Evidence Based Management for Bologna Process Support

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**Abstract**

In the paper, author explains the evidence based management approach application for university education process audit and accreditation. The Bologna Process encourages universities to implement the National Qualification Framework, and student learning outcomes development. Author shares her own experiences and argues that learning outcomes provide the evidence of quality of educational processes. The paper aims to present that evidence based approach results in university education ontology development. The paper supports the methodology for evidence gathering at universities.

**Keywords:** Evidence Based Management, Learning Outcomes, University Audit, Accreditation, Protégé Ontology.

1. **Introduction**

For years, evidence based (EB) approach has been developed in medicine, dentistry and public health. According to Trinder and Reynolds, this approach has been adopted in other fields, i.e., social work, education, social politics and human resources management [11]. EB practice proponents claim that the approach results in the resource usage controlling. They add that EB practice is developed, because otherwise the professionals would rely on a range of less reliable indicators, i.e., knowledge gained during trainings, prejudice and opinions, outcomes of previous cases, fashions, advices of senior and other colleagues, observations done in other countries or in other social environments. The opponents have argued that EB practice is overly simplistic and constraints professional autonomy. The article consists of three parts. Firstly, the author provides discussion on EB approach and on the characteristics of evidence. Next, the author considers student learning outcomes according to the Bologna Process and the National Qualification Framework ideas, particularly focusing on the situation in Poland. This part of the paper covers the ontology models. The third part includes discussion on learning outcomes evidence as useful for university education stakeholders, i.e., students, academic staff, potential employers, and university accreditation institutions. This part concerns the audit evidence procedures for further improvement of university education methods and outcomes.

2. **Evidence Based Practice**

Evidence based practice is considered as a scientific approach, which is justified in terms of sound evidence based upon a process of methodical research, evaluation and utilisation of the research findings in decision making. Evidence is factual knowledge that supports or casts doubts on the hypothesis. Evidence is facts that allow people to justify their opinions or explain their attitudes, their proposed solutions and answers to questions. Evidence is the object or substance of what is advanced to support a hypothesis that something is true. That is why an evidence is different from information, data or facts [1]. In law, evidence is identified with a proof of a fact or condition. It is collected to support a claim that something is true. It is intentional and purposeful, but evidence is never waiting to be found by the researcher. There is always the question for whom is the evidence, according to which criteria and in which context the evidence is analysed.

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Evidence based management at university means making decisions about the management of university courses, learning outcomes, teaching staff efforts, and administrative staff and students' work through conscientious and explicit use of four sources of evidence: scientific evidence, organizational evidence, experiential evidence, learning outcomes evidence as well as organizational values and stakeholders' concerns. Generally, evidence should always be located within a dialogue among those who seek to reach agreed-upon conclusions [1]. The meaning of evidence should be recognized in the overall context, in which the evidence is presented. The individual pieces of evidence should be interconnected and mutually reinforce one another. At the university, the evidence-based management is an iterative and incremental improvement process. The decision on what is or what is not an evidence requires iterative approach. Using the education consultancy and university operational audit as a basis raises the problems of selectivity of knowledge and expertise. The auditors' and consultants' expertise must be up to date and well grounded in the most recent research evidence. Therefore, in the process of evidence selection, an action research approach seems to be the most suitable. According to Kemmis and McTaggart, the action research involves the use of qualitative, interpretative modes of inquiry and data collection by teachers [6]. The research is oriented towards improvement of the teaching practices. Primacy should be given to teachers' self-understandings and judgements. The emphasis is on practice and on the sense of practical reasoning about how to act rightly and properly in a situation with which one is confronted. If university researchers are involved as consultants, their role is a service role to the teachers. Such university consultants are often advocates for teachers' knowledge and they seek to diminish the relevance of more theoretical discourses [6].

3. Evidence in Educational Process

Discussions on applicability of evidence-based approach for university management should include the requirements of the Bologna Process. Therefore, each university ought to implement European Credit Transfer System (ECTS), European Qualification Framework (EQF) and National Qualifications Framework (NQF). NQF is an instrument for the classification of qualifications according to a set of criteria for specified levels of learning achieved, which is developed to integrate and coordinate national qualifications subsystems and improve the transparency, access, progress and quality of qualifications in relation to the demand on the labour market [5].

The traditional emphasis on factual knowledge provided by universities no longer meets the requirements of a changing society. The word "competence" is more attractive for both educators and employers, because it is easily identified with value capabilities, qualifications and expertise. Competence is defined as knowledge, skills and attitudes. It is the proven ability to use knowledge, skills and personal, social and methodological abilities, in studies and in professional and personal development. In the context of EQF, competence should be described in terms of responsibility and autonomy. Simultaneously, universities defined the learning outcomes, which are also expressed in terms of knowledge, skills and attitudes (KSAs). Beyond KSAs model, there are some other similar models, e.g., Knowledge, Attitude, Skills and Habits (KASH) model [3], and Knowledge, Experience, Skills, Aptitude and Attitude (KESAA) model [10].

Generally, universities in Poland have implemented the KSAs model. In this model, knowledge should not be identified only with understanding. Understanding represents the intellectual capability to use information in a sensible and meaningful way. The information from observations, personal experiences, beliefs and prejudices in everyday life are also referred to as knowledge. Skills are associated with activities like problem solving, reasoning, assessing, concluding and they include the mental process of analysis, synthesis and evaluation. The cognitive skills are observable in practice, but social competences, i.e., attitudes, are revealed in student behaviour. In EB approach to the university education management, the learning outcomes are the most important drivers of the educational process and as such they require evidence. The KSAs learning outcomes are specified in university
program of studies as well as in the individual course description cards. The concepts in the course description and the relationships among them are presented in Fig. 1.

According to Fensel [4], ontologies are developed to provide a shared understanding of certain domains that can be communicated between people and application systems. Ontology of the university course is applied to represent the semantics of structured information for further automatic support of acquisition, maintaining and accessing information. The ontology is to facilitate the construction of a domain model. The ontology covers a vocabulary of terms and relations in the university education domain. The ontology is visualised with Protégé tool, which is to assist in the construction of large knowledge bases [8]. The key concepts of a university course (i.e., sub-classes in the ontology model) are as follows: code, title, keywords, content, language, objectives, custodian, tutor, prerequisites, learning outcomes, status, references, education level, teacher's requirements, students' grading, didactic methods. Course tutor is characterized by name, department, field of study, projects, publications, faculty to which they are affiliated. The teacher requirements concerns hardware, software, and group size. Learning outcomes are divided into three groups, i.e., knowledge, skills and attitudes. Course status means that the course can be mandatory for field, mandatory for specialization, or just optional. Course references can be treated as recommended or optional. The courses are provided to students on Bachelor or on Master level. Course prerequisites established by course tutor are usually accepted as recommended or compulsory. Student grading requires the establishing of assessment techniques and assessment criteria. The applied educational methods are divided into learning methods and teaching methods. Student learning outcome (SLO) describes what a student is expected to learn as a result of participating in academic activities or experiences [2]. Sometimes, beyond SLO, student progress outcome (SPO) is developed to reflect student progress in course sequences and in degree programs. Examples of direct assessment techniques usually applied at universities comprise the use of written communications, project work, portfolios, grading system with rubrics, theses, reflective essays, and performance assessment. Examples of indirect assessment methods are surveys of employers, comparison with peer institutions, surveys of past graduates, retention rates, analysis of curriculum. The challenge for teachers is to ensure the alignment among teaching methods, assessment techniques, assessment criteria and learning outcomes. Taking into account the requirements of the Bologna Process, course mentors develop formative and summative assessments. Formative assessment is described as
an assessment for learning. It helps to inform the teacher and the student as to how the students are progressing. Formative assessment is usually introduced at the beginning of a programme and it is a part of the teaching process. Summative assessment is to summarise student learning at a point in time. The use of summative assessment enables a grade to be generated that reflects the student's performance.

The science learning outcomes determine the discipline, i.e., field of study, learning outcomes, which are the premise to further specification of the student learning outcomes (SLOs) that are included in the course description card. Taking into account the SLOs, the teacher formulates the course objectives, course contents, references and methods of student work assessment. Course contents determine teaching hours and student individual work, i.e., learning hours. Beyond the SLOs and data provided by the teacher for the course, the evidence concerns the student work assessment.

Student learning outcomes must be monitored, registered, evaluated and stored in a documentation computerized system. The student learning outcomes are an evidence of education process realization. The simplified process of student learning outcomes realization includes the following phases:

- defining the program and plan of studies, and simultaneously defining the student learning outcomes,
- aligning course components with learning outcomes,
- selection and implementation of assessment methods,
- evaluation of evidence gathered in the assessment activities.

The student learning outcomes are defined as specific, observable behaviours evidenced by students who have achieved the educational objectives. Student learning outcomes are established operationally by teacher and they describe the observable evidence of student's knowledge, skills and social competence. The student learning outcomes are evidencing educational objectives. The course curricula and programs of studies should be designed to meet university strategy, program goals, and educational objectives. Course assessment methods and instruments are selected by teachers and university administrative staff for gathering evidence to show whether students have achieved the expected learning outcomes related to program objectives. Assessment methods should be meaningful, manageable and sustainable. They are selected to show whether students have achieved the expected learning outcomes related to educational objectives and goals.

Development of an appropriate typology of KSAs is important in promoting student mobility as well as labour mobility in three senses: vertical as in career progression, horizontal as in movement between sectors or among university specializations, and spatial, as in mobility in the extended European Union [12]. Generally, the acceptance of qualifications and competences is realized at universities in two ways:

- social approval: acceptance of competences by organizers of socio-economic events,
- formal approval: acceptance of competences through diploma, certificates, ECTS points' transfers, and courses' validations.

Some examination processes are realized centrally, even on national levels, but the most of the examination process is realized offline. University e-learning platform, i.e., Moodle is applied as compulsory communication tool for teachers and students. Always, because of the university audit requirements, the teachers responsible for the exams should collect examination results, student portfolios and benchmark assignments embedded in regular classes and scores by teams of faculty teachers employing specially designed scoring guides [1].

The universities should ensure the necessary technical tools and consultancy to simplify assembling different items of assignment works and to enable the integration of student works into a coherent personal portfolio. Students usually complete and submit their portfolios during their studies, particularly during their Master studies. Evaluation and scoring of the portfolio can be done by a team of faculty teachers working as a commission. Simultaneously, they participate in faculty strategy development and campus discussion. A portfolio includes works demonstrating: 1) critical thinking and writing, 2) interdisciplinary thinking, 3)
historical analysis, 4) creative work and reflection. Students can be requested to present the most personally satisfying works and add the cover letter to the portfolio as well as the learning experience questionnaire [9]. Student competence portfolio is developed as a certain portrait of student capabilities. It makes it possible to check what has learnt to date and what needs to be improved. Portfolio encourages teachers to focus on student outcomes, provide potential employers and the community with credible evidence of student achievement, and inform governmental institution about the university education system.

![Fig. 2. Protégé ontology model of the apprenticeship.](image)

Student's portfolio can be enriched by the results achieved during apprenticeships and internships. The learning outcomes achieved in apprenticeship process have to be cohesive with the learning outcomes in university educational process. Student-apprentice is responsible for the specification of learning outcomes, apprentices' recipient, apprenticeship plan and report (see Fig. 2). During the apprenticeship, student is evaluated in the following aspects: promptness, regularity, punctuality, neatness, availability, responsibility, team work ability, independence of work, commitment, orderliness, effectiveness and friendliness (see Fig. 2). The presented above ontology models are topic maps, which are solutions enabling the representation of complex structure of knowledge and delivering useful models of a knowledge representation. Topic map is a semantic graph that contains definitions of a set of topics and a set of associations between topics. Topic map permits to reveal hidden knowledge concerning hierarchical and semantic dependencies. Visualization in the topic map permits interactive retrieval of information, taking into account semantic dependencies among different topics [7].

4. Recipients of University Education Evidence

According to the Bologna Process, student learning outcomes (SLOs) present what a student is expected to learn as a result of participating in academic activities and apprenticeships. Beyond SLOs development process, universities focus on student progress outcomes (SPOs), which reflect student progress in a given course sequence. SPOs provide indirect measures of student learning, as well as describe the outcomes of the programs that students themselves may consider to be most important [3]. The SLOs assessment process is to directly involve all faculty staff who teach courses being assessed in the accreditation process itself. The course
outcomes should be assessed using the same methods regardless of where or how the course is taught. The faculty teachers give grades to students, but the works selected for assessment in the accreditation process are evaluated basing on student learning outcomes. Therefore, it may be required to analyse and compare the student learning outcomes (SLOs) with student progress outcomes (SPOs). The student learning outcomes are the subject of interest of different groups of stakeholders (see Fig. 3). For students, the SLOs will:

- communicate clear expectations and form an evidence about what is important in a course or program of studies,
- inform them that they will be evaluated in a consistent and transparent way in the aspect of pre-specified learning outcomes,
- allow them to choose courses taking into account their outcomes [3].

According to Fig. 3, learning outcomes evidence has an impact on students, teachers and administrative staff at universities as well as on relations among these stakeholders and their attitudes towards SLOs development. For faculty teachers, participating in student learning outcomes development process, SLOs will:

- help them to determine what is and what is not important in their courses and programs,
- facilitate valuable interdisciplinary and multidisciplinary considerations and inter-institutional discussions among academicians,
- provide evidence to justify needed resources to maintain or improve course syllabus and program of studies,
- allow teachers to recommend the course for other students and to explain the value of the course to the Faculty Boards, University Rectors, other institutions, potential employers, university administration and sponsors,
- ensure that all faculty teaching staff providing any courses agree to address certain content specified in course syllabus, and they will work to distribute the defined knowledge and take care to receive the pre-specified outcomes.

For university administrative staff, collecting the evidence of student learning outcomes and outcomes assessment will permit to:

- demonstrate an institutional commitment to continually improving the university programs and services offered by the university,
- provide valuable evidence to support requests for funds from state government and private donors,
- demonstrate responsibility and accountability for the courses provided by the university,
• provide valuable evidence for university planning and decision-making on educational processes and university procedures,
• enable administrative staff to inform elected officials, local businesses and potential donors about the impact of SLOs on university students and on academic staff in a very compelling and convincing way.

Financial support and scientific development of universities strongly depend on the evaluation provided by the central national accreditation commission. Systematic outcomes assessment and gathering learning outcomes evidence are now required for accreditation by all higher education accrediting organizations. Through university evaluation, the accreditation commission has impact on educational processes at universities as well as on the further development of student learning outcomes. Less than satisfactory assessment results should lead to necessary improvements in programs, courses and services.

The necessary requirements for completing student learning outcomes assessment tasks at university are as follows:
• obtaining faculty consensus about the outcomes and the plan to assess them (the discipline custodians are asked to work with their faculty teachers to achieve consensus),
• establishing a committee responsible for defining the learning outcomes and informing the faculty teachers about the outcomes to ensure that they will be achieved, regardless of who teaches it or where,
• sharing outcomes with students, because they must be aware of the expected learning outcomes for the courses as well as of the courses’ objectives, contents, and references,
• usage of the results of student learning outcomes assessment for the improvement and remedy of the weaknesses [3].

Student learning outcomes regular assessment permits to systematically review the alignment between student learning, instructional or institutional expectations and instructional activities. The learning outcomes should focus on what students can do instead of the effort the teacher can put into teaching. The learning outcomes ought to be aligned with the course's and program's mission. Some people argue that the outcomes specified in the program of studies are very general, however outcomes that are idiosyncratic or tied to a particular teacher's approach to a course should be avoided as incomparable. The student learning outcomes present ways of thinking, from low level identification, i.e., on Bachelor level, to higher level application of knowledge and skill, i.e., on the doctorate level. Beyond student learning outcomes, the accreditation commission should review student progress outcomes. SPOs can be evidenced in student portfolio. Evaluation and scoring of the student portfolios are done by faculty staff, who also participate in faculty development and in preparation of the faculty self-evaluation reports for accreditation commissions.

Accreditation commissions' inspections are realized once every three years. In the meantime, the faculty audit commissions evaluate the educational processes at universities. Educational resources and processes auditors are appointed by the faculty dean. Mostly, they are interested in gathering appropriate evidence, which covers physical examinations (i.e., teachers’ inspections), confirmations, documentations, inquiries of students, and auditor's observations. Confirmations cover written or oral responses from an independent party, e.g., faculty commission for teaching quality management or student representatives. Documentations include reviews and examination protocols, apprenticeship reports and plans, courses syllabuses, plagiarism reports, and teachers' inspection reports, seminar and lecture lists of participants, examination and diploma works. The systematic documentation of teaching skills is needed. The documented skills are confronted with the taught courses' contents and teacher inspection reports to evaluate cohesion among them.

5. Conclusion

Nowadays, gathering student learning evidence is crucial for effective educational assessment. In the paper, the learning outcomes were presented as necessary for university audit and accreditation process. The learning outcomes, analysed in the paper, concern the
knowledge, skills and social competences that are developed throughout the programs' curricula. The traditional approach to educational assessment have relied on indirect evidence pertaining to student's self-perceptions of their learning and their perspectives on program structure and curricular contents. Nowadays, the student learning outcomes, student portfolio, departmental evaluations of students' projects and diploma theses, apprenticeship reports, and institutional and individual certificates are accepted as university identity constructive evidence. Gathering evidence should be supported by university management information systems and knowledge systems. Visualization in topic maps reveals the complex structure of knowledge sub-classes and would allow the navigation from topic to topic in a highly interactive manner.

References