Nonverbal Creativity in Students of Pedagogy for Technical Education at Elementary Schools

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Abstract

Ideas about creativity are neither unknown nor new. Creativity understood as self-realization belongs to one of the basic human needs as other physiological needs such as the need to be loved, the need of belonging and being appreciated. Creativity is therefore a significant marker of each human being. However, it comes in various forms, areas and levels. We intend to introduce the reader to the research of levels of nonverbal creativity in students of pedagogy, attending the study programme of technical education at the College of Education, University of West Bohemia in Pilsen (Czech Republic). Urban´s test – TSD-Z and a questionnaire were used as the research methods.

Keywords: project SGS, creativity testing, Urban´s Figural Test of Creative Thinking, pedagogy students, technical education

1. Introduction

Creativity is one of the most important aspects at elementary schools. Creativity is a significant trait of each individual elementary school pupil. However, creativity may appear in various forms, areas and levels. The estimation of the level of creativity has been one of the frequently discussed issues among pedagogues. Bibliographic and personal questionnaires and non-test methods, interviews, projective techniques, the assessment of the creative activities and products, questionnaires concerning the creative climate, test sets and multidimensional projects, experimental and research methods related to specific topics or various identification tools (e.g. tests of productive thinking, tests of scientific thinking, test for creative types etc.) are used during the evaluation of creativity skills.

Constancy, consistency and reliability of the test results also are influenced by the fact that displays of creativity are contingent on other factors, e.g. emotional, physical condition, atmosphere in group, motivation and other frequently random influences.

There are many opinions about the adequacy of measuring through the pencil – paper method (Jurčová, Amabile, 1992, and others). The critics have dealt with the fact that such tests measure only one part of creativity, for they are not motivating enough for respondents, and time limits may represent a serious obstacle for the respondents by encompassing low information value about creativity within the meaningful activities of their daily lives. Apart from the negative aspects of the aforementioned test, there are in contrast many studies confirming the validity of these tests.

2. Urban´s Figural Test of Creative Thinking – TSD-Z

Figural test of creative thinking – TSD-Z is a screening tool which visualizes the creative potential of an individual. It is used as a means of identifying well-developed creative skills on one hand or below-average developed skills on the other. There are several advantages to this test, e.g. simple administration and evaluation and a wide range and low expenditures. The test may be used for various age groups which is an advantage as well. The test consists of one sheet for A type and one sheet for B type. There are figural fragments on the test sheet (a semicircle, dot, wave line, right angle, dashed line, lying "u" off the frame) which have to be sketched by the respondent. The result is evaluated on the basis of 14 criteria. In contrary to other test, the qualitative features of the creative effort are taken into account using Urban´s Test.

It is objective, valid and is able to withstand the reliability criteria (Urban, Jellen, Kováč, 2003).

The test may be employed in many situations, e.g. to make an opinion about creative skills of the respondents, to compare performances of the pupils to performances of their peers, to identify the effectiveness of the programs developing creativity, in spheres of psychological and pedagogical counseling, in the sphere of special education to estimate an unknown potential in children with behavior and learning disabilities, in search for exceptionally gifted individuals, as a supplemental method in the sphere of professional counseling, during a selection procedure for professions requiring creative skills and as a research tool of developmental psychology, clinical, work and pedagogical psychology (Urban, Jellen, Kováč, 2003).

The TSD-Z test fulfills all the requirements of the modern methods of research of creativity which are not focused only on divergent thinking. Basically, the test is focused on qualitative, contentual and elaborative aspects of creativity.

3. Testing in Students of Technical Education

As referenced earlier, the test sheet contains figural fragments (semicircle, wave line, dot, right angle, dashed line, lying "u" off the frame).

The angle and semicircle may be completed in various ways as it is visible from the figures:

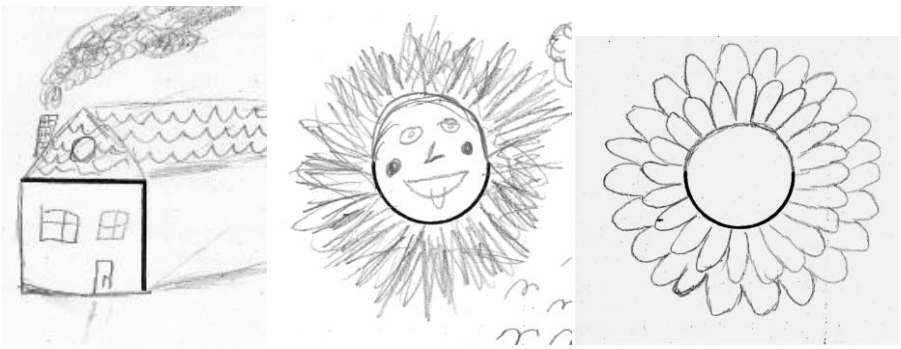


Figure 1: Completion of Semicircle and Right Angle

The wave line was part of the picture or it was only added abstractly.

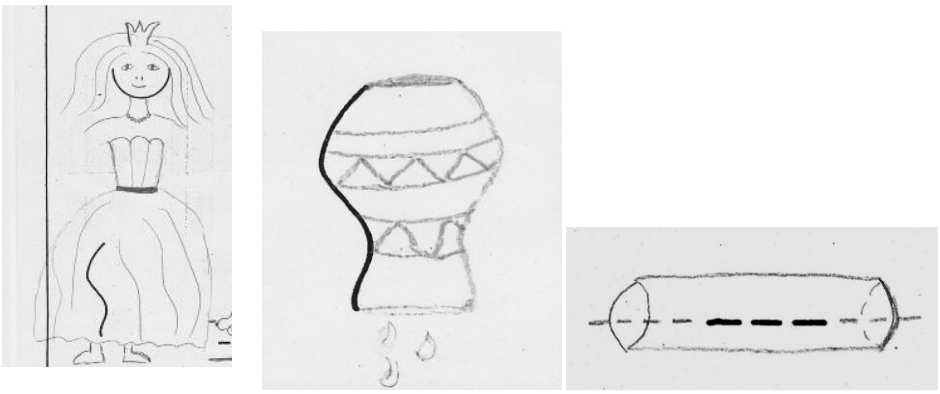


Figure 2: Completion of Wave Line and Dashed Line

The lying "u" off the frame was neglected by the majority of respondents.

Many tests we designed as a general picture. However, there were tests in which the individual figural fragments were not even thematically related.

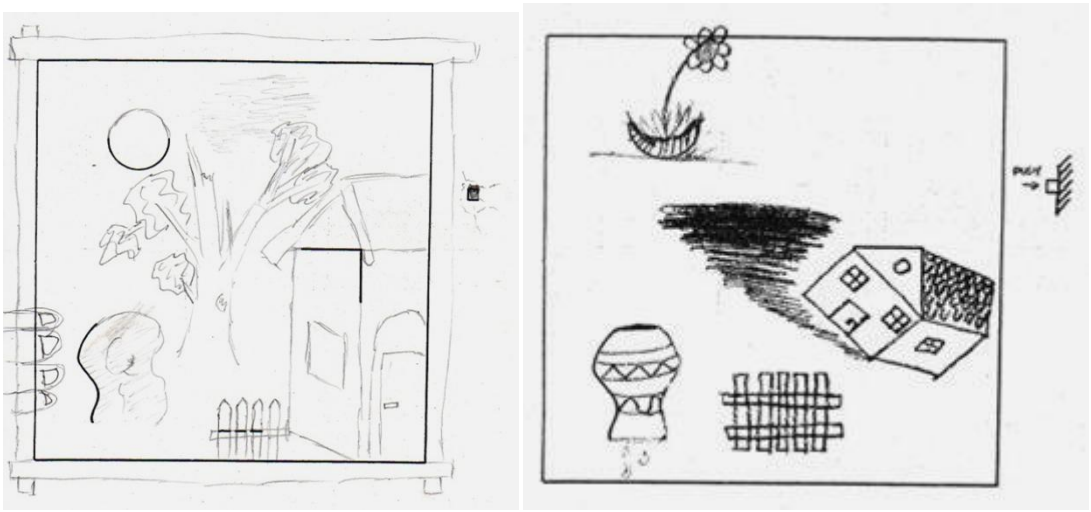


Figure 3: General Composition

4. Students of Technical Education and Creative Activity

In the process of education, colleges of education do not expect that they will only bring up smart inventors. However, it is important to motivate the students to employ invention and enthusiasm as much as possible in their work. Enthusiasm of the teacher is easily contagious to his/her students and, as Immanuel Kant wrote: *"Nothing big would be finished without enthusiasm"* (Stebila, 2012). Technical creativity may be perceived as a specific type encompassing certain particular requirements. These requirements are specific and should be respected by the creator. What requirements are those? E.g. general and special professional knowledge as well as other fields related to ecology, economy, esthetics and safety must be enlisted among the most important ones. A requirement of cooperation and team work is very important as well because the majority of products is made through a team effort. Long-term experiments and observation of behavior of the product are necessary since even the smallest mistakes may result in negative consequences in the form of a limited function of the product or even in form of risk to human health. Each creator should be familiar with the latest discoveries in his/her field which may influence his/her work. The creator should have an ability to overcome various obstacles in his/her work as e.g. shortage of materials or information. Each newly-made product should serve to the benefit and not to destruction of humanity. Each creator is under time pressure because the projects usually have only a limited time for completion and there also is the danger that his/her work will not attain the necessary level and might be surpassed by another creator just before the final touches are made. (Honzíková, Novotný, 2012)

5. Level of Creativity among Students of College of Education, University of West Bohemia in Pilsen

What is the level of creative skills in today's students of technical education? Such was the primary question for research of the creative skills among the students of pedagogy. Two basic hypotheses have been formed:

H 1 –students of technical education reach above-average level of creative skills.
H 2 – evaluation of the teacher is directly proportional to the results of the test.

Research Organization, Respondents and Research tools

The research was carried out in terms of the SGS (Student Grant Competition) project at the College of Education, University of West Bohemia in Pilsen in the summer semester. Forty students in their second year of study of technical education for elementary school teachers were enlisted in this project. Thus, these students constituted some of the future teachers of technical education. The Urban´s Figural Test of Creative Thinking – TSD-Z was chosen as the research tool. A questionnaire was used as well because various authors mention that the techniques of comparison of results of measuring through test and real creative performances in real life (school practice in our case) are most efficient in researching technical creativity. The advantage of this procedure is that the discrepancies stemming in heterogeneity of the theory in questions of definition of creativity are eliminated. The products are evaluated by independent observers – experts, the teachers in our case.

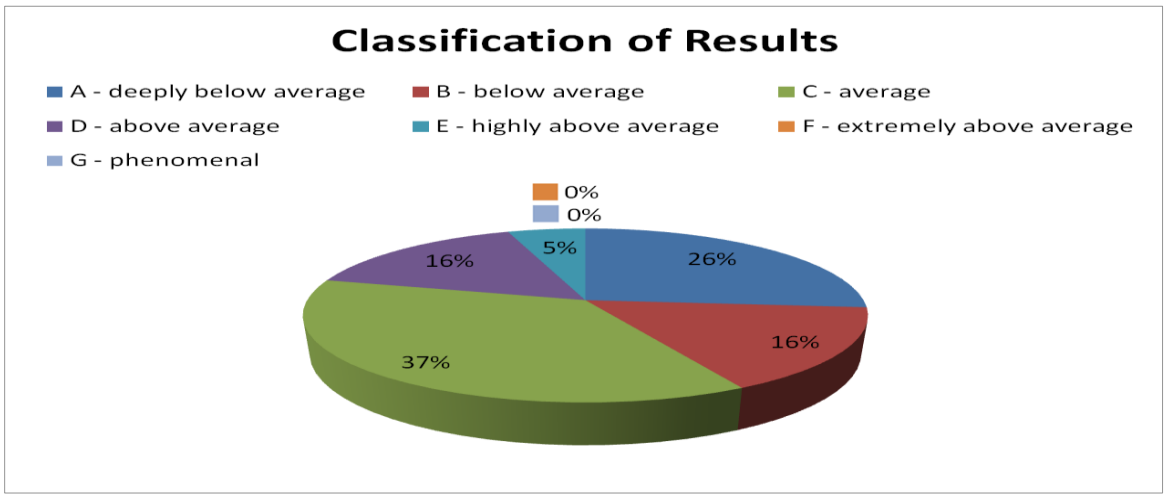
Research Implementation

The students completed the figural test and the teachers completed a questionnaire independently on the work of the students. The results of the questionnaires showed which one of the students had been considered creative, less creative but manually skilled and which one of them appeared to be neither creative nor manually skilled. The graph 1 below visualizes evaluation of the students by their teachers.

Research Results

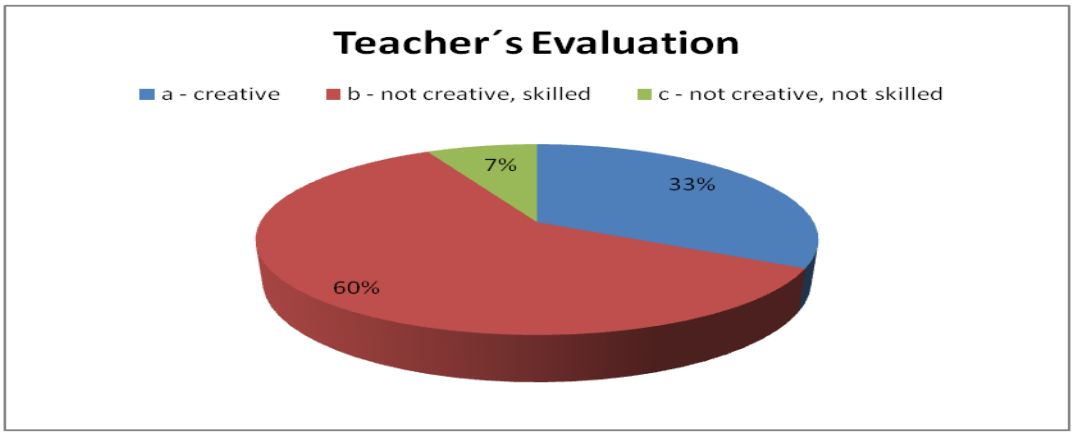
It was shown that the majority of students achieved below-average and average results.

Hypothesis H1 was not confirmed.



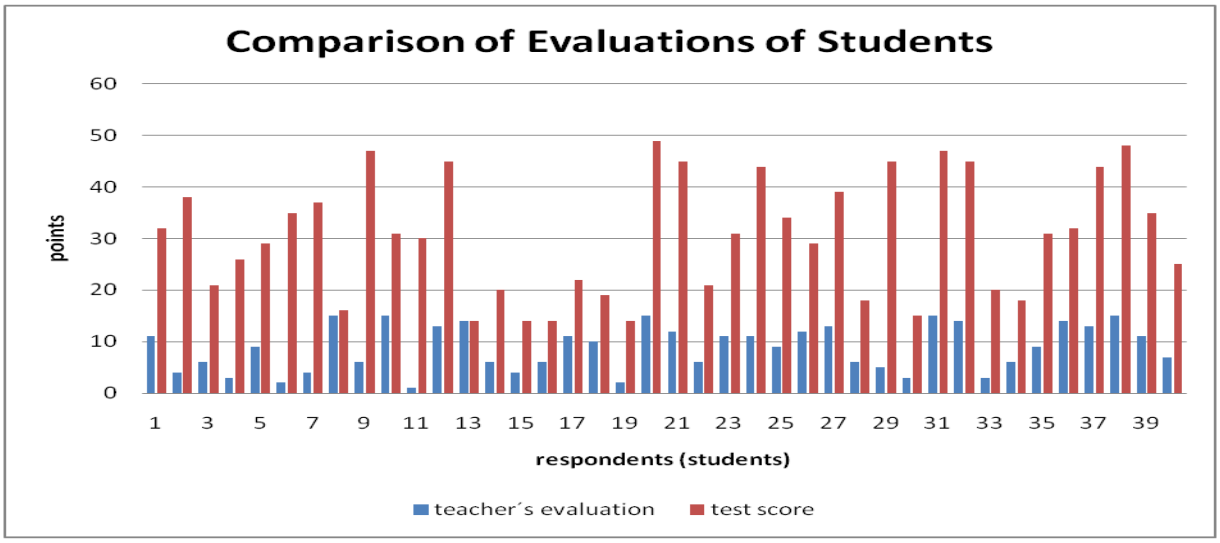
Graph 1: Results of Testing

The results obtained through the questionnaires used by the teachers to evaluate the students were also of interest (graph n.2).

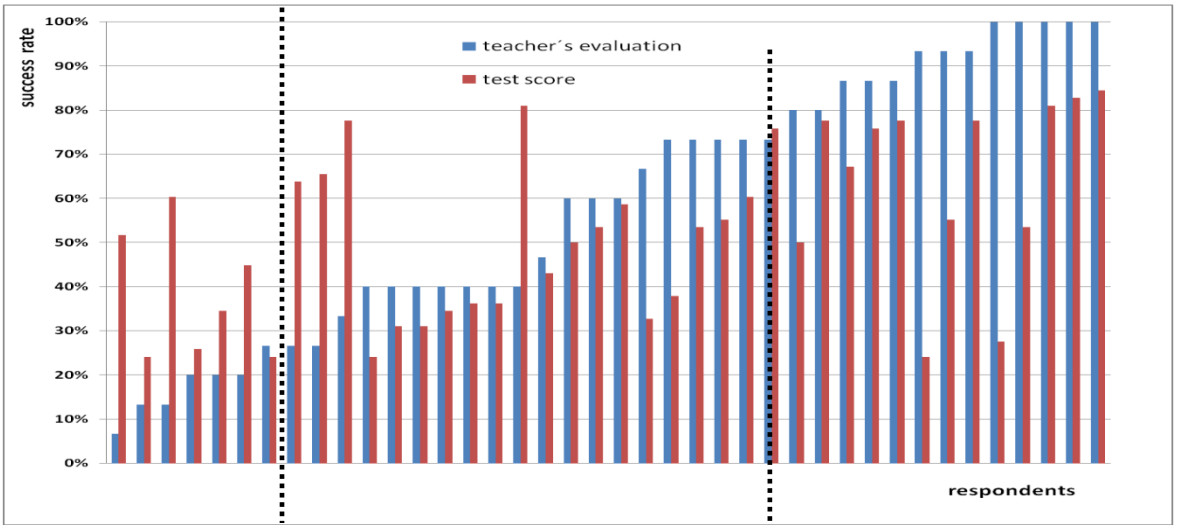


Graph 2 – Evaluation of the Students by the Teacher

It is observable that majority of the students was not found to be creative, but skilled. If we return to the original statement that the college of education prepares future teachers, we can state that manual skills are very important for a teacher. However, each teacher should also be creative- it will be a teacher who chooses topics for the pupils plan and choose materials. It is the teacher who will inspire the pupils through his/her behavior and enthusiasm to encourage a positive approach to technology and creative products.



Graph 3 – Comparison of the Teacher´s Evaluation and the Test Score



Graph 4 – Comparison of the Teacher´s Evaluation and the Test Score – Extremes and Trends

The highest score from the teacher was 15 points while the highest possible score in the test was 58 points. Graph 3 implies that the teachers underestimated their students.

Graph 4 visualizes a comparison of the evaluation carried out by the teacher and the test result. The values are re-computed in order to reach an objective comparison. The maximal possible values that could be reached are equal to 100%. Graph 4 is characterized by three significant areas. The central part represents the most respondents (2/4) while the evaluation and score values show a minimal divergence as well as a linear increasing trend.

The most significant differences between the measured values are visible in the first part of the graph. This part represents 1/4 of all the students who achieved the worst evaluation. The score achieved in the test surpasses the evaluation of the teacher for the majority of the members of this group by more than 100%. This is the most underestimated group. A mistake in communication between the teacher and student or a need of individual or any other specific approach to this group may have been the reason for these extremely diverging values.

The last part of the graph (on the right) displays the last quarter of the students who obtained the highest evaluation by their teacher. There is no significant difference in the majority of the respondents of this group hence the teacher´s evaluation is in almost full accordance with the test results.

The evaluation of the teacher is directly proportional to the results achieved in the test only in half of the respondents in the middle part of the graph. Both increasing trends for results of evaluation and the test results are clearly visible here.

The relation is unconfirmed or insignificant (right part of the graph) in lateral areas characterized by a high difference between the score and the evaluation. Therefore, hypothesis H2 cannot be confirmed in its entirety.

Hypothesis H2 has not been confirmed.

6. Discussion

The results of the tests were compared to the results of similar research conducted in Germany (Urban, 2005), in Slovakia (Kováč, 2002) and in Hungary (Kárpáti, Gyebnár, 1994). No significant differences have been found in the particular groups of respondents. At the same time, results in particular age groups and sex differences were compared as well. No significant differences have been identified. Similar tests are also used in other countries such as Canada, India, Indonesia, Italy, Nigeria, China, Philippines, Poland, Portugal, South Africa, Spain, Turkey, Britain, America.

The aforementioned research inspired us to think about the development of creativity in the future teachers.
Teachers at the College of Education, University of West Bohemia in Pilsen are constantly trying to motivate their students to work as creatively as possible. In terms of teaching technical subjects or practice education, students encounter plenty of technological processes which they are to master, too. Outcomes necessary for passing the subjects successfully, outcomes validating correct mastering of knowledge and practice skills are designed only partially. Therefore, students are free to perform their own activities and express their own creative work. The students are introduced to these requirements and are encouraged to present their own suggestions and concepts. The teacher leads the students in search for problems and to decipher them and make suggestions for solutions. The originality of the outcome is emphasized and a unique or non-traditional solution is preferred. The students should be able to adjust the already known phenomena and use them differently.

The students of technical education are motivated to such activities in many various ways:

Enthusiasm of the teacher. This way of motivating is a keystone of every successful activity of students. The students must see an interest on the part of the lecturer in the discussion, analysis of the solution as well as the individualized work with the students.

Possibility to choose their own or similar topic. One of the students of the master´s degree program played Warhammer board games in his free time. He was encountering difficulties related to the specificity of commercially-produced game plans. Therefore, he decided to make a prototype of a universal game plan for board games.

Practical use of a fully functional product. All activities should aim at concrete goals. We search for problems and design solutions. The students are influenced negatively when their production activities have no goal and only purposeless seminar papers (products, text setc.) emerge. The students may think that the only purpose of the teacher´s requirements is to keep him/her from completing the subject quickly.

Presentation of someone´s work and result of this work. It is a very strong factor related to the use of the product. The students are aware of the need to distinguish themselves from the other graduates and offer something more for the market and win preference of a future employer. The student who presented a solution at a student conference (scientific and vocational activities etc.) puts on display his or her ability to do something creative. The high-quality products of the students of technical education have been patented or showed publicly as exhibits at the Techmania Science Center.

Financial prize or reimbursement of expenditures. The students are enlisted in various projects which may serve as a means of reimbursement for their possible contribution.

Completion of the subject. This factor is important as well. However, it should not be the only one engaging the student´s motivation.

7.Conclusion

Study of technical education may be considered very important for further development of mankind in the present time. It is important to inspire students to a positive approach to technology and technical education, especially through motivation and a positive evaluation. In terms of the SGS project mentioned above, we would like to focus not only on the students and their motivation to technical education but also on the teachers to help them find the evaluation tools through which they may most optimally support the students and trust them more.

It should be mentioned at the end that each participant of technical education – the teacher and student – should realize that not all creative effort leads to a technical invention and that social response or mere satisfaction of the creator may be the likely criterion of creativity. It is much more difficult to be a teacher of technical education than just a technician.

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