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ASSESSMENT OF MANAGEMENT INFORMATION SYSTEMS CURRICULUM FROM "UNDERSTAND by DESIGN" PERSPECTIVE

YÖNETİM BİLİŞİM SİSTEMLERİ EĞİTİM PROGRAMININ "ANLAMA ODAKLI TASARIM" PERSPEKTİFİNDEN DEĞERLENDİRİLMESİ

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ÖZ: Anlama odaklı öğretim tasarımı, 21. Yüzyıl eğitim anlayışında önemli bir yer tutmaktadır. Bu anlayışın temelinde öğrencilerin bir eğitim süreci sonunda sahip olması gereken bilgi, beceri ve yeterliliklerin önceden belirlenmesi, eğitim tasarımının öğrencileri bu hedeflere ulaştırmak üzerine planlanması ve ölçme değerlendirme sürecinin bu plana uygun şekilde geliştirilmesi yer alır. Bu çerçevede geliştirilen bir öğretim tasarımının başarılı sonuçları olduğuna ilişkin kanıtlar literatürde yer almaktadır. Ancak, bu modelin başarıya ulaşması için, belirlenecek hedef kazanımların bilişsel, duyuşsal ve psikomotor beceriler göz önünde bulundurularak belirlenmesi; öğrenci merkezli, içerik merkezli ve performans merkezli hedef ve kazanımların belirlenerek, geçerli ve güvenilir bir ölçme değerlendirme sürecinin planlanması esastır. Bu ilke doğrultusunda bu çalışma kapsamında Yönetim Bilişim Sistemleri bölümü, lisans eğitim programı incelenmiş, hedef ve kazanımları Bloom Taksonomisi'ne göre, öncelikli olarak bilişsel alanlar olmak üzere, analiz edilmiştir. Veri kaynağı olarak bölüm Bologna sitelerindeki programın öğrenme çıktıları ve eğitim programında yer alan derslerin öğrenme çıktıları değerlendirilmiştir. Bu çalışma kapsamında, program ve planlarındaki çıktılarının arasındaki tutarlılık ile kazanımların ilgili olduğu bilişsel, duyuşsal ve psikomotor düzeyler analiz edilmiş, ölçme değerlendirme süreçlerine ilişkin değerlendirmeler yapılmıştır. Değerlendirmeye alınan 476 özel öğrenme hedefinin %30'unun geçerli ve güvenilir ölçme değerlendirme için uygun olmadığı, kalanlarının alt bilişsel düzeylerde yığıldığı görülmüştür. 14 program öğrenme çıktısının tamamının üst bilişsel düzeylere odaklandığı, duyuşsal ve psikomotor becerilere yönelik çıktıların belirlenmediği değerlendirilmiştir. Çalışma sonucunda Yönetim Bilişim Sistemleri bölümü eğitim programının, anlama odaklı öğretim tasarımı ilkeleri gözetilerek bütüncül bir anlayışla ölçme-değerlendirme süreçleri de planlanarak güncellenmesi gerektiği sonucuna varılmıştır.

Anahtar Kelimeler: Yönetim Bilişim Sistemleri, Anlama Odaklı Tasarım, Program Çıktıları, Öğrenme Tasarımı, Eğitim Programı

ABSTRACT: Understanding by design as an instructional model has an important role in the 21st century education approach. The basis of this understanding is to determine in advance the knowledge, skills and competencies that students should have at the end of an

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education process, to plan educational design to help students achieve these goals, and to develop educational assessment process in accordance with this plan. There is evidence in the literature that an instructional design developed within this framework has successful results. However, in order for this model to be successful, it is essential that target achievements must be determined by taking into account cognitive, affective and psychomotor skills besides planning a valid and reliable measurement and evaluation process by selecting student-centered, content-centered and performance-centered goals and objectives. In line with this principle, within the scope of this study, the undergraduate education program of the Management Information Systems department was examined and its goals and objectives were analyzed according to Bloom's Taxonomy, primarily in cognitive areas. Learning outcomes of the program on the department's Bologna website and learning outcomes of courses in the program were evaluated as data sources. The consistency between the outcomes of the program and the cognitive, affective and psychomotor levels to which objectives are related were analyzed. It was observed that 30% of the 476 specific learning objectives evaluated were not suitable for valid and reliable educational assessment. The rest piled up in lower cognitive levels of Bloom Taxonomy. It also concluded that all 14 learning outcomes of the program level focused on cognitive levels, and outcomes for affective and psychomotor skills were not included. As a result, it was concluded that the Management Information Systems department education program should be updated by taking into account the principles of understanding-based instructional design planning educational assessment processes with a holistic approach.

Key Words: Management Information Systems, Understanding by Design, Program Outcomes, Learning Design, Education Program

UZUN ÖZ

Giriş Yükseköğretimde kalite arayışları, Bologna süreçleri ve akreditasyon süreçleri ile birlikte özellikle 21. yüzyılın ilk çeyreğinde oldukça hız kazanmıştır. Özellikle 2010 yılında Avrupa genelinde ortak kriterler ve standartları benimseyen Bologna süreçleri, sonrasında ise Yüksek Öğretim Kurumu (YÖK) öncülüğünde ilerleyen kalite arayışları ile lisans programlarında yapılması öngörülen iyileştirilmeler planlanmaya ve uygulanmaya başlanmıştır. Bu süreçlerle birlikte, Milli Eğitim programında sıkça duyulan hedef ve kazanımlar, ölçme değerlendirme süreçlerinde geçerlilik ve güvenirlik, öğrenci merkezli eğitim anlayışı, Bloom Taksonomisi, öğretim tasarımı, paydaş katılımı gibi kavramlar yüksek öğrenim hayatımızda daha fazla yer almaya başlamıştır. Tüm bu kavramları tek bir çatı altında toplayan ise aslında 20. Yüzyıl sonlarından itibaren özellikle öğretim tasarımı alanında kullanılmaya başlanan ve literatürde yapılan çalışmalarla etkililiği kanıtlanmış olan "anlama odaklı öğretim tasarımı çerçevesi" olmuştur. Bu kavramsal çerçeve, öğretim süreci başlamadan önce, eğitim öğretim süreci sonunda öğrencinin ulaşması gereken hedeflerin ilk önce belirlenmesi üzerine odaklanmıştır. Bilmenin değil de bildiklerimizle yapabildiklerimizin önemli olmaya ve değer kazanmaya başladığı bu dönemde, etkili öğretme pratikleri, geçerli ve güvenilir ölçme değerlendirme süreçlerinin planlanması ve öğrencileri ilgili hedeflere ulaştıracak içeriklerin seçilmesi amacıyla planlı bir sürece geçilmiştir. Anlama odaklı öğretim tasarımı modeli, hedef ve kazanımların belirlenmesi, bu hedeflere ulaşılma düzeyinin değerlendirilmesi için kanıtların belirlenmesi ve son olarak içerik belirlenmesi üzerinde sistematik bir yapıya sahiptir. Bu tasarım modeli, günlük ders

planlamasından, eğitim programlarının tasarımına kadar spesifik ya da daha geniş ölçekli eğitsel planlamalarda kullanılabilir. Örneğin: bir lisans programı için, anlama odaklı öğretim tasarımı program çıktılarının belirlenmesi, bu çıktılara ulaşılıp ulaşılamadığının değerlendirilmesi için kanıtların belirlenmesi ve son olarak eğitim içeriklerinin öğrencileri bu hedeflere ulaştıracak şekilde seçilmesi şeklinde planlanabilir. Benzer şekilde ders içerikleri kapsamında ise dersin hedef ve kazanımlarının belirlenmesi ve bunların program çıktıları ile ilişkilendirilmesi, dersin hedeflerine ulaşıp ulaşmadığının değerlendirilmesi için ölçme-değerlendirme süreçlerinin planlanması ve son olarak öğrencileri belirlenen hedeflere taşıyacak içerik ve bu içeriklere yönelik öğretim yöntem ve tekniklerinin belirlenmesi olarak tasarlanabilir. Bu yapı hem program tasarımında hem de ders tasarımında modüler bir yapı oluşturur ve ihtiyaç duyulması halinde hedef ve hazanımlar güncellenerek, programın veya derslerin de güncellenmesine olanak sağlar. Anlama odaklı öğretim tasarımında hedef ve kazanımların belirlenmesi oldukça önemli ve hassas bir hususdur. Bu planlamada, Bloom Taksonomisi oldukça önemli bir yer tutar. Bu çalışmanın amacı, Yönetim Bilişim Sistemleri (YBS) bölümü lisans düzeyi eğitim programını oluşturan dersler için belirlenen hedef ve kazanımların Bloom Taksonomisi'ne göre bilişsel düzeyde değerlendirilmesidir. Çalışma kapsamında YBS bölümü ders içerikleri analiz edilmiş ve kalite çalışmalarına öncülük edebilecek önerilerde bulunulmuştur.

Yöntem Bu çalışma nitel içerik analizi yöntemi kullanılarak hazırlanmıştır. Çalışma kapsamında dört yıllık Yönetim Bilişim Sistemleri bölümü lisans programının çıktıları, dersler için hazırlanan Bologna ders izlencelerindeki hedef ve kazanımlar analiz edilmiştir. Toplamda 47 zorunlu, 43 seçmeli ve 6 üniversite alan dışı olmak üzere 96 ders içeriği çalışmaya dahil edilmiştir. Bologna ders izlence formları nitel veri kaynağı olarak kullanılmıştır. Bu formlardan elde edilen 476 kazanımın, Bloom Taksonomisine (1956) göre bilişsel alanda dağılım değerlendirilmiştir. YBS programının 14 çıktısı da aynı yöntemle değerlendirilmiş, program çıktıları ile derslerin öğrenme çıktıları arasındaki uyum yorumlanmıştır. Kazanımlar, performans merkezlilik, ölçülebilirlik ve son olarak bilişsel düzeylerdeki kategorilere göre değerlendirilmiştir.

Bulgular Bu çalışma kapsamında analiz edilen 96 ders izlencesinden elde edilen 476 kazanımın, %30'u (n=142) performans-merkezli olmadığı veya ölçme ve değerlendirme süreçleri açısından uygun olmayan doğrudan gözlemlenebilen veya ölçülebilen performans fiilleri içermesi nedeni ile bilişsel sınıflandırmaya dahil edilmemiştir. 334 kazanım Bloom Taksomisi bilişsel alanında: %12 (n=41) bilgi düzeyinde, %28 (n=92) kavrama düzeyinde, %22 (n=72) uygulama düzeyinde, %16 (n=53) analiz düzeyinde, %2 (n=8) sentez düzeyinde ve %20 (n=68) değerlendirme düzeyinde olduğu görülmüştür. Araştırma kapsamında, YBS lisans programına ilişkin belirlenmiş 14 program çıktısının tamamı analiz edilmiştir. Program çıktılarının ağırlıklı olarak üst bilişsel düzeylerde gruplandıkları, bilgi ve kavrama düzeylerinde ise program çıktılarının olmadığı görülmüştür. Psikomotor ve duyuşsal alanlara yönelik bir analiz bu çalışma kapsamında olmamasına rağmen, yapılan ön incelemede, program çıktılarında bu alanlarda gruplandırılabilecek program çıktılarına da yer verilmediği görülmüştür.

Sonuç ve Tartışma Anlama odaklı öğretim tasarımı lisans programlarının planlanmasında ve yürütülmesinde etkin bir şekilde kullanılarak kalite çalışmalarına önemli ölçüde destek olabilir. Bu çalışma kapsamında, kalite arayışları odağında, Yönetim Bilişim Sistemleri

bölümünün eğitim programı incelenmiştir. Öncelikli olarak program çıktıları analiz edilmiş, ders izlencelerinde 14 program çıktısının belirlendiği görülmüştür. Program çıktılarının üst bilişsel düzeylere odaklandığı değerlendirilmiştir. Program çıktılarında bilişsel alanda bilgi ve kavrama düzeyleri ile duyuşsal ve psikomotor alandaki beceri ve yeterliliklere yer verilmemiş olması anlama odaklı öğretim tasarımı ilkeleri açısından bir eksiklik olarak değerlendirilebilir. Program çıktılarının üst bilişsel düzeylere odaklanmış olması bu hedeflere ulaşan öğrencilerin bölümden nitelikli olarak mezun olacağı şeklinde yorumlanabilir. Ancak, program çıktılarının üst bilişsel düzeyleri hedeflemesi beraberinde bu program için seçilen derslerin de üst bilişsel düzeylere odaklanması gerektirebilir. Derslerin öğrenme çıktıları analiz edildiğinde ise 142 kazanımın performans odaklı olmaması ve ölçme değerlendirme için uygun olmaması dezavantaj olarak değerlendirilmiştir. Anlama dayalı odaklı tasarımında, kazanımların iyi belirlenmemiş olması, hedeflere ulaşılıp ulaşılamadığı konusunda kanıt toplama sürecini ve sonraki içerik seçimi ve öğretim planlaması süreçlerini de olumsuz etkileyecektir. Üst bilişsel düzeylerde, ders kazanımlarının program çıktıları ile uyumlu olduğu sonucuna varılabilir. Ancak, sentez düzeyinde yer alan ders hedef ve kazanımlarının azlığı ve bilgi ve kavrama düzeylerindeki ders kazanımlarının fazlalığı, program çıktıları ile uyumu olumsuz etkileyen faktörler olarak değerlendirilmiştir. Program çıktıları ile birlikte ders hedef ve kazanımlarının da hem bilişsel, duyuşsal ve psikomotor alanlarda hem de bilişsel alan düzeyleri arasında dengeli bir dağılım gösterecek şekilde güncellenmesi kalite çalışmalarında önemli ölçüde destek sağlayacağı sonucuna varılabilir.

1. INTRODUCTION

Learning, as a skill, is a gift for humanity. It is very important how this capacity is used and what purpose. Humanity has developed innovative tools, better environments, new strategies, methods, technologies and above all education systems to teach better and associated with it to learn better. However, none of those efforts has ended up with a single recipe of teaching and learning that fits for all. Teaching has been the main focus in educational discussions for many years. Attention has been put on teaching more than learning for decades. It is a fact that learning is not the end result of teaching, but is a product of learners. Starting with the 21st century, the role of teachers and teaching has been switched from teacher-centered instruction to student-centered instruction. Indeed, it should be transformed to learning-centered instruction. It is known that learning is closely associated with teaching, but the question is if no one learns anything, isn't it meaningless to teach? We must first understand the dynamics of learning before start to teach for specific skills and knowledge in a systematic way. Education systems should be designed in a modular way to help learners to learn and to construct the meaning in a way of their learning preferences. Our perception on learning should be transformed from teaching to construction of meaning by learners.

Indeed, this modularity has been provided by understand by design, which is a popular instructional design framework. In this instructional design model, the

outcomes of instructional processes are determined first, and all teaching methodologies and techniques are selected and planned to have students to reach these outcomes (Bowen, 2017). Moreover, educational assessment of learners is planned to assess whether students reach these goals or not, so this process directs instructional designers to a valid and reliable assessment of educational outcomes. Well-determined educational outcomes require well-planned instructional and assessment activities in understand by design model of instructional design. The target outcomes are desired to be determined by consulting with all educational stakeholders of the program if possible. Program outcomes are determined first, and course outcomes which are aligned with the program outcomes are selected second. The course outcomes can also be segmented weekly or daily course-based if needed. This segmentation has offered flexibility that instructional designers and instructors needed. For example, Management and Information Systems (MIS) undergraduate program goals and objectives were determined by consulting with private business owners, non-governmental organizations, faculty members from the other MIS departments and other educational stakeholders. After the program outcomes have been selected, the course list, which is desired to have learners to graduate with knowledge and skills required satisfying program outcomes was offered. Each course was planned in detail, and course outcomes were aligned with program outcomes. Instructional materials, methods and techniques along with assessment procedures were selected to teach for reaching these course outcomes and to assess whether students reach these learning outcomes or not. Modularity of learning outcomes plays an important role in at this point because these learning outcomes can be modified as a piece of a big puzzle for each course. Educational assessment guides instructors which learning outcomes need to be modified, replaced or kept. Also, evaluation of assessment outcomes guides instructors which outcomes cannot be reached, so they can reteach for those and help students to remediate their deficiencies in a specific course or a specific unit of a course. The modularity that learning outcomes provide also helps instructors to update their instructional methods, strategies, materials and resources if students have difficulties to reach selected outcomes for a course or a unit.

The selection of the learning outcomes should not be arbitrary or randomly. There are several criteria for selection of learning outcomes and the most important one is to write them in a way so they can directly be observed or measured. This criterion underlies the valid and reliable educational assessment. This obligates another fundamental criterion to be satisfied: learning outcomes must be performance-based. These two criteria are located at the center of the understand by design model from planning to assessment of learning outcomes. Reliability and validity of the educational assessment highly depend on whether these two criteria are satisfied or not. The second criteria introduce a concept which is the type and

levels of performance verbs. Bloom et al. (1956) introduced this concept through his publishing of Taxonomy of Educational Objectives: The classification of Educational Goals Handbook I: Cognitive Domain. In their study, they classified action verbs that require a goal to be performance-based under six cognitive domains: knowledge, comprehension, application, analysis, synthesis and evaluation. For many years, Bloom's Taxonomy is one of the most accepted type of systematic classification in classifying learning objectives (Çelik, Kul &Uzun, 2018). This classification was revised by Anderson and Krathwohl in 2001, but the analyses completed within the scope of this study were carried out faithfully to the Bloom et. al (1956). The main reason for this decision is that reliable and valid performance verbs classification references in the literature are very limited for revised version especially translated into Turkish language for assessment. Reliable and valid resources for list of performance verbs according to Bloom's Taxonomy are cited according to the original classification of Bloom et. al. in general. This might be considered as limitation of the study, and analysis of learning outcomes according to revised version of Bloom Taxonomy with reliable and valid performance verbs lists might be suggested for future studies.

Reflecting on these explanations, the purpose of this study is to analyze whether the MIS curricula is designed based on the principles of Understanding by Design model of instruction. A critical analysis of MIS curriculum is essential for accreditation processes, outcomes of the program, and training of qualified graduates as ill-structured instructional design yields ill-structured instructional practices, educational assessment and student learning. In educational sciences literature, there are numerous research on assessment of learning outcomes (i.e. Avcı, Aslangiray & Özyalçın, 2021; Şahin, 2022; Aydoğdu, 2024). However, almost all of them analyzed K-12 curricula and learning outcomes at different grade levels. It is important to apply the principles of Understand by Design model of instruction beyond K-12 instruction. As it is one of the well-grounded model of instructional design in 21st century, it should be applied, analyzed, criticized and used for remediating the instructional programs in other disciplines such as medicine, engineering, architecture, applied sciences etc. Hasan, Heck and Govindaraju (2024) summarize that "while factual recall remains crucial, more than an overreliance on this method is needed for the enduring comprehension and practical application of information, particularly in the context of engineering education". Management Information Systems (MIS) is one of the disciplines embodied in applied sciences, and the literature offers limited resources about teaching and learning in such a multidisciplinary field. Therefore, this study fills the gap where is a need for understanding, applying and assessing the principles of Understand by Design model of instruction for different disciplines. MIS curricula was selected on purpose as studies in the literature about how to teach for

understanding is limited, so this study guides teachers, faculty members and especially professionals who redesign curricula for accreditation for a cognitive aspect of instructional design by following the principles of UbD model of instruction.

Under the scope of this study, MIS curriculum of a government university was analyzed from a cognitive perspective at higher education level. The outcomes of the study will fill out an important gap in curricular analysis of higher education programs based on Bloom's Taxonomy. Performance verbs of program learning objectives (PLOs) along with course learning outcomes (CLOs) were analyzed whether they are performance-based, directly observed or measured. It was evaluated whether the performance verbs were aligned with cognitive levels of Bloom's Taxonomy and at which level. Their alignment with PLOs were analyzed and suggestions were offered for a complete instructional design from beginning to the end under the scope of the understand by design model of instruction. This analysis is also particularly important as quality teaching and accreditation are ongoing procedures in Higher Education, so this analysis is expected to become a reference for other programs which need a curriculum revision to address needs and expectations of accreditation procedures. Answers for the following research questions were sought:

• Whether PLOs and CLOs were determined performance-based?
• Whether PLOs and CLOs were measurable or observable for valid and reliable educational assessment?
• How PLOs and CLOs were distributed over Bloom's taxonomy of cognitive domain?

To answer these research questions MIS curriculum of an undergraduate MIS program at a public university was analyzed and the results were reported under the scope of this research.

2. LITERATURE REVIEW

Quality in instructional practices has been sought for many years. Literature cites studies (i.e., Biggs and Collins, 2014; Branch and Kopcha, 2014; Caskurlu et al., 2021; Demiroz, 2023; Ehlers, 2004; Hernard, 2010; Gitomer, 2019; Hernard and Leprince-Ringuet, 2008; Jung, 2011) which look through lenses either on quality from learners' perspective or from instructional design perspective. It is a fact that the ultimate goal of teaching is to have learners to learn of a specific skill, knowledge or concept. If no one learns anything, it is meaningless to teach or at least for being insisted on same instructional practices. Quality requires involvement of all stakeholders including students to instructional design procedures in educational practices at all grade levels. In a study on quality assessment in higher education, Noben, Deinum and Hofman (2022) observed six teaching practices, which may affect academic achievement: safe and stimulating

learning climate, efficient organization, clear instruction, intensive and activating teaching, teaching of learning strategies, and differentiation. Among those, clear instruction, intensive and activating teaching, teaching of learning strategies and differentiation could possibly be achieved through understand by design instructional model due to its modularity of learning outcomes. Patfield et al (2022) investigated pedagogy-focused academic development from quality teaching perspective in higher education through Quality Teaching Model. They listed three key dimensions for quality teaching practice: intellectual quality; quality learning environment, and significance. Among those, intellectual quality focuses on deep understanding of key concepts whereas significance emphasizes a pedagogy for a content valued by learners. Especially these two criteria could possibly be evaluated under the scope of the understand by design model of instructional design because modular learning outcomes allow instructors to highlight and focus on key concepts knowledge and skills while up-to-date program and course learning outcomes help learners to value what they learn. Therefore, understand by design as a model for instructional design has potential to satisfy criteria required for quality in higher education settings.

Wiggins and McTighe (2005) first defined understand by design model as a Backward design model of instruction by warning that the UbD is not a prescriptive program and it just offers a conceptual framework. They defined teachers as designers and highlighted that their profession is client-centered as in fields of architecture or engineering. Identification of the desired results is the first step of instructional design in UbD. Second step is to determine and collect acceptable evidences whether learners reach the desired results or not. The final step is to plan learning experiences and instruction that helps students to reach desired goals and objectives. In case of MIS program development, desired goals and objectives were determined with educational stakeholders, and overall curriculum was aligned with these desired outcomes. Likewise, learning outcomes for each course and each unit within the curriculum were determined in a way aligned with the program outcomes. McTighe and Wiggins (2012) summarized seven key tenets of UbD model of instructional design: UdB helps teachers to think purposefully about curricular planning, UbD framework help learners to develop, deep and transform what they learn, authentic performance underlies understanding of what is taught, backward planning yields to effective curriculum that eliminates the common problems, teachers' role changes and they become coaches of instruction not sole resource of content knowledge, curriculum and units are evaluated for improving curricular quality and effectiveness and UbD focuses on continuous improvement on student achievement, and allows for adjustments in curriculum. Aligned with these seven principles, UbD framework could possibly be

adopted for undergraduate programs including mathematics, history, arts and curricula in other fields including MIS program.

Lewis et al. (2020) defined learning outcomes as short, clear, and specific statements which indicate what students achieve at the end of an instructional process. These brief statements should be student-centered, content-centered and performance-centered (Brookhart & Nitko, 2019). For cognitive assessment of a learning objective, focus should be on performance verb that help us to evaluate if its performance-based or not. Being performance-based is closely related to evaluation of the learning objective for being appropriate for educational assessment. Performance verbs are also used for evaluation of grouping learning outcomes in cognitive levels of Bloom Taxonomy. Anderson and Krathwohl (2001) summarize the reasons of categorizing learning objectives as: to look learning objectives from students' perspective, to consider possibilities in education, to evaluate the relationship between knowledge and cognitive processes, to ease educational assessment procedures, to guide how to teach and how to assess, and to make better sense of educational terminology. Bloom Taxonomy is an essential guide for designing and assessing specific learning objectives, and it is one of the main references when it comes to assessment of program learning outcomes. For example, Hasan, Heck and Govindaraju (2024) examines an engineering course that adapts a model of instruction according to Bloom's Taxonomy.

Management information systems (MIS) is an undergraduate program that focuses on information systems and management. MIS curriculum consisted of courses that focuses on information systems, heavily focus on technology and software development, and on management perspective, which emphasize financial management and business. The ultimate goal of the program is to graduate students who are equipped with both technological such as software development, mobile programming etc. and financial knowledge and skills. As of 2022, 47 public universities, and 84 private universities offered MIS programs as 4-year undergraduate program (YOK, 2022). The MIS curriculum includes 96 courses offered in total, and the course descriptions are accessible through the Bologna web page of the program (EOS, 2023). Program outcomes and course learning outcomes were analyzed based on the cognitive domain of Bloom's Taxonomy under the scope of this study.

3. METHOD

Research Approach / Model

According to Patton (2014), "the case study approach to qualitative analysis constitutes a specific way of collecting, organizing and analyzing data; in that sense it presents an analysis process" (p.447). Patton defines the purpose of case studies as collecting comprehensive, systematic and in-depth information

about each selected cases. In this manner, qualitative case study design was used in the design of the research, and the data were obtained, arranged and analyzed accordingly. Patton clarifies that case studies might be nested or layered, and a single program can be a case study in evaluation in which multiple –nested-cases can be studies within that single program. Under the scope of this program, MIS program was selected as a single case, while course curricula were analyzed as multiple individual cases. As a result, as Patton emphasizes analysis begun with the course curricula of MIS program, and cross-case pattern analysis of single cases became part of the data for MIS program case study analysis. Document analysis was selected to collect data where documents were the course syllabi or curricula taught at the MIS undergraduate program.

Sampling and Selection

In this study, document analysis was used and documents as cases were selected from an undergraduate MIS program offered by a public university in Türkiye. Course syllabi and curricula of MIS program as case study documents were selected because they were easily accessible, recently developed and has been actively taught in 2022-2023 academic year. In total, 96 documents were analyzed and compared. The list of courses was attached in appendices. MIS program consists of 47 compulsories, 43 selective and 6 extracurricular courses in total and all included in the analysis under the scope this research study.

Data Collection and Analysis

Data collected through content analysis of the MIS program curricula and syllabi of the courses. In total, 96 cases were analyzed through qualitative content analysis. Data resources were available online as open-access. No data was collected from groups of individuals or resources that are subject to IRB approval. Data was retrieved from publicly accessible online documents, so the research was exempt from IRB approval. Patton (2014) emphasizes that research is guided by purpose. In this regard collected data was analyzed to answer research questions that guided the research through case analysis. Cases could be defined as individuals, groups, neighborhoods, programs, organizations, cultures, regions, or nation states and they are the units of analysis (Patton, 2014). MIS program was defined as a case, and program units were defined as cross-cases. The analysis is started with evaluation of MIS program outcomes based on the cognitive domain of Bloom's Taxonomy. List of action verbs created by Anderson and Krathwohl (2001) was used as a reliable reference for evaluation of program and learning outcomes for each course. MIS program syllabi and curricula were analyzed and in total 96 cases were examined. Program learning outcomes, and course learning outcomes were evaluated according to cognitive domain of the Bloom's Taxonomy. Performance verbs were also analyzed for whether they were stated in a way so that they can be directly measured or observed for planning reliable and

valid assessment procedures. During the analyses, inter-rater reliability was not sought because the evaluation criteria were clear, unambiguous and not subjective for being affected by evaluator's bias.

Findings

MIS undergraduate program was selected because the curricula is up-to-date and was designed by considering the Bologna procedures. YOK (2023) defines Bologna Process as a reform that aims to develop a European Higher Education Area by 2010, and that sets several targets to achieve this aim. Remediation and update efforts, which mainly started with joining the Bologna process, have accelerated for more than a decade in Turkish higher education system. Efforts in Bologna processes are aligned with accreditation studies in higher education for increasing quality especially in undergraduate programs. Not only Bologna processes, but also accreditation focus on instructional design of the programs, required program and course learning outcomes, and how to collect evidences for educational assessment and how to teach for having learners to reach these learning outcomes and associated with it to reach program objectives. This sequence shows similarities with principles of UbD model of instructional design. UbD also requires course learning objectives associated with program objectives, gathering evidences and planning instructional processes.

UbD instructional design starts with program objectives consulted with stakeholders, and course learning outcomes, then planning of assessment procedures and finally designing of instructional content and practices. Thus, learning goals and objectives are the must have fundamentals of this instructional design, so that they can lead instructors to reliable and valid assessment of learning outcomes, and planning and applying instructional practices. In this study, MIS program learning outcomes and course learning outcomes were analyzed based on the following criteria: (a) whether the program learning outcome (PLO) and course learning outcomes (CLO) were performance-based; (b) whether performance verb(s) of the PLO and CLO were directly measurable or observable so they were appropriate for valid and reliable educational assessment of learners; and (c) if criteria a and b were satisfied than in which cognitive domain category of Boloom's Taxonomy they were placed in.

Evaluation of MIS Program Learning Outcomes

Program learning outcomes are set for determining what learners will be able to know and do at the end of the undergraduate program. Therefore, they are not very specific but broad enough to be achieved at the end of the program by all learners. For the MIS program fourteen PLOs, which were attached in the annexes, were selected. Primary evaluation indicated that they were all stated as performance-based although some of them were double-barreled which means that those include more than one performance verbs in one statement. In these cases,

PLOs were segmented in a way, so each PLOs has one performance verb and at least one content for valid evaluation. After segmentation, 21 PLOs were determined although 14 were listed in investigated cases. Evaluation of performance verbs of PLOs, resulted that they all selected on purpose and they were directly measurable and observable for valid and reliable educational assessment planning. However, it should be kept in mind that the association and alignment between CLOs and PLOs should be the main focus while evaluating the PLOs from educational assessment perspective. The analysis, indicated that 21 PLOs were performance-based, measurable and/or observable for valid and reliable educational assessment planning. The PLOs were distributed over the cognitive domains of the Bloom's Taxonomy according to the performance verbs based on the list of Anderson and Krathwohl (2001). The final analysis indicated that PLOs were grouped under cognitive domain as eight PLOs were under application; three PLOs were under analysis, three PLOs were under synthesis; seven PLOs were under evaluation, and none under knowledge and comprehension levels. Findings from assessment of PLOs were presented in Table-I:

Table 1: Assessment of Program Learning Outcomes

Cognitive Domain						
	Knowledge (K)	**Comprehension (C)**	**Application (AP)**	**Analysis (AN)**	**Synthesis (S)**	**Evaluation (E)**
PLO1			2		1	
PLO2			2			
PLO3						1
PLO4					1	
PLO5			1			
PLO6			1			
PLO7				1		
PLO8					1	
PLO9				1		1
PLO10						2
PLO11			1	1		
PLO12						1
PLO13						1
PLO14			1			1
Total*	0	0	8	3	3	7

* Total number of PLOs were different than PLOs listed in the syllabi due to double-barreled learning outcomes.

Evaluation of MIS Course Learning Outcomes

MIS undergraduate program is designed for fourteen weeks in both fall and spring semesters. There are three types of enrollment to the courses: compulsory, selective and extracurricular. Compulsory courses are mandatory for all students enrolled in the program. These courses include but not limited with algorithm and introduction to programming, graphic design and animation, statistics or visual

programming. Selective courses on the other hand are offered for students whom want to learn and to gain more experience in a specific field of content such as search engine optimization or governance/e-governance. Full list of courses offered in MIS undergraduate program is attached to annexes. Although there is no must-have number of course learning objectives, it is desired to have enough number of CLOs to have students achieve PLOs. Depending on the structure of the CLOs and performance verb associated with Bloom Taxonomy, teaching for a single CLO might take few minutes to few weeks including valid and reliable assessment procedures. However, for a fourteen-week program that includes midterm exams, it might be reasonable to have at least ten CLOs per course of instruction. From an educational assessment perspective, two to three specific learning outcomes (SLOs) could possibly be determined under the CLOs for weekly or unit-based instructional practices. In this manner, SLOs should be well aligned with CLOs and those should be well associated with PLOs. Educational assessment procedure should start from evaluation of specific learning outcomes at the bottom of assessment planning. Assessment of specific learning outcomes is not subject to this study.

The MIS curricula was examined for course learning outcomes through 96 course syllabi, and the results were shown in Table 2:

Table 2: Number of learning objectives per case under cognitive domain

Cases	K	C	AP	AN	S	E	NM		K	C	AP	AN	S	E	NM
C1							5	C49	1	1^{1}				1	1
C2	1	1	1				2	C50							2
C3	2^{2**}	3^{3}		1	1	7	0	C51				1	1		1
C4		4	1	1			1	C52	1						4
C5		1	1				3	C53	3^{3}	3^{3}		3		3	0
C6							3	C54							3
C7							1	C55	3	3^{1}		4	1	1	0
C8							3	C56			2				1
C9							3	C57							1
C10		4	3	3		4	0	C58	2^{2}	7^{5}				3	0
C11		2^{1}	3				0	C59	1^{1}	1	1	2		5	0
C12			3	1		1	0	C60						1	2
C13					1		2	C61							3
C14		1					1	C62	1^{1}						2
C15	1^{1}	8^{6}	1				0	C63				1			1
C16			4			1	2	C64	1						0
C17							5	C65	1						2
C18	2						1	C66	1^{1}	1^{1}	8			4	0
C19			1	1		1	2	C67						2	0
C20		9^{9}	1	1	1		0	C68	3	1^{1}	1				0
C21							1	C69							3
C22			1				0	C70			1				0
C23			1				2	C71				1			2
C24			1				2	C72				1			0
C25		2	2			1	1	C73			1				0
C26						2	1	C74			1				3
C27		1	1				1	C75							2
C28	2^{1}	5^{3}	1		1	1	0	C76	2	6^{6}		5		1	0
C29	1	1	1	2			0	C77						1	2
C30							1	C78	1		1				0
C31				1			0	C79			1		1	1	1
C32				1			0	C80		1				1	3

* K: Knowledge, C: Comprehension, AP: Application, AN: Analysis, S: Synthesis, E: Evaluation, NM: Not Measurable-Observable

** indicates number of learning objectives that are cross-loaded under more than one cognitive level.

Table 2 Cont.: Number of learning objectives per case under cognitive domain cont.

Cases	K	C	AP	AN	S	E	NM		K	C	AP	AN	S	E	NM
C33						2	0	C81							5
C34				2		2	3	C82							1
C35							3	C83		6^{2}		4			0
C36	2^{2}	4^{4}	1	2		4	0	C84			1	2		1	5
C37				1		2	2	C85			1				3
C38			2			2	4	C86							1
C39	1		2		1	1	0	C87	2^{1}	7^{6}	3	1		1	0
C40	1						1	C88		5^{2}		6		1	0
C41			1	1		1	2	C89	1	1^{1}	1	1			1
C42			1	1		1	2	C90						1	5
C43						1	2	C91						1	3
C44			2			1	2	C92	1	1	4				1
C45	1	1		2		1	0	C93	1		2				2
C46			3				1	C94							4
C47			2			3	0	C95							4
C48		1^{1}					1	C96	1		2				2
								TOTAL	41	92	72	53	8	68	142
								TOTAL	334						

* K: Knowledge, C: Comprehension, AP: Application, AN: Analysis, S: Synthesis, E: Evaluation, NM: Not Measurable-Observable

** indicates number of learning objectives that are cross-loaded under more than one cognitive level.

Under the scope of this research study, 47 compulsories, 43 selective and 6 extracurricular courses were examined according to the same criteria used for analyzing program learning outcomes. In total, 476 CLOs were specified in MIS undergraduate curricula. Regarding the first evaluation criteria, 142 of them were not performance-based so they cannot be used for further analysis. These CLOs either did not have a performance verb and just stated as a content, or the performance verbs were stated in a way so they could not be measured and/or observed during instructional period for educational assessment. Two steps of analysis indicated that almost %30 of the CLOs stated in MIS undergraduate curriculum were not well-stated, not performance-based and not appropriate for collecting evidences as proofs for achievement of learners. Remaining %70 (n=334) were included into the 3rd step of analysis and distributed over the cognitive domains of Blooms Taxonomy. It should be noted that some performance verbs could be listed under two cognitive categories. In this study, such cross-loaded CLOs were listed under the lower cognitive category. For example, performance verb “explain” is listed in both comprehension and synthesis cognitive domains. In such a case, as a performance verb “explain” was listed under comprehension. The distribution of 334 performance-based, measurable and observable CLOs over cognitive domains of Bloom Taxonomy was summarized as: 41 (%12) under knowledge, 92 (%28) were comprehension, 72 (%22) were

application, 53 (%16) were analysis, 8 (%2) were synthesis and 68 (%20) were evaluation. Out of 41 CLOs under knowledge sub-domain, 15 (36%) of them were cross-loaded items, depending on the evidence collection and educational assessment planning along with course content and instructional strategies, those 15 might be distributed over higher cognitive levels. Likewise, under comprehension sub-domain, 56 CLOs out of 92 (61%) were cross-loaded as well, so depending on the instructional and assessment practices those can be distributed over higher cognitive sub-domains of Bloom's Taxonomy. Instructional design requires a balanced distribution over the cognitive domain of Bloom's Taxonomy. The percentiles %12 for knowledge, %28 for comprehension, %22 for application, %16 for analysis, and % 20 for evaluation were acceptable, but %2 for synthesis level is not enough for a balance. It's a fact that expecting 16.66% (100% / 6 cognitive subdomains) distribution over each cognitive domain might not be realistic in practice, but it could theoretically be suggested and an acceptable deviation could be tolerated. Also, 476 CLOs were listed for 96 cases in total. Average CLOs per course is 4.9, and it reduces to 3.5 when ill-structured and non-measurable CLOs were excluded. This average was not sufficient for a fourteen-week undergraduate program.

4. DISCUSSION, SUGGESTIONS AND LIMITATIONS

Understand by Design (UbD) concept of instructional design has become popular at the beginning of the 21st century in Turkish higher education especially because of Bologna processes and accreditation efforts in undergraduate programs. In this manner, planning and remediation have focused on increasing quality, and many initiatives have been carried out on along with these efforts. Under the scope of this paper, an undergraduate MIS program was analyzed based on its program learning outcomes and course learning outcomes. In this qualitative research, the program itself was accepted as a case, and course syllabi and curricula were evaluated as cross-cases under the main case.

The results of the study indicated that UbD model of instruction was followed based on the documentation required for the Bologna processes. However, in many cross-cases the instructional design was ill-structured. Program learning objectives were analyzed according to their distribution over the Bloom's Taxonomy. Although psychomotor and affective domains were not subject to this research, preliminary analysis indicated that no program learning outcomes were determined in these domains. However, instructional design should include program learning outcomes which aligned with psychomotor or affective domain as well. For example, Case 43 RFID Technologies and Applications requires psychomotor skills for assembling electronic circuits, so PLOs should include such statements for aligning the course with PLOs. Likewise, Case 60 Research & Development and Innovation Management requires CLOs in affective domain.

MIS programs aim to graduate skillful and innovative workforce whom are life-long learners, and those should be reflected upon PLOs as well as CLOs in course syllabi. So that assessment planning and instructional planning should be aligned with the CLOs and then with the PLOs. Instructional design of the MIS program heavily focuses on cognitive domain, but not psychomotor and affective domains.

The study showed that PLOs were over-loaded to higher cognitive domains such as analysis, synthesis and evaluation whereas CLOs were over-loaded to lower cognitive levels such as knowledge, comprehension and application. This situation creates an inconsistency and disconnection between CLOs and PLOs since none of the PLOs was grouped under first two cognitive domains namely knowledge and comprehension. To minimize the gap and strengthen the relation between CLOs and PLOs, PLOs should be updated and new PLOs that address to the knowledge and comprehension should be selected. It should be noted that the PLOs should be determined by consulting with educational stakeholders. Double-barreled and ill-structured PLOs should be eliminated. PLOs should be stated clearly as performance-based to allow designers to collect evidences of achievement and to plan for effective instructional practices.

Regarding course learning outcomes, the analysis revealed that average number of CLOs was 3.5 for a 14-week program. Also, number of CLOs that were neither measurable nor observable was very high, and ill-structured CLOs negatively affect planning of assessment and teaching practices. CLOs should be restated in a way that they allow instructional designers to plan for collecting evidences for achievement of learners, and also to plan for selecting and using the best teaching practices. Some cases, such as Case 15 Statistics I and Case 20 Statistics II are well planned and UbD instructional design practices were followed. On the other hand, some cases, such as Case 7 Introduction to Business or Case 9 Business Mathematics should be redesigned since none of the CLOs were performance based nor measurable or observable. If CLOs were ill-structured, then specific learning objectives (SLOs) cannot be determined properly by the instructional designer. Educational assessment of learning should start with SLOs that are closely aligned with CLOs. If CLOs are ill-structured then it is not realistic to expect valid and reliable assessment results and effective teaching practices selected to teach for having students to achieve SLOs, CLOs and finally PLOs.

For the deficiencies in instructional design, several reasons could be listed especially considering UbD principles. Potential instructors who might or might not have a pedagogical formation could possibly plan the courses. Their knowledge and experience in instructional design and educational assessment especially under UbD model could possibly be limited. These could create a disadvantage for the instructional design of the MIS program. The purpose of this study was to reveal the current situation by outlining the instructional design of the MIS curricula to

offer suggestions to improve the quality in MIS undergraduate program. Following suggestions could be made:

a) MIS curricula especially CLOs should be revised and aligned with PLOs. Both CLOs and PLOs should allow instructors to determine SLOs for on-purpose educational assessment and for on-purpose teaching practices. All should be distributed over the cognitive domains in a balanced manner and also should include PLOs and CLOs for psychomotor and affective domains. PLOs should be revised by consulting with all educational stakeholders of the MIS program that include NGOs, private business owners, software developers, and finance experts etc.
b) PLOs, CLOs and even for the SLOs in-service training programs should be planned. UbD principles should be explained in detail and the best practices should be introduced to the instructors.
c) Overall instructional design should be modularized so SLOs and CLOs should be revised based on assessment evidences, learner feedbacks and peer feedbacks from other faculty members. PLOs should also be revised according to new trends, needs and expectations of learners and stakeholders.
d) Self-assessment of undergraduate programs should be planned. Principles of UbD should be considered in this assessment. PLOs should be determined with educational stakeholders, CLOs should be selected with instructional designers, and instructors should be free to state SLOs by considering students' readiness levels, school facilities etc. SLOs should help all learners to achieve CLOs.

This research study is also limited with undergraduate MIS program at a public university. Both public universities (n=47), and private universities (n=84) offered MIS programs. Thus, it should be needed for more comprehensive analysis for better evaluation of instructional design of MIS programs. This study will very helpful to outline strengths and weaknesses of the instructional design of the MIS programs. Thus, it could be repeated after redesign of the program for a comparative assessment.

6. ANNEXES

Case	Course / Case Titles	Code	Semester	T+P Hour	Credit	ECTS	Enrollment
C1	Introduction to Information Systems and Technologies	YBS-101	1	3+0 3	3	5	C*
C2	Introduction to Management Information Systems	YBS-102	2	3+0 3	3	5	C
C3	Algorithm & Introduction to Programming	YBS-103	1	2+2 4	3	5	C
C4	Management and Organization	YBS-104	2	3+0 3	3	5	C
C5	Basic Economy	YBS-105	1	3+0 3	3	5	C
C6	General Accounting	YBS-106	1	4+0 4	4	4	C
C7	Introduction to Business	YBS-107	1	3+0 3	3	4	C
C8	Business Mathematics II	YBS-108	2	3+0 3	3	5	C
C9	Business Mathematics I	YBS-109	1	4+0 4	4	5	C
C10	Graphic Design and Animation	YBS-110	2	3+0 3	3	5	C
C11	Computer Operating Systems	YBS-201	3	2+2 4	3	4	C
C12	Marketing Principles	YBS-202	4	2+0 2	2	4	C
C13	Basic Law	YBS-203	3	3+0 3	3	5	C
C14	Database Management Systems	YBS-204	4	2+2 4	3	4	C
C15	Statistics I	YBS 205	4	3+0 3	3	4	C
C16	Object Oriented Programming	YBS-206	4	2+2 4	3	5	C
C17	Data Structures	YBS-207	3	2+2 4	3	4	C
C18	Computer Network and Security	YBS-208	4	2+2 4	3	4	C
C19	Cost Accounting	YBS-209	3	3+0 3	3	4	C
C20	Statistics II	YBS-210	4	3+0 3	3	4	C
C21	Organizational Behavior	YBS-211	3	3+0 3	3	4	C

C22	Strategic Management	YBS-212	4	3+0 3	3	4	C
C23	English I	YBS-213	3	4+0 4	4	5	C
C24	English II	YBS-214	4	4+0 4	4	5	C
C25	Visual Programming	YBS-301	5	2+2 4	3	5	C
C26	Project Management	YBS-302	6	2+2 4	3	5	C
C27	System Analysis and Design	YBS-303	5	2+2 4	3	5	C
C28	Research Methods	YBS-304	6	3+0 3	3	5	C
C29	Operations Research	YBS-305	5	3+0 3	3	4	C
C30	Communication Techniques	YBS-306	6	3+0 3	3	4	C
C31	Vocational English I	YBS-307	5	4+0 4	4	5	C
C32	Vocational English II	YBS-308	6	4+0 4	4	5	C
C33	Human Computer Interaction	YBS-320	6	3+0 3	3	4	S*
C34	Programming Languages	YBS-321	5	2+2 4	3	4	S
C35	Human Resources	YBS-322	6	3+0 3	3	4	S
C36	Modelling and Simulation	YBS-323	5	2+2 4	3	4	C
C37	AI and Machine Learning II	YBS-324	6	2+2 4	3	4	S
C38	Web Programming	YBS-325	5	2+2 4	3	4	S
C39	Data Mining	YBS-326	6	2+2 4	3	4	S
C40	Assistive Technologies	YBS-327	5	2+2 4	3	4	S
C41	Embedded Systems and Programming	YBS-328	6	2+2 4	3	4	S
C42	E-Commerce	YBS-329	5	3+0 3	3	4	S
C43	RFID Technologies and Applications	YBS-330	6	3+0 3	3	4	S
C44	AI and Machine Learning I	YBS-331	5	2+2 4	3	4	S

Case	Course / Case Titles	Code	Semester	T+P Hour	Credit	ECTS	Enrollment
C45	Labor Economics	YBS-332	6	3+0 3	3	4	S
C46	Office Automation I	YBS-333	5	2+2 4	3	4	S
C47	Office Automation II	YBS-334	6	2+2 4	3	4	S
C48	IoT and Industry 4.0	YBS-335	5	3+0 3	3	4	S
C49	Applied Entrepreneurship	YBS-336	6	2+2 4	3	4	S
C50	Governance, e-Governance	YBS-337	5	3+0 3	3	4	S
C51	Neuro Marketing	YBS-339	5	3+0 3	3	4	S
C52	Public Relations	YBS-351	5	3+0 3	3	3	E*
C53	Presentation Techniques	YBS-352	6	3+0 3	3	3	C
C54	Total Quality Management	YBS-353	5	3+0 3	3	3	E
C55	Ethics in Informatics	YBS-354	6	3+0 3	3	3	C
C56	Computer Use	YBS-355	5	3+0 3	3	3	E
C57	Work Safety	YBS-356	6	3+0 3	3	3	E
C58	Project I	YBS-401	7	2+2 4	3	5	C
C59	Project II	YBS-402	8	2+2 4	3	5	C
C60	Research & Development and Innovation Management	YBS-403	7	3+0 3	3	5	C
C61	Enterprise Resource Management	YBS-404	8	3+0 3	3	5	C
C62	Product Management	YBS-405	7	3+0 3	3	5	C
C63	Supply Chain and Logistics	YBS-406	8	4+0 4	4	5	C
C64	Health Informatics systems	YBS-420	8	3+0 3	3	4	S
C65	Software Test Techniques and Applications	YBS-421	7	2+2 4	3	4	S
C66	3D Modeling with 3Ds MAX	YBS-422	8	2+2 4	3	4	S

C67	Search Engine Optimization	YBS-423	7	2+2 4	3	4	S
C68	E-Government and E-Municipality	YBS-424	8	3+0 3	3	4	S
C69	Computer Games Programming	YBS-425	7	2+2 4	3	4	S
C70	Vocational English IV	YBS-426	8	3+0 3	3	4	S
C71	Parallel Programming	YBS-427	7	2+2 4	3	4	S
C72	Quantitative Techniques in Finance	YBS-428	8	2+2 4	3	4	S
C73	Vocational English III	YBS-429	7	4+0 4	4	5	S
C74	Current Accounting Software and Applications	YBS-430	8	2+2 3	3	4	S
C75	Information Technologies Law	YBS-431	7	3+0 3	3	4	S
C76	Artificial Neural Networks with MathLab	YBS-432	8	2+2 4	3	4	S
C77	Mobile Programming	YBS-433	7	2+2 4	3	4	S
C78	Virtualization and Cloud Computing	YBS-434	8	2+2 4	3	4	S
C79	Decision Models	YBS-435	7	3+0 3	3	4	S
C80	Virtual Reality Applications	YBS-436	8	2+2 4	3	4	S
C81	Corporate Accounting	YBS-437	7	3+0 3	3	4	S
C82	Business Mind	YBS-438	8	3+0 3	3	4	S
C83	Social Media Analysis	YBS-439	8	3+0 3	3	4	S
C84	Autonom and Semi-Autonom Systems	YBS-441	7	3+0 3	3	4	S
C85	Game Throry	YBS-451	7	3+0 3	3	3	S
C86	Occupational Health and Safety	YBS-452	8	3+0 3	3	3	S
C87	Graphical Information Systems	YBS-453	7	3+0 3	3	3	S
C88	Traffic Security Systems	YBS-454	8	3+0 3	3	3	S
C89	Communication and Advertisement	YBS-455	7	3+0 3	3	3	E

Case	Course / Case Titles	Code	Semester	T+P Hour	Credit	ECTS	Enrollment
C90	Web Design	YBS-456	8	3+0 3	3	3	E
C91	Ataturk's Principles and History of Revolution I	ZAI101	1	2+0 2	2	2	C
C92	Turkish Language I	ZTD101	1	2+0 2	2	2	C
C93	Foreign Language I	ZYD101	1	2+0 2	2	2	C
C94	Ataturk's Principles and History of Revolution II	ZAI102	1	2+0 2	2	2	C
C95	Turkish Language II	ZTD102	1	2+0 2	2	2	C
C96	Foreign Language II	ZYD102	1	2+0 2	2	2	C

* C: Compulsory, S: In-Field Selective, E: Out-of-Field Elective

Ethical Declaration

In this study, all the rules stated in the "Higher Education Institutions Scientific Research (Türkiye) and Publication Ethics Directive" were followed.

Ethics Committee Approval

The author declare that the research is one of the studies that does not require ethical committee approval.

Conflict of Interest and Funding

No conflict of interest and funding has been declared by the author.

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