

DO MOTIVATION POINTS FOSTER BETTER FINAL EVALUATION IN THE SUBJECT OF "LAW IN MEDICINE"?

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Abstract

Introduction:

The subject "Law in Medicine" is designed for students at the first year of the 2nd degree of Nursing and is realised in form of a lecture (25 hours) and seminars (10 hours). Seminars that were devoted to the subject of civil, criminal, employee and professional responsibility of a nurse were completed with an oral exam. Students answered two open questions and then analysed a study case. There was, however, a possibility of being released from this part of an exam. During each of the five seminars, it was possible to achieve between 1-3 points for substantive activity during classes. Collecting 10 points released a students from having to take an oral part that preceded the final test (e-test). Using a motivating system based on points for active participation in seminars is one of the methods that foster systematic work in students throughout the whole semester. However, for such a solution to fulfil its role, it should be characterised by objectivity and reliability.

Aim of study:

Comparative analysis of compliance of educational measurement based on the system of motivating points and the results of an oral examination against a summative evaluation achieved for solving a final e-test.

Materials and Methods:

Snapshot data of 152 students of Nursing at the 2nd degree studies qualified for the study; students participated in the class "Law in Medicine" at the Faculty of Health Sciences, Medical University of Warsaw (MUW) in the academic year 2014/15. Two subgroups of students were identified: students released from an oral exam on the basis of points for being active (group 1, N = 95); students included in the oral exam (group 2, N = 57). As a comparative criterion determining the quality of motivating evaluation / oral exam, the results of test comprising of MCQs (multiple-choice questions) were used; the test was generated using an ASK Systems platform designed to be used in e-evaluation. Each student participating in the final exam could choose one of the 11 available dates. For each round of examinees, there was a unique set of 30 MCQs drawn from the database of 200 questions. To increase the control over independence in solving tasks within the test set of questions, they were presented randomly with variable sequence of individual options.

The analysis was performed using correlation gamma statistics. The calculation was done in a software package STATISTICA 12.5 (StatSoft©, Inc.) according to the MUW licence. For all analyses, the a priori level of significance was established at 0.05.

Results:

For students from group 1 there were no statistically relevant dependencies between the degree of activity during educational classes and a result achieved by a student in the final exam (gamma statistics = -0.12, P > 0.05). Whereas in group 2, it was observed that evaluation in the oral exam correlates significantly with the number of points achieved by a student in the final e-test (gamma statistics = 0.25, P = 0.046).

Conclusions:

A high degree of subjectivism concerning evaluation of students' activity in classes is fostered by a situation where people insufficiently prepared are accepted for the final exam. Results of correlation

analysis allow to assume that the oral exam that precedes the final exam in form of an e-test is much more reliable than the system of motivating points.

Keywords: e-assessment, oral exam, educational measurement, summative assessment, motivation to learn, outcome-based education.

1 INTRODUCTION

The subject of "Law in medicine", aimed at students of the 1st year of studies of the 2nd degree at the faculty of Nursing was realised as a 35-didactic hour course in form of lectures (25 hours) and seminars (10 hours). The students were obliged to prepare for the seminars, however they had an option of doing it individually or as a group. Except for the time (2 hours) and the maximum number of students (25), the teacher had not other guidelines concerning the procedures, and the description of the subject in the didactic guidebook was limited to the description of the class themes.

In the academic year of 2014/2015, passing the subject of "Law in medicine" covered two stages. Seminars were completed with an oral exam and there was also a final test to be performed. During the oral test, there were two open questions to be answered and there was also a case study to be analysed. There were between 1 and 3 points to be scored during the oral exam. There was, however, another possibility – a student could have been excused from this part of the exam. During each seminar (there were 5 sessions in total), students would receive between 1 and 3 points from their academic teacher for active participation in the classes (participation in the discussion). Collecting 10 points excused the student from the oral part of the exam. All students who positively passed the seminars were allowed to take part in the final e-test. The test included content that was discussed during lectures and was prepared on the electronic *ASK Systems* exam platform.

Interactive group learning is a frequently used method of education in teaching specialists in the field of Health Sciences [1]. The seminar is an example of an interactive method of group work, defined as "a learning session in which a group of some 25 students discuss questions and issues emerging from assigned readings on a topic of practical relevance and is facilitated by a content expert" [2]. Such a method of teaching complies with the constructivist concept, where "deep learning approach" is based on active engagement of a learning person into the course of discussion moderated by the teacher [3]. Through asking questions and interacting with other participants, a student creates a cognitive framework for the topics discussed during classes, which he will be able to apply in new situations, e.g. during his future professional practice [4, 5]. Enrico Ferrari found that teaching with seminars in nursing education was particularly effective in promoting reflection. Seminar discussions helped to bridge the gap between academic information and practice [6]. This deeper learning is usually achieved when knowledge is not restricted to learning a collection of isolated facts, and is instead a result of an active learning process being engaged and knowledge being fully understood and retained in context by the learner. Cognitive psychology research demonstrates that understanding involves creating links, and this is accomplished through active participation of the learner and being familiar with the material in question [7].

Vast worldwide literature in the field of research into effectiveness of teaching through seminars confirms the advantages that are acknowledged by both teachers and students [5, 8-13]. Seminars will serve their role well if we provide appropriate conditions in which they would be carried out. Two groups of factors belonging to the domain of "student" or "teacher" are of importance here. In the first group, the level of motivation for a student is listed and his active engagement in a discussion. According to students, motivation depends on aspects like the subject under discussion, the timing of the seminar in the day and the amount of contact time on the same day. Student behaviour during the seminar also influenced the learning process [8]. Also the degree to which students are prepared has influence on the quality of the seminars: "If all students come to the seminar well prepared, discussions are broader and more in depth" [8, 9]. In the domain of factors connected with the teacher, there are, for instance, the quality of didactic materials and presenting special competences by the teacher: questioning, listening, reinforcing, reacting, summarizing, and leadership [8, 9]. Seminar teachers themselves added that they thought they have an important role in helping students identify gaps in their knowledge, ensuring that learning objectives are reached, and being aware of the placement of the seminar in the course and curriculum so they can estimate the knowledge levels of the students [9]. According to a qualitative study on seminar learning it is assumed that students' extent of preparation will be a positive predictor for teaching performance because the seminar teacher is expected to fulfil his roles better with students with more prior knowledge [9]. We also expect that content will be a positive predictor for teaching performance because of the positive

associations that were found between the content and teacher performance in an earlier study on seminar learning [2].

In comparative observational case studies, Lisa Tsui found that seminar discussions were more effective than lecturing if the goal of teaching was critical thinking and problem solving [14]. Critical thinking was defined as students' ability to identify issues and assumptions, recognize important relationships, make correct inferences, evaluate evidence and come to conclusions. Seminars can, but do not always, help students become active and reflective. Paul Ramsden described possibilities but also problems associated with seminars, such as when students have not prepared, do not take part in the discussions and only respond to questions or want to be given solutions rather than discussing them [15]. Other problems may be teachers not letting students talk and giving lectures instead of being genuinely interested in helping students learn in the seminars. A clearer understanding of the complexity of learning in seminars is needed [16].

Success in educating using a method of seminar depends greatly on the quality of didactic materials, the level of student's preparation and his engagement in the discussion moderated by the teacher. Small seminar groups is seen as an asset by students themselves. In a qualitative study performed by Spruijt et al., a participant of a focus group claimed that "*I really learn more in a seminar when I participate actively and know what I'm talking about as a result of good preparation for the seminar*" [8]. Therefore, the increase in the tendency to a greater intellectual effort during a seminar may result in a better understanding of complex issues that are part of the subject such as "Law in medicine". Applying a motivation system in form of extra points for active participation in seminars is only one of the methods that should favour systematic work of the students throughout the whole semester. For such a solution to serve its purpose, it should also be characterised by objectivism and reliability apart from being motivating.

The aim of the work was to analyse comparatively the compliance of educational measurement based on the system of motivating points and the results of oral exam as opposed to the total score obtained for the e-test that crowned the subject of "Law in medicine".

2 MATERIAL AND METHODS

Snapshot data of 152 students at the Nursing Department who participated in the classes of "Law in medicine" at the Faculty of Health Sciences at Medical University of Warsaw (MUW) in the academic year of 2014/15 were qualified into the study. Two sub-groups of students were extracted: students released from the oral exam on the basis of points for their activity (group 1, N = 95); students included into the oral exam (group 2, N = 57). As a predictive criterion that would determine the quality of motivating grade / oral exam, the result of the e-test was accepted, thus providing a grade that would summarise the subject. The test comprised of MCQs (multiple-choice questions) generated using an ASK Systems platform designed to perform e-evaluation. Each student participating in the final test could choose one from eleven available dates. For every round of candidates, there was a unique list of 30 MCQs drawn. In order to increase the control over independent work on the tasks, questions were presented randomly and in a changeable order for individual options.

The comparative analysis was performed using correlation gamma statistics and non-parametre U-Mann-Whitney and ANOVA Kruskal-Wallis tests. Calculations were performed in a statistical set of STATISTICA 12.5 (StatSoft[®], Inc.) according to the MUW licence. For all analyses, the relevance level assumed *a priori* was $\alpha = 0.05$.

3 RESULTS

For students from the 1st group, there were no statistically significant dependencies presented between the degree of activity during educational classes and the result obtained by a student in the final test (gamma correlation statistics = -0.12 , $P > 0.05$). Whereas in the 2nd group, it was observed that the grade in the final oral test significantly correlates with the number of points obtained by a student in the e-test (gamma correlation statistics = 0.25 , $P = 0.046$). Detailed results of the correlation analysis were presented in Table 1.

No statistically relevant differences were discovered while comparing the score of students released from the oral exam (group 1) and divided according to the degree of activity during the seminars (U Mann-Whitney test: $U = 998.5$, $P = 0.344$, Fig 1) obtained in the final test. Also while comparing the

score obtained by the students divided according to the grade for their oral test (group 2), there were no significant differences (ANOVA Kruskal-Wallis test: $H = 2.889$, $P = 0.236$, Fig. 2).

Table 1. Correlation analysis of the oral exam score or score for being active during the seminars contrasted with the grade obtained in the final e-test

Correlations	N	γ^*	Z	P^{**}
Activity during the seminars vs. e-test result	95	-0.12	-1.207	0.228
Results of the oral test vs. e-test result	57	0.25	1.993	0.046

* gamma correlation coefficient

** gamma correlation statistics

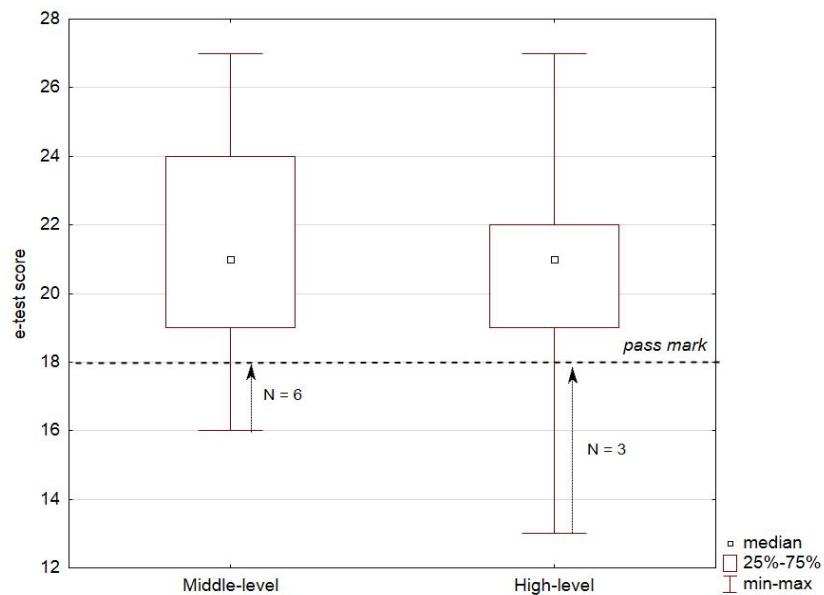


Figure 1. A comparison chart of the final e-test results for students released from the oral exam and divided into sub-groups according to the level of activity during the seminars

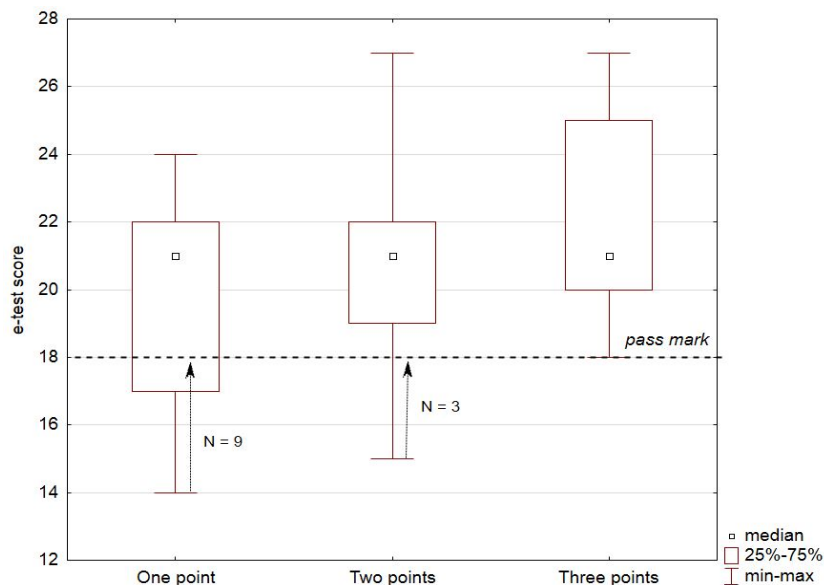


Figure 2. A comparison chart of the final e-test results obtained by the students who presented low activity during the seminars; there were sub-groups of students according to the score obtained in the oral exam

4 DISCUSSION

The problem of low motivation level in students in terms of active learning is seen at every level of education. Terrel Bell put the point emphatically: *“There are three things to remember about education. The first is motivation. The second one is motivation. The third one is motivation”* [17, 18]. Educational institutes rely on students to prepare for classes, assigning study material or independent work continually. Teachers and educational institutes try to enhance student preparation for example through providing study guides [19]. It is assumed that preparation for educational sessions is associated with improved academic achievement [20]; it is acknowledged to facilitate understanding [21] and to increase participation in class [22], which is known to enhance learning [23, 24].

Lack of motivation or its very low level is particularly visible in the quality of classes that require preliminary preparation on part of the student, followed by active participation in the classes. Laboratory or clinical classes and seminars require an appropriate level of motivation and engagement from students. As can be seen from the results of qualitative research carried out among academic teachers, the degree of preparation among students is seen as a key element which decides about the effectiveness of this educational method. As stated by Spruijt et al.: *“Sometimes it is not possible to have in-depth discussions, because students have not prepared properly, and consequently do not know enough about the subjects and/or are unable to discuss it”* [9]. Similar opinions are expressed by students themselves [25]. This problem does not only concern students of medical faculties, but also other directions, e.g. economics or psychology [26, 27]. The ratio of students who do not prepare for classes remains between 30-50%, although there are no data in this area [28]. Teachers apply various methods of dealing with the problem of students not being prepared for classes. One of them is giving penalty points for a weak score in a pop-up quiz or a motivation strategy in form of extra points. Practical ways of motivating students to undertake some effort connected with preparing for classes may take a form of a punishment or positive reinforcement (“carrot and stick approach”) [29]. It needs to be emphasised that qualitative research carried out on students and concerning their grade of effectiveness of various motivating methods provide inconsistent data [10].

In accessible literature, there are practical indication as for how to increase the students’ activity. Edmunds & Brown [11] and Dennick & Spencer [30] provided some simple, effective methods for encouraging students to interact and co-construct knowledge by using different facilitating methods. Using motivating points is one of the ways in which students’ activity may be increased during seminars, which also, as a result, increases mutual interactions between students. Additionally, organising smaller sub-groups within a 25-people group, confronting opinions, creating conditions that would allow a debate are just some of the techniques that may increase the attractiveness of classes and thus their effectiveness. Moreover, as everyday academic practice shows, the strongest motivating factor for students to learn and actively participate in classes is the deadline of a final exam. The form in which the range of topics is included in the final exam also, to a large extent, influences motivation and active participation of students during seminars or exercises [17].

Efficiency of the undertaken motivating activities may be verified by, for example, independent, objective and reliable evaluation of the achieved learning outcomes, which is performed after the educational classes have been finished. Literature presents also other ways of assessing effectiveness of seminars, through applying the method of regression and using a dependent variable in form of teacher’s score or a mark given on the basis of the results of a standardised psychometric scale [2, 29]. A two-stage system of evaluating effectiveness was suggested by de Jong et al., who used primary outcome in their study: test comprising of 10 MCQs, 20 extended matching questions (EMQs) and two problem-solving questions of open type, and secondary outcomes: two types of a survey built on open questions on Likert scale [31]. In this work, however, as a reference point, only students’ results obtained by them in a test comprising of 30 closed questions in MCQs were assumed. Such a test has all the required features, important when collecting reliable results of an educational measurements [32, 33]. Both e-assessment and paper-and-pen one are a frequently used method of evaluation in academic teaching [34]. Using score gained by a student in an e-test as parameter of an independent variable of educational achievements, it was discovered that in case of an oral exam, there is a statistically relevant compliance of both measurements. Also the fact that students who gained a maximum score in their oral exam and had no problems with a positive passing of an e-test draws attention. This observation confirms the fact that both tests sufficiently verify students’ achievements in the field of “Law in medicine”. On the other hand, the analysis of correlation of score obtained for activity during seminars contrasted with the results of a final e-test shows no compliance of these two educational measurements. Also, it was observed that students who achieved high score for being active during seminars, achieved on average, similar results as students

with low level of activity. Lack of differences between these two groups suggests that the measurement of students' activity using extra points is not a relevant predictor of success in the exam. One of the potential reasons of such a result, may be subjectivity and arbitrariness of score given by a teacher who conducts seminars. Mere feeling of a student being prepared for classes and actively participating in a discussion does not equal his sufficiently mastering the material taught.

The results of empirical research concerning effectiveness of seminars are not always confirmed by partial observations of scholars [29]. As the results of the multiple regression analysis concerning the influence of many factors, including the degree of preparation of students to classes and the level of mutual interaction between the participants of the classes and show, they are not fully compliant with the intuitive assumptions. Surprisingly, a finding that students who are better prepared (spent more time preparing), achieved good results in a test to a less degree (teacher's subjective score) than students who prepared less (regression coefficient = -0.055, $P = 0.028$) [29]. The reason for this result can be that some teachers give too much attention to unprepared students during seminars, thus compensating for the students' lack of preparation by reviewing the preparation materials; therefore, deeper and more elaborate discussions on the subject matter can be missing. This can demotivate well-prepared students and be reflected in teaching performance scores [8, 28, 29]. The results of the same study also show that the influence of interaction between the participants of seminars and the effectiveness of such classes (regression coefficient = 0.418, $P < 0.001$) [29]. This observation remains in accordance with other authors [35-38], although it is also contradictory to the results obtained by Jaarsma et al. [2]. A possible explanation for students relating good teaching performance with the ability for group interaction can be that students in this study have gained insight in the ideas behind seminars because the institution communicates the educational philosophy of the curriculum that states the importance of active learning and group interaction [29]. Both Astin [39] and McKeachie et al. [40] found that co-operative student-student interaction and student-faculty interaction were important in encouraging critical thinking and influenced students' academic and personal development. Furthermore, constructive activity within groups and the quality of group interaction were identified as strong predictors of student achievement by Webb et al. [24]. Considering the above, it seems that a much more important pro-quality factor is an appropriately high level of students' activity, which is connected with the increased interaction of the participants of seminars than the mere level of preparation for classes. Perhaps it would be a reasonable solution to combine the two methods, join verifying the degree of preparation for classes with the system of motivating points. Assessment can focus on student preparation for the seminar, student reflections or writings following the seminar, or participation in the seminar itself [41]. Moreover, introducing a variety of techniques that increase the level of mutual interactions between students and also introducing elements of problem-solving teaching, may effectively increase the effectiveness of seminars. Such multi-dimensional approach to the problem is justified by the fact that the efficiency of teaching is of multi-factorial character and no individual element can be treated as an independent predictor of educational success.

5 CONCLUSIONS

A high degree of subjectivism concerning assessment of students' activity during classes is provoked by a situation in which a final test can be taken by people insufficiently prepared. Bias in educational measurement is an important element that must be solved if a fair and reliable evaluation of students' achievements is to take place. Due to that fact, in consecutive years, a more objective way of evaluating students' activity during seminars in the subject of "Law in medicine" should be considered. Moreover, additional motivating elements should be considered as well as those controlling the degree of students' preparation to classes. Due to certain limitations in methodology of the presented results, the above conclusions should be applied within a limited range.

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