

## TESTS OF EDUCATIONAL ACTIVITY AS A MEANS OF ASSESSING THE LEVEL OF COMPETENCE FORMATION

Nataliya A. Senognoeva  
Russian State Vocational Pedagogical University,  
Ekaterinburg, Russian Federation

**Abstract:** *Testing is a powerful tool that opens up wide opportunities not only for assessing students' knowledge, skills and skills, but also for monitoring the effectiveness of the functioning of the entire educational system as a separate university, so the entire educational community of the country. The main goal of the work is to analyze the tests of training activities to assess the level of competence formation. To achieve the goal, the authors used the method of analysis. It is established that the tests of educational activity have an advantage over the ordinary assessment of knowledge. The introduction of testing at each of the stages of assessing the quality of the development of educational programs, simplifies the process of testing the assimilation of competencies. It is determined that the use of computer diagnostics makes it possible to think actively when performing a task. The results of the test develop a monitoring system that fosters the development of competence.*

**Keywords:** control, test task, adaptability, curriculum, theoretical knowledge.

In education, within the framework of the competence approach, the practical, interdisciplinary, applied aspects of education are strengthened. This is achieved through the reorientation of the content of disciplines on the activity-type content of instruction (from "declarative" knowledge to procedural and value-semantic knowledge)<sup>1</sup>. When implementing a competence approach in teaching methods and technologies, special emphasis should be placed on developing technologies based on active, reflexively active forms and methods of teaching. To include in the learning process problem-modular training systems, design and research methods, through which the independent work of students is expanded and activated<sup>2</sup>.

Designing the learning process with a competent approach raises the task of testing the productive and creative, creative levels of applying knowledge, skills in the future professional activities of the student.

The main concepts of the competence approach are competence and competence. Competence is a generalized characteristic of the

---

<sup>1</sup> A.A. Feskova, "On the problem of increasing students' motivation for learning", in *International Scientific and Research Journal*, 2013, vol. 3-4, no. 3, p. 11-13.

<sup>2</sup> V.D. Duzhenkov, T.I. Panasyuk, "Some aspects of testing methodology", in *Organization of the Educational Process*, 2006, no. 8, p. 104-109.

personality, determining the willingness to successfully solve professional, social and personal problems. Competence is a personified competence; the expressed ability to apply knowledge, skills, experience, personal qualities for the decision of professional, social and personal tasks<sup>3,4</sup>.

In the professional sphere, there are several types of competences:

– special (subject), which determine the ownership of professional activity;

– general professional, related to several subject areas or types of professional activity, which the graduate must master in his profession;

– key (basic, universal), contributing to the effective solution of various tasks from many areas and the implementation of socio-professional roles and functions on the basis of the unity of generalized knowledge and skills, universal abilities.

Competencies are most effectively formed in the educational process of the university by means of technologies that facilitate the involvement of students in the search and application of knowledge, the acquisition of experience in the independent solution of various tasks<sup>5</sup>.

For each specific stage (level) of training in the mastery of the competence, the categories "know", "able", "possess" are identified, in which the following meaning is embedded:

– "know" – to reproduce and explain the educational material with the required degree of scientific accuracy and completeness.

– "be able" – solve typical problems based on the reproduction of standard solution algorithms;

– "own" – solve complicated problems based on acquired knowledge, skills and skills, with their application in atypical situations, is formed in the process of gaining experience of activity and be able to transfer this experience.

The competence approach in testing knowledge is an important and relevant topic for monitoring the knowledge of applicants and students. Modern educational conditions and the widespread introduction of

---

<sup>3</sup> K. Muenks, D.B. Miele, "Students' thinking about effort and ability: the role of developmental, contextual, and individual difference factors", in *Review of Educational Research*, 2017, vol. 87, no. 4, p. 1-29.

<sup>4</sup> E. E. Nakhratova, I. Y. Ilina, A. I. Zotova, M. S. Stepanov, S. V. Dusenko, "Modern peculiarities of SWOT analysis when taking management decisions by Russian TOP managers", in *International Journal of Applied Business and Economic Research*, 2017, vol. 15, no. 7, p. 187-194.

<sup>5</sup> C. Stan, A.D. Manca, "The dimensions of intercultural education", in *Astra Salvensis*, 2018, vol. 6, no. 12, p. 291-297.

information technologies dictate the need to create such testing systems, based on this approach<sup>6,7</sup>.

As for competence, the dramatic nature of the situation that has developed in the present period of the development of society consists in the fact that people in their value orientations tend to work in the conditions of development, they strive for new knowledge, a variety of activities, to take responsibility for themselves, to maintain colleagues, realization of abilities, to the manifestation of initiative (the circle of ideas of K. Ardzhiris, F. Herzberg, A. X. Maslow). But in the routine and actually defining the behavior of current motivational attitudes, many of them often do not want to listen to the opinions of others, reflect flaws, mistakes, are not ready to waste time developing more efficient forms of work, motivate people to improve the quality of work, are not always ready for creativity and innovation. This picture is very close to what is recorded in our domestic studies of professional activity, and in foreign ones<sup>8</sup>.

### **Features of the study activity test**

Turning to the research of the British scientist John Raven concerning the characteristics of the competence of different professional groups, we will meet the following definition of competence: “Competence is a specific ability necessary to effectively perform a specific action in a particular subject area”<sup>9</sup>. Evaluation of the sequence of the learner's learning activities is precisely laid down in the very concept of the learning test, in particular, the learning activity test.

The training test is a kind of test, the tasks of which control the learning process, and not its final result.

The test of learning activity is a kind of training test in which, based on the choice of alternatives, the sequence of learner's learning activities that the student constructs for the performance of the test task is evaluated.

---

<sup>6</sup> K. Muenks, D.B. Miele, A. Wigfield, “Students’ perceptions of the source of effort influence ability judgments of other students”, in *Journal of Educational Psychology*, 2016, no. 108, p. 438-454.

<sup>7</sup> S.M. Markova, T.V. Svadbina, E.P. Sedykh, S.A. Tsyplakova, O.A. Nemova, “Methodological basis of vocational pedagogical education”, in *Astra Salvensis*, 2018, vol. 6, p. 769-777.

<sup>8</sup> A.D. Manea, “Features of educational activities in the contemporary society”, in *Astra Salvensis*, 2018, vol. 6, no. 12, p. 255-260.

<sup>9</sup> J. Raven, *Competence in modern society. Identification, development and implementation*, Kogito-Tsentr, Moscow, 2002.

Relying on the general concept of the teaching test, we specialize it by defining the concept of a learning activity test. Already in the title the key moment of this form of control is laid, which distinguishes it from the variety of forms of training tests: the learner's learning activity is controlled.

The test of learning activity is a system of tasks of a specific form. In the tests of educational activity, the essence is the availability of alternatives to the composition of actions. As in any test, each alternative diagnoses the student's chosen option of achieving the goal. But for the tests of learning activity the goal is to form the composition and mode of action, therefore the alternatives are represented by the variants of a sequence of actions aimed at solving the problem, each subsequent step being chosen by the test subject, depending on what the result of the previous one was. The tested constructs the desired sequence, choosing from the list of proposed actions<sup>10</sup>. Thus, it becomes possible to evaluate not only the answer to the problem, but also the constructed way to solve it.

This opportunity is provided to both the teacher who conducts this test and the student himself. Control over the choice of the way to solve the proposed test task, and not only for the final result is the main feature of the learning activity test. Such control allows the student not only to highlight the difficulty that has arisen in the process of solving the problem, but also to realize to what stage of the solution of the problem it relates, what exactly complicates it. It is important, at the same time, to design test tasks so that the operational control can be treated as already performed actions, and to planned ones. This, in turn, provides an opportunity to analyze the work on the training task before it is performed, anticipating the results.

As shown by the experiment, trained to work with this form of control, students and schoolchildren, having received a study assignment, first plan the course of its implementation (in particular, they compare and evaluate the methods of solution known to them, deliberately select the most rational of them, consider the possible consequences of their application) and only after that they start the task. If there is a need, they can return to the required stage of the task, check the composition of the performed actions, understand the mistakes and correct them. This control is naturally called planning. Mastering them shows that the educational activity has become sufficiently spontaneous and self-

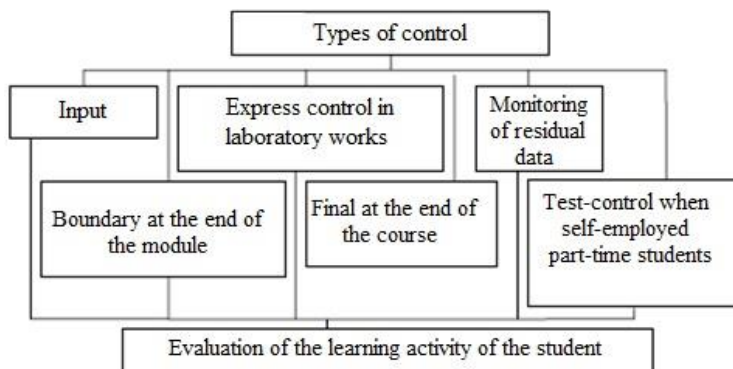
---

<sup>10</sup> A.J. Ganimian, R.J. Murnane, "Improving education in developing countries", in *Lessons from Rigorous Impact Evaluations*, 2016, vol. 87, no. 3, p. 1-37.

regulating. The student, having mastered such activity, is able to foresee the occurrence of possible mistakes and difficulties, and timely indicate measures to prevent them. The feedback that is established here is in-system, the most important effect of self-regulation arises, when the evaluation and adjustment of the learning activities mastered by the student occurs during the execution of the test task, and not after it as a reaction to a mismatch with the control answer.

Following the adopted terminology, it can be said that the tests of educational activity primarily control the creation by the student of an indicative basis of actions to solve the problem, and already this shows the training nature of this form of testing. This aspect is not limited to the learning character of the tests of educational activity. The variation in the choice of the ways of performing the test task, laid down in the definition of the test of the learning activity, makes it possible to set as the learning goal the choice of the most rational way of performing the task on the basis of the knowledge available to the student at the time of the test (Figure 1).

Tests of learning activities are a way of learning, in which the planned formation of educational activities. The application of tests of educational activity is aimed at the assimilation of knowledge, the development of methods and methods of action. When using the tests of learning activities, the process of mastering the student's knowledge is controlled, which involves taking into account the ways students work, methods of mastering new knowledge, fixing individual steps in the solution of the problem, and how the result of the work is obtained.



**Figure 1: Types of control**

This, in particular, helps to shift the student's orientation from the final result to intermediate results, and, in general, to an assessment of the

process of solving the problem as a whole<sup>11</sup>. From the definition of the test of learning activity it follows that the student consciously controls his educational activities and critically evaluates their results, characteristic for the formation of learning activity. An important feature of the tests of educational activity is the availability of their adaptive properties in the framework of the so-called fixed-branching strategy of adaptive testing.

### **Comparative analysis of tests of learning activity and ordinary adaptive tests**

But there are fundamental differences in the characteristics of tests of educational activity in comparison with the usual adaptive tests of knowledge and skills control. Here are a few basic differences<sup>12</sup>.

1. In tests aimed at monitoring the learning outcomes, adaptability manifests itself in the fact that, with the correct answer of the subject, the next task is chosen more difficult, and the incorrect answer entails the presentation of a subsequent easier task than the one to which the subject was given the wrong answer. In the tests of learning activity, adaptability is realized by the possibility of choosing the way of solving the problem that the learner is capable of, corresponds to the level of mastery of the action, and so on.

2. In the tests of educational activity the student will necessarily come to the correct answer. In adaptive tests of the control of learning outcomes, the presence of students who cannot perform the test task correctly is laid down initially, since this is precisely the tool for constructing the adaptation mechanism.

3. When constructing adaptive tests, one assumes that such characteristics as strength, awareness, generality of knowledge, despite all the attractiveness, have a significant drawback, since they cannot be given any objective methods of measurement. In the tests of learning activity, as will be shown below, parameters can be measured such as the level of coagulation, the level of complexity, the degree of alternatives, etc., allowing to judge the above characteristics.

---

<sup>11</sup> K. Ferguson-Patrick, R. Reynolds, S. Macqueen, "Integrating curriculum: a case study of teaching global education", in *European Journal of Teacher Education*, 2018, vol. 41, no. 2, p. 187-201.

<sup>12</sup> Z. Sun, K. Xie, L.H. Anderman, "The role of self-regulated learning in students' success in flipped undergraduate math courses", in *Internet and Higher Education*, 2018, no. 36, p. 41-53.

4. As can be seen from the foregoing paragraphs, adaptability in the traditional testing system is a means of modernizing the system of monitoring and evaluating the quality of training of students, aimed at improving the effectiveness of the monitoring and evaluation systems in education. In the tests of learning activity, adaptivity is an immanent property, and evaluation is a regulatory function, and not an end in itself.

5. In tests of control over the results of training, it is necessary to ensure a high level of secrecy, in particular, by presenting to each individual tested a set of test tasks corresponding to his level of knowledge. In the tests of training activities, no. secrecy is required. Moreover, the student can ask a question to a teacher, a neighbor on a school desk, etc.

The authors considered the technological characteristics of tests of educational activity. We will determine the qualitative characteristics of the tests of educational activities, taking into account the requirements for pedagogical technology, as well as the structure of educational activities and the means through which this structure will be implemented<sup>13</sup>.

Firstly, the tests of educational activity are innovative pedagogical technology.

When creating tests of educational activities, we will proceed from the notion of "innovation" formulated by M.V. Clarin, who believes that the concept of "innovation" refers not only to the creation and dissemination of innovations, but also to transformations, changes in the way of activity, the style of thinking that is associated with these innovations<sup>14</sup>.

The construction and application of tests of educational activity correspond to the features of pedagogical technology:

1) technology is an algorithmized and structured process aimed at achieving an unambiguously set learning goal;

2) technology implies the presence of subjects (people, devices, equipment, machines and tools);

3) availability of diagnostic tools;

4) this process is the most effective in comparison with similar processes, at least for some parameters;

---

<sup>13</sup> A.A. Larionova, N.A. Zaitseva, Y.F. Anoshina, L.V. Gaidarenko, V.M. Ostroukhov, "The modern paradigm of transforming the vocational education system", *Astra Salvensis*, 2018, vol. 6, p. 436-448.

<sup>14</sup> R. Boelens, B.D.E. Wever, M. Voet, "Four key challenges to the design of blended learning: a systematic literature review", in *Educational Research Review*, 2017, no. 22, p. 1-18.

- 5) reproducibility of pedagogical results;
- 6) the focus of technology on achieving product efficiency;
- 7) the quality of the product can be characterized by performance parameters<sup>15</sup>.

Secondly, in the tests under consideration, educational activity is formed on the basis of a step-by-step formation of mental actions.

Thirdly, in the tests of educational activities the structure of educational activity and the means through which this structure will be implemented reflected.

Fourthly, in the process of testing, not only the final result of the trainee's activity in solving problems (the correctness or incorrectness of the answer) is controlled, but also the decision process itself.

### **Comparative analysis of tests of learning activity and ordinary adaptive tests**

For greater effectiveness, it is necessary to begin checking the formation of professional competencies of entrants and newly admitted students. With the help of testing, applicants will show all the knowledge of competencies they have acquired in school, technical school, college. The teacher can immediately assess the knowledge gaps in this or that section of the academic disciplines profiling in the chosen specialty. Conducting such tests, including a large coverage of issues, will help increase the quality of mastering competences. A full assessment of the degree of mastery of the programs by students includes current monitoring of academic performance, intermediate certification of trainees and final attestation.

Specific forms and procedures for monitoring the progress and intermediate certification of students for each discipline (module) and practice are established by the educational organization independently. The results of the training correspond to the individual levels and elements of competencies and are comparable to the specific components of the curriculum of the disciplines<sup>16</sup>. The results of the training are a description of the knowledge, skills and skills of the student after the successful

---

<sup>15</sup> E.V. Povorina, O.V. Serbskaya, N.F. Bondaletova, E.V. Duplij, N.V. Buley, "Improving quality control tools for domestic industrial production", in *International Journal of Applied Business and Economic Research*, 2017, vol. 15, no. 12, 283-296.

<sup>16</sup> H. Al-Samarraie, N. Saeed, "A systematic review of cloud computing tools for collaborative learning: opportunities and challenges to the blended-learning environment", in *Computers and Education*, 2018, no. 124, p. 77-91.



completion of a certain stage of training. Learning outcomes are parameters that can be measured and the achievement of which is an affirmation that planned competencies have been formed.

The introduction of testing at each of the stages of assessing the quality of the development of educational programs, simplifies the process of testing the assimilation of competencies<sup>17</sup>. The testing program should contain tasks for assessing the level of competence formation and learning outcomes. There are three such levels: initial, basic, advanced. The results of testing should be clear, formed for the convenience of processing and improving the activities of the teacher, reflect the shortcomings of knowledge in this or that section of the discipline. By conducting tests on the quality of mastering competencies, the student will show the degree of his readiness to solve practical problems of varying degrees of complexity. You can visually analyze how students use theoretical knowledge and skills in their professional activities<sup>18</sup>.

The problem of structuring competencies and creating metrics for certification is exacerbated by the additional difficulties that arise when trying to assess competencies. The testing procedure provides for the testing of various complementary types of testing and tasks, both closed in form test, and open, which, with a competence approach, become decisive when fixing the student's level of competence. When performing each task, several indicators are evaluated, programmed in them as indicators of one or several competences. Tests should cover all sections of the material covered. Including the skills acquired in the practical classes of discipline. To assess the learning outcomes, practical control tasks are used, which are a brief statement of the necessary actions to obtain the desired result.

Russian education has not yet entered the period of active dissemination and development of the system of tests in universities. Expanding the range of audited skills and habits has led to an increase in the share of open assignments that allow us to assess not only the correctness of the answer received, but also the ways of solving, the logic of presentation, the validity of judgments and many other skills, including practical ones that cannot be assessed using closed assignments. The

---

<sup>17</sup> L.B. Rasmussen, M.S. Hansen, "Learning facilitating leadership", in *Studies in Higher Education*, 2018, vol. 43, no. 8, p. 1484-1506.

<sup>18</sup> A.V. Ivanov, Y.V. Chelysheva, A.G. Akhtyan, V.A. Vishnyakova, V.P. Sorikhina, "Ethical concepts of pedagogy of consciousness as a foundation for the development of the school for the future", in *Astra Salvensis*, 2018, vol. 6, p. 453-462.

testing process should ensure the validity of the results – the importance of testing the student when evaluating specific ZUN<sup>19</sup>.

At the same time, under the new paradigm of Russian education, there is a need to move from a one-dimensional to a multidimensional measurement of the student's quality of teaching. Namely, the evaluation of competences as integrative learning parameters determined by the ZUN set, personality-oriented qualities and abilities of the student to perform tasks and functions in accordance with the requirements of the GEF HVE and vocational training courses in the direction of training that are projected on the invariant and variable components of the curriculum.

Most of the ZUNs currently undergoing testing at universities can be attributed to the reproductive level of their use and rarely to the productive one. Designing the educational process with a competent approach raises the task of testing the productive and creative, creative levels of ZUN application in the future professional activity of the student. Taking into account the unity of the learning processes and the evaluation of its effectiveness, as well as the primacy of cognitive activity in relation to its control, the methodology proposed in this work for implementing the competence approach in the educational process makes it possible to define a didactic-qualimetric platform for evaluating the competencies formed.

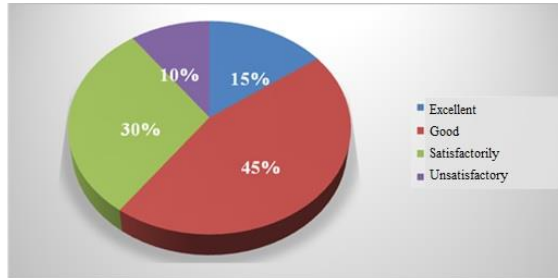
As follows from the considered methodology of training and development of self-processes in a competent approach, the qualification of the formation of competences should be based on measuring not only the amount of knowledge that a student or graduate of a university possesses, but, first of all, on assessing their abilities to apply this knowledge, skills and skills in practice. The level of complexity of the test task and the volume of ZUN used for its successful implementation depends on the level of the evaluated ZUN. However, widely used closed testing at any level of complexity does not correspond to the purposes of assessing the levels of formation of final competencies as the final result of training in a university.

Indeed, a student on traditional exams can brilliantly demonstrate profound knowledge of the theoretical issues of special and general professional disciplines, but then often after graduating he finds that he cannot cope with practical assignments because of the lack of necessary skills, skills and competencies for these tasks.

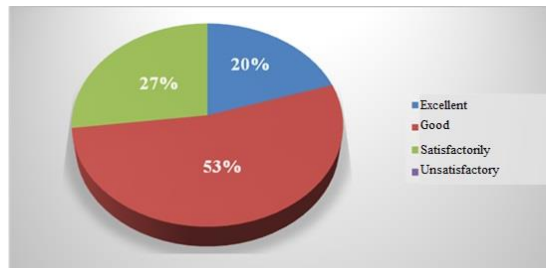
---

<sup>19</sup> P.-Y. Chao, "Exploring students' computational practice, design and performance of problem-solving through a visual programming environment", in *Computers and Education*, 2016, no. 95, p. 202-215.

In the determination of the content and validity of the entrance, current and final testing in the discipline "History of Art", as well as the testing in practice of achieving the goal and solving the problems of testing technology, 2-year students of 20 people took part (Figure 2, Figure 3).



**Figure 2: Results of input testing**



**Figure 3: Results of the final testing**

As can be seen from Figures 2, 3 the results of the entrance testing are lower than the final one. This is due to the fact that in the learning process, students try to learn the small ones, as the tests contribute to creative thinking. Thus, competence testing should be implemented, as well as their acquisition, in the process of educational and professional activities on the didactic platform of MUPs, the structure and implementation of which can be designed in a significantly expanded in the new GEF HPE curriculum vitae. The result of the analysis of the student's educational and professional activity is a formal description of his competences in terms of knowledge, skills, skills, with the levels of competence development in terms of the ability to perform tasks and functions in accordance with the requirements of the GEF HVE and the performance program<sup>20</sup>.

---

<sup>20</sup> G. Thompson, S. Sellar, "Datafication, testing events and the outside of thought", in *Learning, Media and Technology*, 2018, vol. 43, no. 2, p. 139-151.

The assessment of the complexity of each of the tasks of the base bank allows you to group tasks by levels of complexity for the subsequent formation of test variants with indicator indicators necessary for assessing the different levels of competencies. Statistical analysis of testing data also allows to adjust the scores, structure and content of the unit of test tasks, which allows to achieve high validity and authenticity of testing and to avoid mistakes in the current and final certification of students. Studying the dynamics of the process of testing knowledge with the help of tests allows you to set an individual test time for each specific set of test tasks.

Often, the testing time for different disciplines is set to the same on the basis of a certain standard, not taking into account the specificity of the specific discipline and its training module. The assessment is made not only on the basis of computer test-technologies, but also by teachers based on the results of observing the student's activity in the process of performing open test tasks and analyzing their results, which makes it possible to assess the indicators that are difficult to describe in a formalized way-indicators of the formation of the student's social and personal qualities<sup>21</sup>.

This or that test simulates a specific production or cognitive situation in which the subject has to comprehend a typical professional problem, show his understanding of its essence and propose ways of the right and best solution. No speculative questions with a list of ready answers, among which false judgments predominate, he does not suggest. Test assignments, if possible, are given a character in which the subject has to actively think, perform certain conditional actions, seek and make informed decisions, mobilizing as much as possible their internal resources.

They are designed not so much to measure specific knowledge as to assess the level of understanding of the subject, the degree of maturity of his professional thinking. The results of the test develop a system for monitoring the formation of competence.

Thus, computer diagnostics allows you to obtain a detailed description of the level of preparedness of a group of students and at the same time see that it is better absorbed, what is worse (strengths and weaknesses of preparation). If you carry out testing in the middle of the final year of training, you can correct the training work in time and, in the remaining time, to fix the shortcomings in graduate training purposefully. And if you take into account that the program clearly ranks the tested

---

<sup>21</sup> R. Enyon, "The quantified self for learning: critical questions for education", in *Learning, Media and Technology*, 2015, vol. 40, no. 4, p. 407-411.

people by the size of the evaluation and thus reveals the most and least well mastered competences of students, it turns out that the head of the educational institution has the opportunity to conclude with what professional tasks future specialists will be able to successfully manage and which ones will cause they have difficulties.

A profile of professional competencies can be built for any testing participant. It is only necessary that at the entrance to the system he fill out an electronic personal card, in which he indicated his name, name, sex. Students celebrate the course of study. Thus, the opportunity that appeared in the tests of educational activity to evaluate not only the answer to the task, but also the constructed way of its solution allows to consider them as a means of assessing competencies. At the same time, educational activity with its own structure is formed on the basis of a step-by-step formation of mental actions. The authors have established the positive aspects of the tests.