speed and efficiency.

6. Conclusion

In the teaching of vertical addition to adult students with mental disabilities, there are many problems encountered, some of which are similar to those of the average student, such as lack of self-confidence and inattention. Adult learners with special needs are also faced with some unique challenges, e.g. weak perception and slower comprehension, which must be accounted for when teaching new mathematical concepts. Through this research, it was found that the problems of inattention and short-term memory are common difficulties in learning vertical addition among this learner group. The use of a counter can help students keep their focus and reduce the effect of external disturbances, as well as improve their short-term memory ability.

Secondly, for students with an unclear understanding of mathematical principles, specific tools such as an abacus can be used to help them understand abstract concepts, especially the carrying principle in addition operations. It was also found that good writing habits were essential to success in mathematical operations. On one hand, legible and complete writing can correctly reflect the degree of understanding of mathematical concepts, and on the other hand, it directly affects the accuracy of calculation by allowing the learner to see all of the components of the equation clearly and utilize them accordingly.

In addition, for the students who struggle to understand and retain new knowledge, we can use the way of splitting knowledge points to help them understand faster, thus combining their existing knowledge with new information, and thereby simplifying complicated concepts.

Overall, it was found that adult learners with intellectual disabilities may become complacent after achieving a certain minimal grade standard, and may therefore fail to see the relevance of furthering their studies, learning new skills, and becoming more proficient in their existing knowledge. This complacency may be related to the positioning of those with disabilities as a largely incapable minority in a society where the majority is not afflicted with such conditions. This may then lead to special needs learners obtaining higher praise for marginal achievements as the standard for success is set much lower. However, this lack of expectations may lead to a fundamental deterioration in self-confidence. Therefore, teachers are advised to give these students personalized special attention to improve their self-confidence and encourage them to continue learning.

In general, in the teaching of mathematics to adult learners with intellectual disabilities, there are many methods and tools at the disposal of special needs practitioners. Tools and props can help students improve their attention and solidify abstract mathematical concepts in concrete terms through tactile interaction and visualization. Furthermore, teachers of special needs students should strengthen care and attention towards these learners, incorporating methods of increased moderate intervention, especially in the areas of students' learning will, motivation and psychological outlook. This should be done in tandem with monitoring and improving their writing habits and other behavioral norms. Through further research and demonstration, we can deepen our understanding of these problems at the theoretical level, and provide practical reference and enlightenment for other teaching fields.

References

[1] Wang Shimei. How to Improve Students' Mathematical

Operation Ability in Regular Class [J]. Modern Special Education, 2014, (09): 55-56.
[2] Ding Yuan. The Construction Strategy of the Effective Classroom of Life Mathematics in the School for the Intellectuals [J]. Guide to Knowledge, 2022, (17):5-7. DOI:10.14161/j.cnki.qzdk.2022.17.001.
[3] Xie GuihuaApplication of games in mathematics teaching for children with intellectual disabilities [J]. Xueyuan, 2014, (22): 172.
[4] Fu Yijun. Gender Differences in Science Classroom in Junior Middle School [D]. East China Normal University, 2022. DOI: 10.27149/d.cnki.ghdsu.2022.004009.
[5] Zhang Lan, Ma Hui. Influence of environmental noise on children's short-term memory and attention [J]. Journal of Acoustics, 2018,43(02): 246-252.DOI:10.15949/j.cnki.0371-0025.2018.02.014.
[6] Gao Dongyan, Tang Haolong. Research on Gender Difference of Mathematics Core Accomplishment Performance of Junior Middle School Students[J]. Science and Education Wenhui, 2024, (04):185-188. DOI:10.16871/j.cnki.kjwh.2024.04.043.