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CONSTRUCTIVE ALIGNMENT IN MARITIME ENGLISH: A CASE STUDY FROM THE UNIVERSITY OF RIJEKA

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Abstract. Owing to the technological advances and trends in the maritime sector, maritime education and training need to adapt to satisfy the needs of the labor market and industry. Teaching of Maritime English also needs to keep up with the growing demands by revising the necessary knowledge and competencies, but also by making sure they are properly communicated. In the last few decades the teaching paradigm has changed, shifting focus from the teacher to the student, specifically to the learning outcomes. In that sense, the application of the revised Bloom's taxonomy (Anderson and Krathwohl 2001) is a useful tool for communicating measurable learning outcomes. However, in order for teaching to be effective, the outcomes need to be aligned with learning activities and evaluation methods, in line with the theory of constructive alignment. The aim of this study is to analyze the current state of learning outcomes in key documents related to maritime education and then provide examples of outcomes, activities and evaluation methods in specific courses. The analysis of key documents will be corpus based, using the frequency data on the relevant verbs in STCW core and extended competencies and Model Courses to see what is expected on a global level. In the second part of the study, the principles of constructive alignment will be applied to Maritime English courses at the Faculty of Maritime Studies, University of Rijeka. Preliminary corpus results have shown the underrepresentation of the verbs from psychomotor and affective domains and a higher frequency of verbs defining lower knowledge levels. As universities should pursue higher levels of knowledge, this should be given further consideration.

Keywords: Maritime English; Constructive Alignment; Corpus Study; Bloom's Taxonomy.

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1. INTRODUCTION

Today, maritime professional knowledge is dispersed in various documents and standardized at the international level, with the minimum knowledge and competencies codified in the International Convention on Standards of Training, Watchkeeping and Certification, 1978 (STCW). It is systematically implemented through maritime education and training (MET) institutions, but with varied proficiency levels and activities, different levels of knowledge and skills and diverse scope. The recent technological advancements have raised the issue of how adequate the core set of competencies given in the STCW Convention are considering the necessary level of knowledge and competencies for future seafarers. This is rooted in profound changes in communication and the use of AI, accelerated business activities and consequently changing shipboard organization owing to which the industry noticed a significant skills gap between the knowledge standards and the needs of the labor market. In addition to that, MET also had to meet the objectives of the Bologna Process and the Lisbon Strategy which aimed to strengthen the link between education, employment, and innovation and modernize and internationalize higher education. In that process, MET relied on the Bloom's taxonomy of educational objectives, including its revised version by Anderson and Krathwohl (2001), which offered a structured way to define and assess learning outcomes across the different levels of knowledge.

Here, the key is in the planning process that develops and defines the teaching process before actual teaching takes place. This encompasses planning the study program, planning the course syllabus and planning the topics within the course. In this stage, the course designer should define the learning outcomes as clear and measurable objectives of learning aligned with the methods of assessment. The idea of the constructive alignment of learning outcomes, activities and methods of teaching and methods of assessment, as defined by Biggs (1999, 2014), provides a framework for defining the steps of the teaching process to reach the predetermined learning outcomes and standards. It focuses on what the students will be able to do with the knowledge and skills they have acquired, which is why the statements describing the learning outcomes contain specific measurable action verbs. These verbs establish the common ground for the intended learning outcomes, the teaching activities and the assessment tasks.

Therefore, the research presented here deals with the knowledge representation in the STCW core and extended competences and model courses to analyze the set standards and the levels of knowledge defined in the key documents related to MET. This was then compared with the actual Maritime English course descriptions, as case studies, implemented at the University of Rijeka, Faculty of Maritime Studies to analyze the level of knowledge and skills provided.

2. RESEARCH OBJECTIVES

Professional knowledge, including maritime knowledge, is understood as systematic, codified, abstract knowledge that has undergone a formal rationalization. In the transfer of that knowledge, it is necessary to define the generic and specific competencies that should be acquired in the process. This is operationalized through learning outcomes that indicate precisely what the students will be able to do, understand or show after the learning process. The documents codifying maritime knowledge provide statements describing the competencies of future seafarers, which are then implemented through the study programs at higher education institutions.

This study aimed to identify the prescribed level of knowledge and the most represented domains of learning based on the frequency of action verbs used to describe the competencies in the formal documents. The second aim was to check the actual implementation of the competencies on a small sample of course syllabi. This was performed to identify a potential gap between the standard and the practice. The hypothesis was that the action verbs used in the formal documents will mostly belong to the cognitive domain. The second hypothesis was that the action verbs used in describing learning outcomes in university settings will belong to a higher level of complexity than those in formal documents.

3. METHODS

The first part of the study was based on corpus data about the frequencies of relevant verbs in the selected sources. The corpora for this study were compiled to address specific research questions so the selection process followed specific criteria to make the corpus representative of the area under study. The criteria, as recommended by the EAGLES project (Sinclair 1996), included external non-linguistic criteria, such as style and origin, and internal linguistic criteria, such as genre and topic. The selected texts were the following:

1 Core STCW competencies for deck and engine crew members, expressed in the form of statements that formally describe the knowledge, understanding and proficiencies at different levels in respective STCW tables (Chapters II and III).

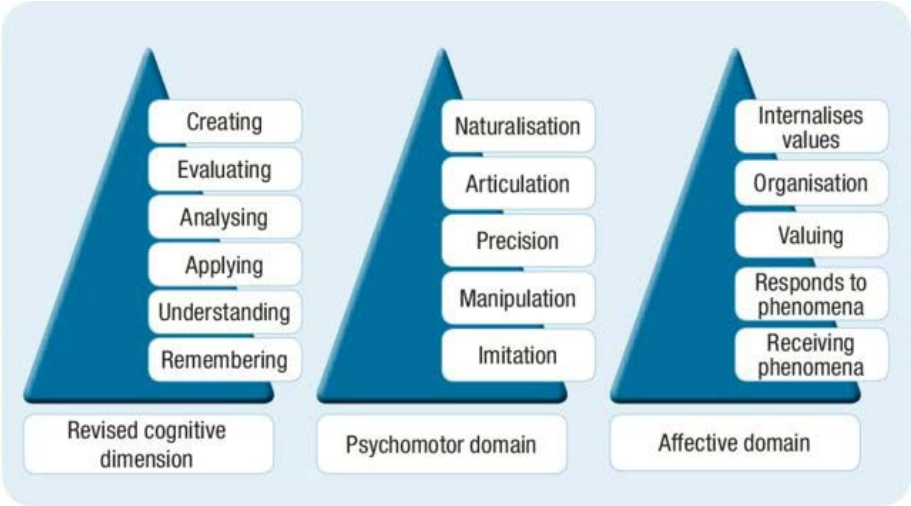

Figure 1. Domains of learning according to Bloom. (Source: Cedefop, 2017)

2 Extended STCW competencies, as represented in the STCW Code A & B, without Chapter I, which include the core competencies supported with other competencies, recommendations and guidance related to these competencies.

3 Model Courses (Deck, Engine, ETO), which contain instructions for developing study programs for officers at the management and operational level. The competencies in these texts are more detailed, with guidance on delivering, references, teaching aids, etc.

These documents communicate maritime knowledge in a specific way, and corpus analysis enabled the detection and description of typical patterns and frequent forms which are not randomly used but are cognitively motivated. This provided insight into the presentation of maritime knowledge, on the one hand, and implied levels of complexity and knowledge domains on the other. The corpora were compiled and analyzed in the online corpus analysis tool Sketch Engine. Owing to the difference in the size of the corpora, all the frequencies were normalized per million to have comparable results.

The second part of the analysis included a comparative qualitative study of the existing course descriptions, implemented at the University of Rijeka Faculty of Maritime Studies and available on their website. The studied syllabi are implemented at the second year of undergraduate study Nautical Studies and Maritime Transport Technology and Marine Engineering and include the learning outcomes and methods of assessment for the courses Maritime English 3, Maritime English 4 in the Nautical Studies and English Language 3 and English Language 4 in the Marine Engineering. Here the focus was on the constructive alignment of outcomes and assessment methods and how they compare with the results of the quantitative corpus-based study. The activities could not be assessed as they are not described in the course descriptions mentioned.

Both parts of the study relied on the Bloom's (revised) taxonomy of learning outcomes and his classification of action verbs into domains of learning: cognitive, affective and psychomotor. Within each domain the learning processes are segmented according to their level of complexity. The cognitive domain focuses on mental processes and intellectual skills, i.e. on how students think and process information. The affective domain refers to emotion, attitudes and values, while the psychomotor domain focuses on physical skills and abilities, i.e. how students use their motor skills in learning. Figure 1 shows the domains and their respective levels of complexity.

4. RESULTS AND DISCUSSION

The corpus-based analysis showed that action verbs from the cognitive domain were the most frequent in the corpora, followed by those from the psychomotor domain, and finally from the affective domain (Figure 2). This could be due to the fact that the cognitive domain is commonly associated with learning, as it involves understanding or recall of specific facts, procedures, and concepts directly related to the topics in the maritime domain. These are often more easily identified than skills or attitudes related to the psychomotor and affective domains. In this regard, it is interesting to note that lately there have been frequent discussions within the maritime industry on the importance of attitudes, motivation, management skills, communication skills, commonly associated with the affective domain.

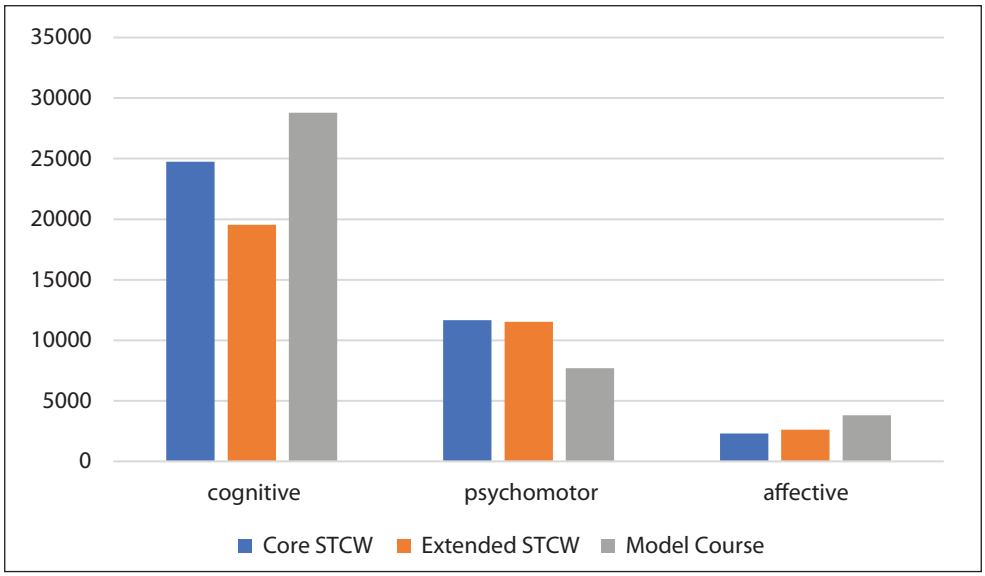

Figure 2. Frequency of action verbs within particular domains of knowledge.

When analyzing the frequency of action verbs per level of complexity in each domain (Figures 3a, 3b and 3c), the results show that most frequent verbs belong to the second and third level of complexity. Therefore, the focus here is on the application level, which might have been sufficient before the implementation of contemporary highly sophisticated ships and onboard systems. Future seafarers will most likely need skills at higher complexity levels. In the psychomotor domain the focus is on manipulation and precision, again with higher level skills of articulation and naturalization being neglected. In the affective domain, the focus is mostly on reception and response, with some dedication to organizing.

Figure 4 provides a general overview of the frequency of action verbs per level of complexity, which corroborates the previous results. The action verbs at the second and third levels of complexity are the most frequent in all three corpora, whereas higher complexity levels are underrepresented.

The qualitative part of the analysis focused on the action verbs used in defining the learning outcomes and methods of assessment in the four course descriptions. As the courses are based on the previously analyzed documents, it is expected to find similarities in the distribution of action verbs.

As can be seen from Table 1, the learning outcomes are mostly described using action verbs from the lower levels of complexity of the cognitive domain. While the psychomotor domain is marginally represented, the affective domain is not present in the courses, at least not explicitly as a learning outcome. It is also important to note that the methods of assessment are constructively aligned with the intended learning outcomes, without discrepancies in the levels of complexity or domains of knowledge. In the case of the mentioned courses, the assessment is performed in written form, through tests, and in oral form, through an oral exam and through student presentations. These methods of assessment correspond to the cognitive domain defined in the learning outcomes.

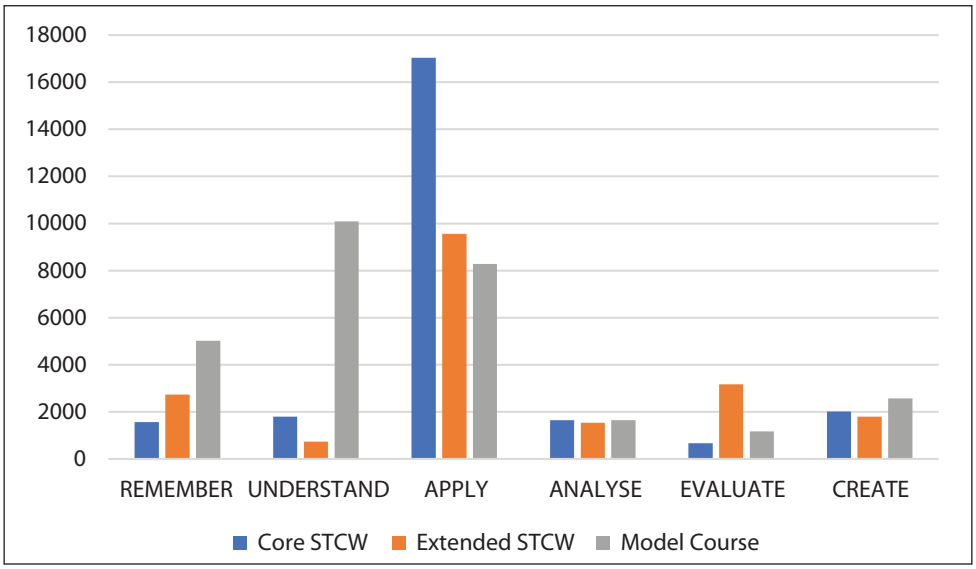

Figure 3a. Frequency of action verbs in the cognitive domain.

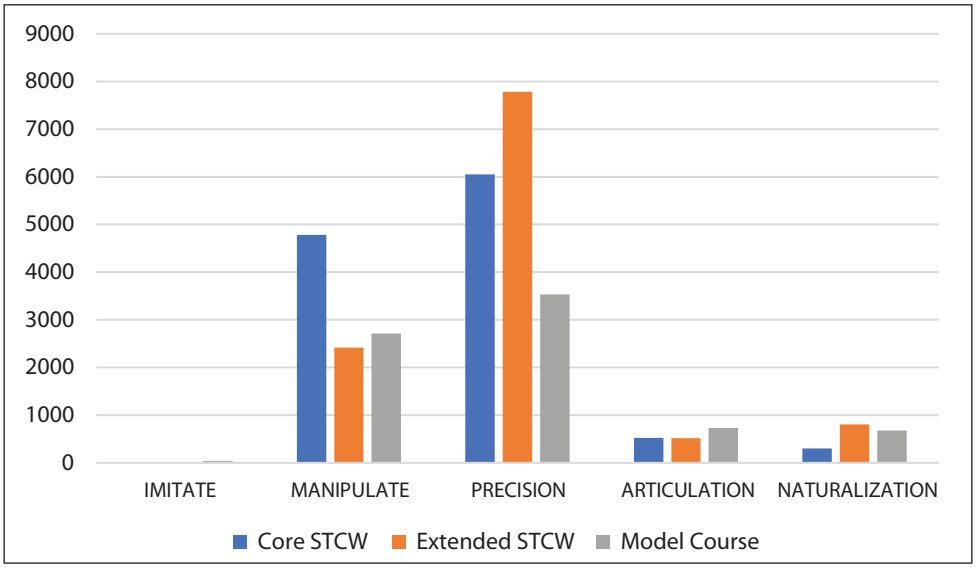

Figure 3b. Frequency of action verbs in the psychomotor domain.

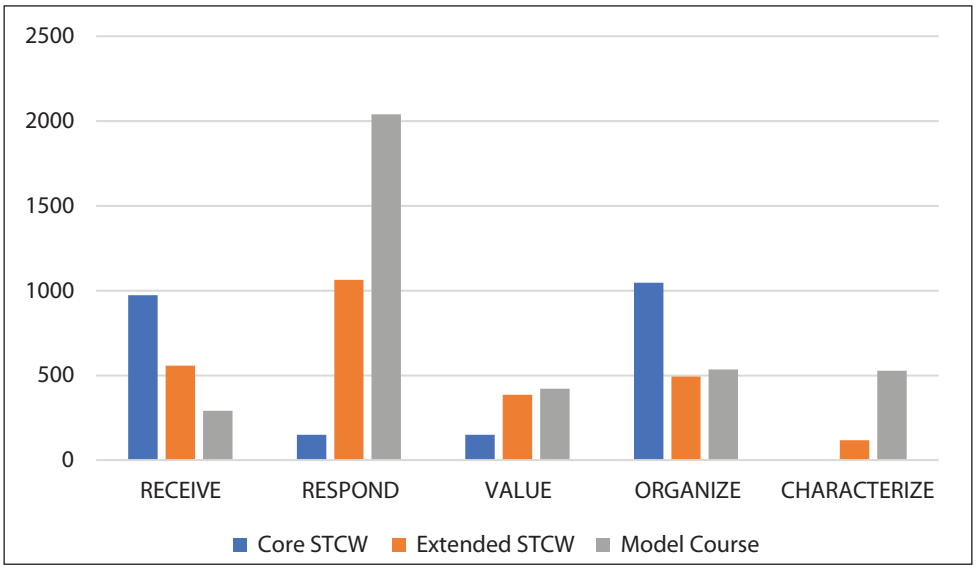

Figure 3c. Frequency of action verbs in the affective domain.

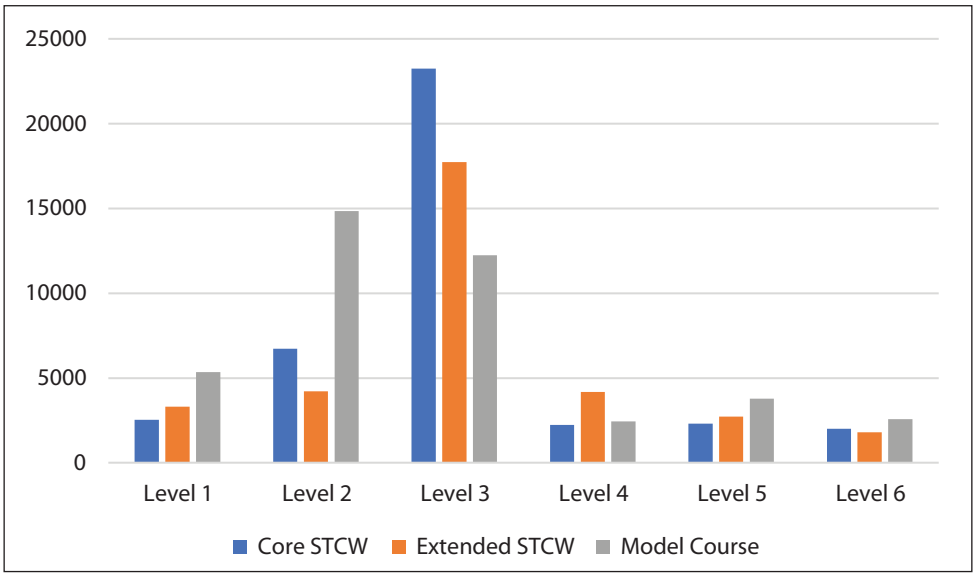

Figure 4. Frequencies of action verbs per levels of complexity.

Table 1. Examples of action verbs used in course descriptions with domains and levels of knowledge.

	Cognitive Level 1	Cognitive Level 2	Cognitive Level 3	Cognitive Level 4	Cognitive Level 5	Psychomotor Level 3	Psychomotor Level 5
Action verbs	recognize mark list name	describe interpret present rephrase translate define explain	distinguish write	connect	anticipate assemble	demonstrate	compose

5. CONCLUSION

The results presented in the previous paragraphs lead to several important conclusions from the research. First, the courses delivered at the university level follow the domain and complexity schemes of the main documents describing maritime knowledge. This mainly includes the cognitive domain at the level of application. Secondly, it must be noted that psychomotor and affective domains are clearly underrepresented in all considered documents. It is much more difficult to codify and formalize these domains, but they still represent an important aspect of learning. This is particularly evident in recent times, as the maritime industry is advocating for the introduction of skills related to these domains into the educational curricula. Also, there are a number of courses introduced at various levels that address the development of these so-called soft skills. Owing to their significance for the maritime industry of the future, which will rely upon a different set of skills, further developments in these areas of maritime education are highly welcomed. Related to that is the third conclusion, where the majority action verbs describing the required knowledge deal with the application level. In this sense, the question arises whether this level is sufficient for the level of higher education or for the future needs of the maritime industry. Such insights might contribute to the ongoing discussion about the necessary revisions of the STCW or other documents prescribing maritime knowledge. Additionally, these conclusions might contribute to the changes in higher education curricula by introducing the constructive alignment into the syllabi to make the learning outcomes, activities and assessment methods clear, logical and structured for the students. As this was a small-scale study, in the future it would be necessary to extend the qualitative part of the study to all syllabi at the Faculty of Maritime Studies or even compare these syllabi

with another similar higher education institution in Croatia and abroad. In addition to that, the quantitative part of the study could be extended to include other documents that describe maritime knowledge, e.g. the Global Maritime Professional Body of Knowledge or the scientific papers from the area of maritime studies, to gain an insight into the current trends and topics in the maritime industry.

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Conflict of interest: All authors declare that they have no conflicts of interest.

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