STUDENTS' REVIEWS IN THE PRECLINICAL COURSE – A PART OF THE EDUCATIONAL PROCESS. A preliminary report.

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ABSTRACT

The main goal in teaching of dental medicine is to support students in their seeking of theoretical and practical knowledge.

The aim of the authors is to confirm or reject the hypothesis concerning the positive effects of reviews for higher learning outcomes based on an analysis of student reviews.

Material and methods: Subject of investigation were twenty five students from two groups in the year 2012-2013 and one group in 2013 – 2014 (average 8-9 students in group). Students were asked to write reviews starting with hierarchical summarization of the textbook and including additional information gathered from internet and the library.

Results and discussion: For the period of 2012-2014 from 3 groups /25 students/ were received 14 reviews and 8 reviews were at the stage of hierarchical summarization, argument maps and selected material.

Conclusion: Analysis of results showed positive correlation between writing and the exam marks with best results in the group with the greatest activity. All students who wrote reviews even those at the project stage received excellent marks with one exception where the mark was very good.

Key words: dental education, students' reviews,

INTRODUCTION

In today's world of education where the Bologna statement is a reality and the demand to higher education is to produce capable and thinking specialists there is a growing necessity to draw attention on theoretical and practical knowledge from a wide range of subject areas in order to address the complexity of real world problems. Promoting learning across boundaries is an essential part of the process while "fragmented" attitude is detrimental to learning, practice and research [1]. Looking forward at ensuring life-long learning we have to concentrate our efforts in students' education on a combination of different educational concepts - a mixture of pedagogy, heutagogy and andragogy. The focus lies in the shift from teacher-directed to self-directed, self-organized, to completely self-determined learning, as such transformation is an essential part of the problem solving process and promoting of "life-long learning".

When discussing students' education there are two main concepts: teacher-centered and students-centered. On one hand, the traditional curricula are mainly teacher-centered. More specifically, in the teacher-centered model the information is typically delivered by the lecturer or the instructor, while at the same time the students are more passive listeners and this concept is referred as pedagogy. On the other hand, in the students'-centered model, the students are in fact the active participants in the educational process, and this concept was introduced in 1980 by Malcolm Knowles in his book "The modern practice of adult education: Andragogy versus pedagogy". There the author attempts to document the differences between the different ways adults and children learn, at the same time popularizing the concept of andragogy as "the art and science of helping adults learn", and putting it in contrast with pedagogy - "the art and science of teaching children" [2]. Knowles postulated a set of assumptions about adult learners. "His four assumptions are that as individuals mature (a) their self-concept moves from that of a dependent personality toward one of increasing self-directedness, (b) they accumulate a growing reservoir of experience that becomes a rich resource for learning and a broad base upon which they can relate new learnings, (c) their readiness to learn becomes increasingly more oriented to the developmental tasks of their social roles and not the product of biological development and academic pressure, and (d) their time perspective changes from one of future application of knowledge to one of immediate application, giving them a problem-centered rather than subject-centered orientation to learning [3, 2, 4, 5] Moreover, self-directed learning (SDL) is defined as the process "… in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes." [6].

A further development of that idea is the conception of heutagogy which is aimed at dealing with the notion of self-determined vs. self-directed, which is typical for the in andragogy learning. In fact the heutagogical approach acknowledges the necessity one to be flexible in the learning, where in fact the learner designs the actual course while the teacher is responsible to provide resources. Therefore, learners might actually define what is interesting for them, what is relevant and at the same time read around critical issues or questions and consequently discuss further reading and assessment tasks if needed. Thus, assessment and

evaluation become much more of a learning experience rather than a means, aimed at measuring achievement [7]. Moreover, evaluation and motivation are crucial and vital modules in the educational process.

Essential part of the understanding of the educational process is the knowledge of students' learning. Loyens, Gijbels and Coertjens [8] cite the paper by Marton and Säljö [9], who investigated the interaction between a student and a set learning task, and concluded that intention or approaches of the students towards the task defined the degree to which they actually got involved with their subject, and this influenced the outcomes and their quality, thus leading to the classification of "deep" and "surface" approaches to learning.

The deep approach is measured by the intent to understand and look for a meaning, to relate information to previously acquired knowledge, and to construct ideas into understandable units [9]. In order to construct understanding it is required to involve both cognitive and metacognitive elements. Basically, when learners are "constructing knowledge" they make use of various cognitive strategies, and they lead, adjust, and assess their learning and its outcomes via using metacognitive strategies (how to learn). Therefore the real learning outcomes happen via this use of metacognitive strategies and this "thinking about thinking". Furthermore, those individuals who prove an extensive diversity of metacognitive skills in reality perform better on exams and more efficiently complete their work, due to the fact that they use the accurate tool for the job. They are also able to modify learning strategies if and when needed, detecting blocks to learning, and simultaneously altering strategies or tools in order to guarantee the achievement of the objective. It is very important to emphasize that the instructors help the learners to develop metacognitively, for the reason that metacognition plays a crucial role for the successful outcome of the learning process [10, 11].

The surface approach is defined by the intention to reproduce content and memorize units of information, without making association between pieces of knowledge [9]. A typical example of surface approach is the "rote" learning, which originates from the students' intention to suggest and make the impression that a maximum learning has taken place, while in reality the facts are learnt without a meaningful framework [12]. Moreover, rote memorization is often the only as most usual learning strategy, which is embraced by the students in high-schools when they enter college [13].

Interviewing students on their everyday studying Entwistle & Ramsden [14] introduced an additional category – "strategic approach - in which the intention is to achieve the highest possible grades by using organized study methods and good time management." Strategic students focus on the academic content and the demands of the assessment system, reaching their own understanding through making connections with previous knowledge and examining evidence, while relying on memorization and reproducing [15, 16].

In this aspect assessment is an essential part of the educational process. In 2005 Birenbaum et al. [17] introduced the idea for integrated assessment systems (IAS) and defined two assessment practices – assessment of learning and assessment for learning. IAS incorporates both of them. "Key principles include that the learners participate in the assessment process and assessment is contextual and responsive." Assessment of learning is "one dimensional, summative, apart from the curriculum, but drives the teaching ('teaching for the test'), inauthentic, context independent, inflexible". Assessment of learning, i.e., summative assessment stimulates surface approach, while assessment for learning, i.e., formative assessment, addresses the needs of individual learners providing them with information about their progression and the areas where they need improvement and the ways to achieve it. Popham [18] defines formative assessment as "a planned process in which teachers or students use assessment-based evidence to adjust what they are currently doing". The main focus in this definition is process. Formative assessment supports learning, as opposed to summative assessment, which is a one-time event that takes place at the end of the course and is used to make judgments about student competence. Constructive feedback from teacher and peers in formative assessment through the means of effective questioning results in shared learning goals. Collaborating with peers, students use questions as psychological tools for thinking, scaffolding of ideas and reflection. Questioning reveals misconceptions and deficiencies in understanding. Feedback from teacher and peers fills the gaps in understanding and correct the misunderstanding [19, 20].

Supporting students' learning is not just the provision of learning opportunities and services, but it should include support, motivation and inspiration. Study skills include writing, searching for and selecting information, taking notes from lectures, revision and exam techniques [12]. Inspiring interest in studied material facilitates reflection, learning and motivation for searching information [21].

Background

Our curriculum is a traditional one. Students are studying Preclinics of Prosthetic Dentistry during their first and second year. Studied material includes dental anatomy, physiology and occlusion course, fixed and removable prosthodontics. The ratio between lectures and practical exercises is 1:4 and in the winter semester in the second year 1:6. During their practical exercises in the 2, 3 and 4 semesters students are introduced to the basic principles of technology of prosthetic restorations and fabricate the constructions, thus through traditional dental laboratory teaching of procedural skills they achieve psychomotor and professional skill acquisition. Lectures deal with theoretical concepts and principles, scaffold knowledge of technological procedures and part of the time is devoted to demonstrations for the practical exercises. Recommended literature includes the textbook, the manual for practical exercises and hand notes from lectures. Seminars are included at the end of each module. Final assessment includes practical examination where students fabricate a two unit bridge and arrange teeth for complete dentures, written and oral presentations on themes from the questionnaire and tooth recognition.

Non formal interviews with students reveal some of the problems they have when preparing for the exam. The textbook gives well structured and sufficient information, but visual aids are predominantly schemes. Lectures provide a lot of pictures, video-materials and demonstrations, but students cannot view them after their end. Low level of foreign language knowledge is a serious obstacle for finding and using other resources. Seminars are threatening because of misunderstanding the main idea of discussion, brainstorming, questioning and peer evaluation of concepts – in other disciplines they are used mainly as a tool for current assessment. Students expressed necessity for clinical relevance of the studied material which in their point of view will help them "better understand things".

How our students study? This is a question of further investigation on a scientific base, but our observations for the moment reveal a somewhat "strategic" approach to learning. This is not the strategic approach Entwistle describes. For most of the students the main study activities are during sessions. This inevitably leads to less retention of knowledge in long term memory due to overload of working memory. There are themes from the questionnaire which are extremely difficult for the students to reproduce and reflect. We can state a lot of reasons for this "strategy", some are the overweight curriculum, approximately forty hours a week, thus remaining less time for self-regulated learning; main focus during practical exercises is on technology and only a few seminars during the course to identify gaps of knowledge; relatively low level of extrinsic motivation with focus on theory - feedback provided mainly for practical performance. Often excellent students feel difficulties in verbalization their experiences during practical exercises.

Hypothesis

Our main goal as educationalists is to support students in their seeking of knowledge. Unfortunately although every one of us is a good professional in his own field we have no pedagogical or psychological education, all our knowledge is empirical. Investigating the literature dealing with education we found strong evidence of the positive impact of writing on reading comprehension. "Transforming a mental summary of text into writing requires additional thought about the essence of the material, and the permanence of writing creates an external record of this synopsis that can be readily critiqued and reworked. As a result, summary writing seems likely to improve comprehension of the material being summarized". [22] Entwistle and Entwistle investigating students' preparing for examinations stated that "final preparation for examinations depends on what they have done previously" and "analysis revision begins with students' comments on the understanding they achieved during the course itself, from lectures and other learning experiences" [16]. The role of the teacher as facilitator and promoter of knowledge is not only to provide information but to motivate students and critically evaluate their efforts in their investigation of additional sources of information and introduce them to the idea of peer reviewed literature [23].

Having this in mind our hypothesis is that writing

reviews will help students in their learning and will promote a deeper understanding and subsequently result in higher learning outcomes. We also expected all students to participate and use reviews in their final preparation for the examination.

MATERIAL AND METHODS

During the last semester when inevitably students' motivation for learning increases and questions like "where I can find…" or "can you explain us …" increase, we offered them to write reviews on themes from the questionnaire which in our observations we have found out to be difficult for them. Twenty five participants from two groups in the year 2012-2013 and one group in 2013 – 2014 (average 8-9 students in group) were asked to write reviews starting with hierarchical summarization of the textbook and including additional information gathered from internet and the library. As additional support we included scanned pages from textbooks, a selection of PPT presentations, found from us in internet and a selection of peer reviewed articles. Instruction included glossary with key words for searching and a short English-Bulgarian dictionary of terminology. Students were instructed to search PubMed portal, Google Scholar, via Google Scholar Images to main page, You Tube Educational, EBSCO which can be accessed from home. Gathered from students information was critically evaluated and selection of material and argument mapping of the review approved. Finished reviews after feedback and final approval were transmitted to group via e-mail for smaller files and Google Drive and Dropbox for larger and discussed and peer reviewed during practical exercises. Materials were used for the final preparation for the examination.

RESULTS AND DISCUSSION

Twenty five participants from 3 groups during two subsequent years were the subject of our investigation. In year 2012-2013 from first group (9 students) we received and approved 2 reviews and 3 were at the stage of argument maps and selected material, from the second group (8 students) – 10 reviews (written from 6 students) and 3 projects (one from a student with 2 approved reviews) and in 2013-2014 group (8 students) -2 reviews (1 student) and 2 projects (from 1 student).

We found a positive correlation of writing with the exam marks with best results in the group with the greatest activity. All students who wrote reviews even those at the project stage received excellent marks with one exception where the mark was very good. We observed improved verbalization and appropriate usage of terminology.

At the first stages of writing where students presented for approval hierarchical summarization of the textbook, argument maps and additional sources from internet we encountered some problems. Writing is not a common practice in our high school education. The only experience in writing on entering higher education our students have is in literature and not in science. Students' writing competence for generating secondary (written by them) from primary texts (textbooks, additional sources, etc.) is a necessary objective for adequate content reproduction of educational

texts [24]. In her study approximately 20% of first year students' writings were of good quality. Knowledge of the process of writing, text structures, and paragraph and sentence construction improves reading comprehension.

Where are we? Assessing hierarchical summarization (extracting and summarizing the main themes and subthemes of a text) of the textbook and argument maps (diagramming arguments for easy assimilation of core prepositions and easy relations) at the first stages of writing revealed weak places – paragraphs, difficult for understanding and paraphrasing, were omitted, whole sentences were simply copied, sources not cited properly and as a whole most of the students expressed some difficulties in incorporating information from additional sources in the main texts from the textbook, Feedback included information about referent styles and instruction on constructing argument maps. Including PowerPoint presentations from internet came out to be a good idea. On one hand slides are extremely informative, innovative and thought-provoking through the combination of high concentrated text and visual aids [1] and on the other it was easier for students with low knowledge of English to make efforts to understand texts.

After final approval reviews were presented in the group and discussed. As we mentioned above we are professionals and although we have a great content knowledge we sometimes forget what students' know. In this aspect we found peer to peer explanations extremely useful. Starting from the level of their own existing knowledge they succeed to convey knowledge in a more understandable manner even for less successful students. On the other hand students listening presentations are less frustrated to ask questions.

As for our expectations that all students will volunteer to write our hypothesis failed. Although the positive correlation between writing and exam marks we cannot tell for sure whether writing alone is the reason for these results or only excellent students volunteered. Evaluating portfolios as an instrument for testing and assessment Janssens et al. state that "when students did not get grades for their portfolios, much less effort was made in constructing the portfolio" [25]. In our case writing is not a part of the assessment process thus students are driven only by intrinsic motivation. Another reason for the low level of interest in writing in our opinion is the fact that during the period of our investigation course material was presented by three lecturers who participated in the final exams. As we mentioned above lectures are not uploaded in the virtual learning environment (VLE) thus in the students' opinion for "strategic" approach to learning the only reliable source of information remains the textbook.

CONCLUSIONS AND FURTHER DEVELOPMENT

It is too early to draw conclusions, although there is an obvious benefit of writing on students learning, metacognitive and communicative skills. As for us, mentoring students, we learned a lot selecting sources and thinking of the ways to assist students in presenting materials. As further development we consider using a VLE to start a Web based group project in order to involve all students in writing and learning activities.

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REFERENCES:

1. Thimmappa BHS. Perspectives of technology enhanced learning and teaching for an exciting learning experience. *Chemistry: Bulgarian journal of science education,* 2013; 22(1): 30-51.

2. Davenport J, 3rd. (1987, March). A way out of the andragogy morass. *Paper presented at the conference of the Georgia Adult Education Association, Savannah, GA.*

3. Darkenwald GG, Merriam SB. (1982). Adult education: Foundations of practice. *New York: Harper & Row*

4. Knowles M. (1973). The adult learner: A neglected species. *Houston: Gulf.*

5. Knowles M. (1980). The modern practice of adult education: Andragogy versus pedagogy (Rev. and updated ed.). *Englewood Cliffs, NJ: Cambridge Adult Education*

6. Knowles M. (1975 :18). Self-directed learning: A guide for learners and teachers. *Chicago: Follett Publishing Company.*

7. Hase S, Kenyon C. (2000). From andragogy to heutagogy, *Ulti-BASE In-Site,* December. http://epubs.scu.edu.au/gcm_pubs/99/

8. Loyens SM, Gijbels D, Coertjens L, Côté DJ. Students' approaches to learning in problem-based learning: Taking into account professional behavior in the tutorial groups, self-study time, and different assessment aspects. *Studies in Educational Evaluation.* 2013 Mar;39(1):23-32. [CrossRef]

9. Marton F, Säljö R. On qualitative differences in learning: 1. Outcome and process. *Br J Educ Psychol.* 1976; 46:4-11.

10. Fogarty R. (1994). How to teach for metacognition. *Palatine, IL: IRI/ Skylight Publishing.*

11. Simpson ML, Nist SL. An update on strategic learning: It's more than textbook reading strategies. *J Adolesc Adult Lit.* 2000 Mar;43(6):528–541.

12. Fry H, Ketteridge S, Marshal S. (2008). A Handbook for Teaching and Learning in Higher Education Enhancing Academic Practice. *Third edition, published in the Taylor & Francis e-Library.*

13. Nist S. (1993). What the literature says about academic literacy. *Georgia Journal of Reading*, Fall-Winter, pp.11–18.

14. Entwistle NJ, Ramsden P. (1983). Understanding Student Learning. *London: Croom Helm.*

15. Entwistle N. Promoting deep learning through teaching and assessment: conceptual frameworks and educational contexts, *Paper presented at the TLRP Conference, Leicester,* No-

vember 2000.

16. Entwistle N, Entwistle D. Preparing for Examinations: The interplay of memorising and understanding, and the development of knowledge objects, *Higher Education Research & Development,* 2003; 22(1):19-41. Published online: 14 Jul 2010 [CrossRef]

17. Birenbaum M, Breuer K, Cascallar E, Dochy F, Ridgway J, Dori J, et al. (2005) 'A learning integrated assessment system', in *R. Wiesemes and G Nickmans (eds)* EARLI (European Association for Research on Learning and Instruction) series of position papers.

18. Popham WJ. (2008). Transformative assessment. *Alexandria, VA:* Association for Supervision and Curriculum Development. (p. 15).

19. Vygotsky LS. (1978) Mind in Society: The Development of Higher Psychological Processes *(Cambridge, MA: Harvard University Press).*

20. Chin C, Brown D. Student-generated questions: A meaningful aspect of learning in science, *International Journal of Science Education*, 2002; 24(5):521-549, Pub. online: 26 Nov 2010. [CrossRef]

21. Leontiev AN. Selected psychological publications.1983; pp. 374-329

22. Graham S, Hebert MA. (2010). Writing to read: Evidence for how writing can improve reading. A Carnegie Corporation Time to Act Report. Washington, DC: *Alliance for Excellent Education.*

23. Nosko IV. Student-centered education as a basic principle of the Bologna reforms at the high school., *Vector nauki TGU.* 2011; 1(4):136.

24. Konovalova E. Level of competence of student speech as a condition of the adequacy of play school texts, *Vector nauki TGU*. 2011; 1(4):74.

25. Struyven K, Dochy F, Janssens S. Students' perceptions about evaluation and assessment in higher education: a review. *Assessment & Evaluation in Higher Education,* 2005; 30(4):325-341, [CrossRef].

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