E-Assessment: A Suitable Alternative for Measuring Competences?

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Abstract. More and more companies accomplish tests for the assortment of trainees to measure the aspirants competences and competence potentials. The article in hand is dedicated to the academic evaluation of the adoption of new E-Assessment methods. Thereby it has to be resolved in how far the expectations linked with the E-Assessment's assignment for example seen from the company's view or from the proband's one, can be achieved. To adopt the computer-aided diagnostic professionally, its advantages and disadvantages are to be considered.

Keywords: employability, e-assessment, self-organization, key qualification.

1 Reasons for E-Assessment and Key Issues

The use of new media is currently regarded as one of the greatest challenges for human resource management. This also affects the activities of human resource development. The role of online assessment in this context demands clarification.

The reasons for the increased use of e-assessment are manifold. In light of the job market situation, businesses feel confronted by a "war of talents". They are therefore very keen to improve their image as an attractive employer and speed up the decision-making process with regard to personnel selection. At the same time a multitude of businesses complain that the value and comparability of school graduation certificates has decreased in recent years. In this respect performance standards vary substantially even within the same types of school. It is assumed that the use of e-assessment enables decisions regarding personnel selection to be made not only more quickly but also with greater validity. The current scientific debate constantly reminds us that the competences of an organization's staff play a fundamental role in maintaining or strengthening competitiveness. To this end, the e-assessment process is seen as a low-cost alternative to the conventional assessment-centre procedure. There are, moreover, efforts to document staff members' competences with the aid of knowledge management systems.

The following key questions are the starting point for further scientific debate: what are the advantages and disadvantages of the use of the e-assessment procedure? To what extent does the procedure succeed in the measurement of competences, in so far as they are relevant for (ongoing) employment?

2   Understanding the E-Assessment Procedure

E-assessment is commonly understood to be: "the use of internet-based tests (instruments) …, which serve to appraise and predict relevant job-related biographical and psychological variables and to assess the suitability of applicants" [7] (translated by the author). This paper deals not only with online processes, but also with computer-based diagnostics of suitability as e-assessment approaches (Ridder et al., 2004: 34). Such tests, carried out in the context of formal selection procedures, often take place on site. E-assessment can and is used in a range of organizations (e.g. businesses, public authorities, schools, universities) and applied to different functions (e.g. pre-selection, command of problematic situations, education controls). Furthermore, e-assessment can be used for various target groups such as (potential) apprentices, students, specialist workers and middle management.

Empirical studies which deal with the prevalence of e-assessment are mostly of an exploratory character. The opacity of the multitude of tests and uncertainty as to their quality are considered by businesses to be an obstacle to their take-up of the e-assessment procedure. In order to evaluate the quality of the procedure for a job-related appraisal of suitability, quality standards were developed at different levels. At the international level we have from AERA "Standards for educational and psychological testing", "Principles for the validation and use of personnel selection procedures" from SIOP, and the standards from the "Task Force on Test User Qualifications". In the German-speaking world we have DIN 33430, whose focus is on the entire process of suitability appraisal. The efforts concerning all aspects of DIN 33460 are to be critically reflected upon against the background of various approaches to evaluation (e.g. responsive evaluation). Further points of critique are adequacy and timeliness.

3   Diagnosis of the Construct 'Competence'

In the context of e-assessment, bespoke procedures for competence measurement should be deployed and related to one another, in order to capture the competences of the individuals holistically in terms of occupational competence – the competence to act autonomously in the chosen occupation/work situation.

Occupational competence is achieved when a relationship is present, or is established between the competence dimensions – technical, method-based, social and co-operative. Competences are not constituted by the accumulation of knowledge for testing. Rather, competences are to be interpreted as the "holistic development of capabilities, units of knowledge and lines of reasoning, as relevant to the action in question" [1] (translated by the author). What then is a holistic comprehension of competences? Two concepts can be differentiated: the first seeks a process which captures the individual's capability for action as exhaustively as possible; the alternative seeks to analyze discrete competence dimensions through various means. It is, however, questionable whether a cumulative measure of various competence dimensions can satisfy the claim to capture results holistically. The relationship between the results is crucial.

Returning to the question as to which competences are necessary for the employment of an organization's staff, the various competence dimensions – technical, method-based, social and co-operative competences – are given a particular value. There is disagreement in the research on competence development as to the role of the different dimensions, to do justice to the changes in working life. Great hope was and is attached to the concept of *key qualification.* The belief that a one-sided focus on technical competence should be overcome gained currency. Technical competence alone was not sufficient to cope with the demands of the workplace, let alone to shape it. Within the competence development research, there is controversy surrounding which qualifications belong to the 'real' key qualifications. Nevertheless, almost all these approaches assume that the key qualifications concern superficial knowledge and capabilities. The great expectations vested in the concept of key qualifications, in accordance with Mertens, have not yet been met.

A central assumption of the approaches to the key qualifications is that these cannot age and therefore their acquisition is more important that that of the technical competences. However, simply because technical competences become outdated with time, this does not mean that the technical competences fundamentally lose their value in the context of job-related activities. This is the first weakness in the debate about key qualifications. When it comes to meeting changing work requirements, not just the lack of technical competences, but in particular outdated technical competences become a decisive obstacle. The dominance of the discussion on key qualifications hides a second weakness of that debate: from the perspective of the individuals concerned it can be entirely reasonable to acquire competences in different technical areas in the context of an interdisciplinary focus.

Furthermore, it is noteworthy that there are to date hardly any empirical comparative studies which prove that the possession of key qualifications significantly increases the likelihood of employment. In her empirical study, Müller [8] explores the extent to which the possession of key qualifications influences the likelihood of apprentices remaining in the same trade after completing their training. The ability to communicate and co-operate, self-regulated learning in accordance with PISA 2000, performance motivation as well as aspects of self-competence (such as self-effectiveness) were all included as key qualifications. She could not identify any favorable patterns in their progression through their chosen vocations as a result of the acquisition of key qualifications. A differentiated and critical analysis of approaches which deal with key qualifications is required; this is however complicated by the unclear and shifting use of terminology. It is then clear that the exclusive focus on key qualifications, whereby technical aspects (e.g. expertise as know-how imbued with experience) are diminished in their importance, proves inadequate.

I now proceed to discuss the principles and models to which various approaches to competence research refer, and how they differ between competence dimensions (see Table 1). These ideas are the basis for judging the use of the e-assessment procedure. Bunk bases his definition of occupational competence on the construct of the occupation [3]. As a consequence of structural change, the boundaries between clearly defined occupations are increasingly blurred, which causes this definition to appear of limited suitability. A new model which does justice to the transformation on the internal and external labor markets is the concept of 'employability'. This is defined as „the ability of a person, founded upon their technical and occupational

competences and their ability to create value and to perform, to supply their labor and thus to enter into working life, to keep their job, or if necessary, to seek new gainful employment" [2] (translated by the author). The ideas surrounding the concept of employability are at least in part too unspecific to serve as a point of reference for the competence development of individuals, and should be put in concrete terms.

Wunderer & Bruch [9] examine the distinguishing features of entrepreneurial competences, whose degree they consider to be dependent on five classes of co-entrepreneurial behavior: (1) subcontractor, (2) co-entrepreneur, (3) entrepreneurially inclined staff, (4) staff with low co-entrepreneurial competence and (5) individuals who act as if sacked, are overburdened or procrastinate. Current approaches in the competence development research treat the competence to self-organize as being at the heart of the scientific debate [4]. In order to satisfy the requirements of the working environment (increasing complexity and insecurity), it is necessary for staff to possess the competences of self-organization and self-regulation. The actions of individuals must be increasingly self-directed. Competences are interpreted as a predisposition to self-organized action. They would escape direct scrutiny.

Table 1. Points of reference for occupational competences

Author	Key points	Dimensions / Taxonomy of competences
Bunk, 1994	Occupation	- *technical competence* (continuity: knowledge, skills and capabilities) - *method-based competence* (flexibility: procedural methods) - *social competence* (sociality: behavioral patterns) - *co-operative competence* (participation: ways of structuring)
Blancke et al. 2000; Speck 2005	Employability, model; "entrepreneurial individuals", versatile applicability and life-long learning	- ability to *create value* for the businesses, - ability to *organize oneself* and one's career, - to *market* the abilities oneself which are in demand on the internal and external labor market.
Wunderer & Bruch 2000	Co-entrepreneurial competences	- strategy-orientated *problem-solving competence* (deployment of value-creating innovations), - *implementation competence* (creating acceptance of innovative ideas) - *co-entrepreneurial social competence* (combination v. independent-autonomous action and co-operative-integrated behavior)
Erpenbeck & Rosenstiel 2003, p. XV f.	Competence as a predisposition of self-organized action	- *personal competences* (attitudes, values system, self-perception) - *activity-oriented competences* (integration of emotions, motivations and experiences in drives of the will, etc.) - *technical-methodical competence* (solving objective-representational problems) - *social-communicative competences* (developing group and relationship-orientated behavior, tasks and goals)

Occupational competences, relevant for future employment, are dependent on (1) the concrete work tasks, (2) the requirements of the work in terms of quality, and (3) the authorization which a work task attributes to individuals. In light of the view of competences as occupational competences of individuals (Ortmann, 2007), the

capacity to act (4), which they can develop and activate, is also relevant for their (continuing) employment. Furthermore the relevant occupational competencies (5) are subject to the repetitive interaction between the assignment of competences (in the sense of tasks) and the (potential) capacity to act of individuals. Clearly, self-organization and the corresponding (6) competence to self-organize play an ever-greater role in working life. But without (7) a corresponding other-organization, e.g. from the side of the business, there is a risk that the efforts of self-organization will not have the desired results.

In contrast to personality features, competences relate to a high degree to concrete situations which call for their application. The possession of competences can only be measured in context. In what manner will the e-assessment procedure be undertaken in order to capture the competences and/or personality features of individuals? It will either be based upon the established paper-pencil form, or new tests will be developed against the background of a firm's specific understanding of competence. In the latter scenario, the firm would firstly determine precisely what its requirements were in terms of relevant competences which every staff member should possess [5]. A new requirement analysis would not need to be carried out for every new appointment. Corresponding approaches are based on extensive algorithms, whereby various competences are placed in hierarchic relationships with one another and a different weighting of the expression of competences follows. Such an approach that leads to the forming of statistical opinions is to be distinguished from concepts which seek to capture the entirety of a person (the clinical process of forming opinions).

4   Case Study of the Application of E-Assessment

Based on an actual case study of a large energy trading company, the difficulties of the use of new e-assessment forms as an attribute-oriented selection process are demonstrated. Over the course of a project, running over several years, an e-assessment tool was developed. In contrast to the classic online methods, this new form of e-assessment uses test landscapes and the development of short stories. Cover stories involve a gradual construction of drama and should leave a holistic impression on test persons, with potentially a meaningful impact. Various interrogation methods are assigned to particular objects of the test landscape, and the test persons are guided by a virtual test leader. Characteristic of this new form is a stronger use of media-specific conditions, manifesting in experience-driven question elements such as reaction tests or movement-related tests, together with multimedia extras in classic questioning. Through a real-time, standardised and self-explanatory reporting system, the test persons receive prompt feedback about their results. There is simultaneously an orientation towards DIN 334340. By means of this new concept, the firm strives to enhance its image through an applicant-orientated test. From the perspective of the test persons, these new forms are of interest due to their aim of reducing anxiety of the tests, increasing test motivation, individualising the length of the test, reducing the experience of strain, as well as enabling faster feedback. Firms pursue these goals in order to increase social acceptance of the test procedure.

First the occupational orientation of the test persons is determined. When they move about in the test landscape and take a virtual tour of the firm or its departments, they can choose between the various test modules. For example: (1) Figural intelligence: the test persons proceed in a knowledge management course by inserting an object in a door lock. (2) Arithmetic intelligence: this form of intelligence is examined, for instance, when the test persons must find a particular poster in a poster display which reflects requested data. (3) Mechanical-technical understanding: the test persons must solve particular tasks in order to progress through an obstacle course. (4) Memory capacity: the test persons should note various paths within the building and between the buildings which are shown briefly. (5) Performance motivation: the LMI-test is used for this and a depiction along the lines of a paper-pencil test follows (answers through clicks). (6) Concentration/ attention: the test person is confronted with dangerous situations and a role-playing adventure game in the test landscape (e.g. dust which shouldn't be breathed in). (7) Learning potential: short stories are presented, for instance, about which test persons must later answer questions. (8) Fear of texts/exams: situations will be portrayed which typically trigger fear, ending with an evaluation via a fear thermometer "How scared are you at this moment?" (9) Stress management: short stories will be introduced as situational impulses. Questions are subsequently asked.

It appears plausible that, through the implementation of this form of e-assessment, social acceptance rises compared with conventional forms of e-assessment, but this must be tested. Empirical studies generally indicate that the acceptance of internet-driven personality tests is comparatively high. It must furthermore be clarified whether the validity of the test results is influenced through test persons having a relatively large amount of freedom to choose their tests. There are no consistent research results as to whether paper-pencil tests or internet-supported tests lead to better results [6]. The test case has also highlighted the danger that primarily those competences will be rated as significant for competence measurement, in respect of which approved tests are already available. The existence of, for example, the competence for self-regulation, entrepreneurial competence or technical competence is not examined in this case study. On the other hand, it could be claimed that the points dealt with here mostly concern key qualifications. The results of Müller [8], which could not be confirmed, indicated that possessing key qualifications, such as performance motivation pursuant to LMI inevitably leads to improvement in the employment situation. Finally it should be noted that, in the context of the tests, personality features are predominantly measured. These features are comparatively stable over time and only change to a limited extent. The results of such tests offer little indication at present as to how the test persons may further develop their competences.

5   Conclusion and Outlook

The advantages and disadvantages of computer-aided diagnostics should be taken into account for their professional application. The following disadvantages may arise: high purchase costs, additional expenditure through the creation of an infrastructure, software-ergonomic deficits, hardware and software non-compatibility, high costs

through long dial-in times, low quality of e-assessment concepts (e.g. often simply 1:1 replication of paper-pencil tests), out-of-date content and unsuitability of the norms (see DIN 33430), inflation of applicant numbers, unsecured access of the test persons with the computer, direct contact with the applicants taking place relatively late, and abuse or dissemination of model answers.

The advantages include: savings of time, space, material and personnel, increased independency of time and place constraints in carrying out the tests, more precise recording of time, greater flexibility in the possibilities for constructing the test, valid results and better security against error, greater neutrality and objectivity due to removal of the test leader effect, image benefits as an attractive employer, real-time analysis of results and quicker feedback, as well as higher acceptance through greater consideration of the needs of the test persons. The degree to which the advantages and disadvantages of e-assessment are manifest is dependent upon how e-assessment is deployed and embedded organizationally. The latter point is central task for the future utilization of e-assessment.

In light of the current level of experience it becomes clear that use of the e-assessment procedure at present is only partially able to contribute to overcoming central challenges which arise in relation to the professionalization of competence development (e.g. competence transfer, evaluation of competence development). Against the background of the current usage of the e-assessment procedure, the pre-selection of applicants is in the foreground.

The demands that will be made of staff in the future are for many reasons increasingly more difficult to predict with precision. At the same time, the scientific debate presumes that a precise determination of competences is only possible if the demands on the (potential) staff members are available in a specific form. This insight confronts the application of the e-assessment procedure with huge challenges. Moreover the e-assessment procedure at the level of the test persons can lead to an intrapersonal contradiction: people 'slip' into the role of an object under examination and/or they experience it as such. However later on in working life they will be expected to act entrepreneurially and on their own authority.

The following research questions are for consideration in the further scientific debate: how can internet-based procedures in the strategy of personnel recruitment and human resource development be better integrated? How high is the unintentional drop-out rate of competent applicants during e-assessment processes, who would be of interest to the firms? Could the results of e-assessments provide a foundation for the construction of skill or competence databases in firms? To what extent can the results of e-assessments be relevant to the employees of the HR department, managers, directors and the individuals themselves? How can/is the connection between the (relevant) competences of individuals and the firm capabilities considered? Under what conditions could the results of e-assessment provide the foundation for organization and control of competence development at the level of the firm and at the level of the individual? Depending on the answers to these questions, the next step is to elaborate the requirements in respect of the use of the e-assessment procedure.

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