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ÖĞRENCİ KILAVUZU: ÇEVRİMİÇİ TEKNOLOJİLER ÖĞRENME STİLLERİNE GÖRE NASIL KULLANILABİLİR

ÖZET

Yapılan araştırmalar, öğrencilerin öğrenme stillerine göre yapılandırılmış öğrenme materyallerinin, hem yüz yüze hem de karma eğitimde öğrenci başarılarını artırdığını göstermektedir. Bu makalede, bir akış şeması oluşturularak, öğrencilerin asit ve bazlar konusunda değişik öğrenme stillerine uygun olarak hazırlanmış bir karma öğrenme ortamını etkin biçimde kullanmaları hedeflenmiştir. Akış şemasında Felder ve Silverman Öğrenme Stili Modelindeki Hissederek/Sezgisel, Görsel/İşitsel, Yaparak/Düşünerek, Sıralı/Bütünsel alt boyutları kullanılmıştır. Ayrıca her öğrenme stiline uygun öğretme stratejileri de akış şemasına eklenmiştir. Bu çalışmanın öğrenciler için soyut kimya konularını anlamalarında yardımcı olacağı ve ayrıca fen eğitimi alanında karma öğretim sunan eğiticiler için de faydalı olacağı beklenmektedir.

Anahtar Kelimeler: Fen Eğitimi, Karma Eğitim, Felder-Silverman Öğrenme Stilleri Modeli

A LEARNER GUIDE: HOW CAN ONLINE TECHNOLOGIES BE USED BASED ON LEARNING STYLES

ABSTRACT

It has been argued by researchers that, by customizing learning materials according to different types of learning styles, achievement level would be increased in both face to face and blended learning environments. In this paper, it was suggested a flowchart to help learners on how they can use a blended learning environment more effectively on acids and bases with respect to their learning styles. The flowchart was designed by using Felder and Silverman's Learning Style Model with the dimensions of Sensitive/Intuitive, Visual/Verbal, Active/Reflective, and Sequential/Global. The most appropriate teaching strategies based on the literature for each learning style dimension were also included in the flowchart. It is hoped that this study will be helpful for educators who offer blended instruction in science education and also will be beneficial for learners in order to provide them with much more understanding of nature of abstract chemistry topics such as acids and bases.

Keywords: Sscience Education, Blended Learning, Felder-Silverman Learning Style Model

1. INTRODUCTION (GİRİŞ)

The rapid growth in the use of blended technologies has provided teachers with many opportunities to explore the most suitable mix of teaching and learning styles for a given task. Especially in the last decade, faculty members have been encouraged to adopt a greater blend of technologies in their drive to expand opportunities, widen participation and stimulate a greater acceptance of lifelong learning.

Blended learning has been defined as "to develop, promote and evaluate the combination of established ways of learning and teaching and the opportunities offered by technology in order to improve students' learning and increase flexibility in how, when and where they study" (CETL, 2010). In other words, it is described as a combination of face-to-face and on-line delivery, which is believed to suits a wider range of learning styles. Such a blend of e-learning and class-based learning combines the any time/pace/place advantages of online facilities and materials, often through a mix of media, with opportunities for teacher support. Blended learning offers a variety of teaching and learning styles, course materials and learning strategies (traditional classroom, lecture, laboratory environment, Web 1.0 and Web 2.0, synchronous and asynchronous tools).

Numerous studies, which specifically focused on science education, have showed that blended learning was more effective than traditional instruction when it was complemented by appropriate strategies (Sancho et. al., 2006; Garrison &Vaughan, 2007; Pereira et al., 2007). It is not always easy, however, to create a truly effective and balanced blended learning environment. Students' awareness of their learning styles would increase the understanding about their learning process. In addition, it is also important for teachers to know their students in order to provide better support for them and improve their teaching and learning process (Felder & Silverman, 1988; Graf, Kinshuk, & Liu, 2009; Oravcova, 2009). Analyzing learning styles would help in the design of blended instruction and increase the chances of developing the right blend. Many researchers agree on the fact that customizing learning materials and learning modules according to different types of learners would increase the learning outcomes (Yazıcı, 2005; Liegle & Janicki, 2006;). The most effective learning always involves the use of different strategies and techniques to maximize knowledge acquisition and skill development (Poole, 2006). It is in the educators' best interest to provide as many opportunities for the learner to access the educational content as possible and to do so in a way that the student can learn without finding the experience difficult. One learning style is not effective for all learners, so various ways should be provided for them to receive their instruction via blended learning. In this sense, it is necessary to organize resources to support the learning process in a way that not only suits the characteristics of a few students, but also meets the needs of each student.

A few blended environments, however, have provided a learner guide in terms of how learners can benefit from online technologies based on their learning preferences. The online part of blended learning environments can be designed in different ways to match different learning styles. Therefore, this study's general guiding principles for chemistry learners on acids and bases topics were proposed based on different learning styles. Chemistry education cannot be taught fully online since it requires mastery of in the laboratory experiments. Thus, the online lessons should be supported by hands-on laboratory activities. Moreover, animations and visual media are very useful for understanding the nature of abstract

concepts (Burewicz & Miranowicz, 2005; Morgil, Yavuz, Özyalçin-Oskay, & Arda, 2005; Dalgarno, Bishop, Adlong & Bedgood, 2009).

The purpose of the study is to propose a flowchart (see Appendix 1) which includes appropriate teaching strategies that can be used by learners in a blended learning environment according to their learning styles on acids and bases topics within a university chemistry course. The flowchart was created based on the Felder & Silverman learning style model (FSLSM) (Felder & Silverman, 1988) by combining and adapting teaching strategies and electronic media that was proposed by Franzoni and Assar (2009).

The rest of the paper is organized as follows: Description of FSLSM and related teaching and learning strategies and appropriate electronic media which was suggested by Franzoni and Assar (2009) are presented in the next section. The other section comprehends the flowchart that is organized for a chemistry topic. In the following section, an example is presented on how learners can follow and use the flowchart based on their learning preferences. The last section includes the concluding remarks and comments with directions for future work.

2. RESEARCH SIGNIFICANCE (ÇALIŞMANIN ÖNEMİ)

Although numerous studies specifically focused on science education showed that blended learning is very effective, it is not easy to create a truly effective blended learning environment. It is also important to know students' learning preferences in order to accomplish student centered blended learning environment and provide better support for them. This study gives opportunity for students to know their learning styles and also for educators to choose the best teaching strategies for instructional activities in their blended environment. The study specifically focuses on chemistry learners taking acids and bases topics.

3. FELDER-SILVERMAN LEARNING STYLE MODEL (FELDER-SILVERMAN ÖĞRENME STİLLERİ MODELİ)

Many learning style models have been proposed in the literature by Kolb (1984), Honey-Mumford (1982), Pask (1976), Grasha-Riechmann (1974), Gardner (1983), Martinez-Bunderson (2000), Fleming's VARK Model (2001), and Felder-Silverman (1988). In this study Felder-Silverman learning styles model (FSLSM) was used because (1) it is one of the well known and often used models, especially in technology enhanced learning environments and the model considers learning styles as tendencies rather than obligatory types (Carver, Howard, & Lane, 1999; Graf, Kinshuk & Liu, 2009), (2) it is user friendly and easy to use (Franzoni & Assar, 2009), and (3) it combines major learning style models (Hong & Kinshuk, 2004).

Felder and Silverman (1988) define the learning style term as the characteristics, strengths and preferences in the way learners get and process information. Accordingly FSLSM, learners can be classified by four dimensions; each learner is characterized by a specific preference for each of these dimensions, though these characteristics are tendencies not distinct patterns of behaviors. The learners may show signs of either type on any given occasion. One of the categories in each dimension may be preferenced as strong, moderate, or mild by learners. Also there may be a balance of the two categories. The dimensions can be described as follows:

- **Sensing/Intuitive Learning Style Dimension (Perception):** This dimension is related to the kind of information which learners tend to receive. While sensitive learners like observing, gathering data through the senses, facts and experimentation,

intuitive learners prefer indirect perception through imagination and hunches. Sensitive learners like solving problems with common methods and do not like complications, unlike intuitive learners who search for innovative methods, dislike repetition, and are open to surprises.

- **Visual/Verbal Learning Style Dimension (Presentation):** The way of presentation is the key element in this dimension. Visual learners prefer visual representations of presented material such as pictures, diagrams, flow charts, timelines, films, demonstrations and animations. While verbal learners remember what they read and hear, like verbal explanations, and learn effectively by explaining what they learned to others.
- **Active/Reflective Learning Style Dimension (Processing):** The learners are distinguished by the way in which they process information: active or reflective. Active learners like working and communicating with others and prefer group work. Reflective learners learn best by thinking about and reflecting on the learning material. They favour working alone. Active learners tend to be experimentalists, while reflective learners tend to be theoreticians.
- **Sequential/Global Learning Style Dimension (Perspective):** This dimension explains whether learners make progress sequentially or globally. Sequential learners like to receive information in small pieces with a linear learning process. They like to get the details. In contrast, global learners prefer a holistic thinking process and tend to be more interested in the big picture.

Franzoni and Assar (2009) suggested appropriate teaching strategies and environments and electronic media according to FSLSM dimensions as seen in Table 1. Some of the teaching strategies can be fit with more than one dimension. For example, forums can be used for sensitive, verbal, active, and global learners. In other words, learners may be matched with the same teaching materials on the online part of blended environments more than once. The important thing is to design the same teaching resources and electronic media in different ways which can fit with different learning styles. For example, a discussion forum can be designed for sensitive learners to solve given problems cooperatively with each other or can be designed for sequential learners by giving theoretical presentations as sequentially (Franzoni and Assar, 2009).

Table 1. Teaching strategies based on FSLSM
(Tablo 1. FSLSM'ye göre öğretim stratejileri)

Learning Style Dimension		Students' Characteristics	Appropriate Teaching Strategies
Perception	Sensitive	Like learning facts and concrete concepts and to relate the learned topic to the real world Solve problems by well-established methods and dislike complications Realistic, sensible, and practical.	Forums, Blogs, Wikis, Presentations with animations, Graphics and pictures, Question and answer method, Learning based on problem solving
	Intuitive	Prefer to learn abstract concepts Like discovering possibilities and relationships Like innovation and dislike repetition Innovative and creative	Internet research, Tutorial, Webquest, Discussion panel, Games and simulations, Role playing
Input	Visual	Remember best when they see visual materials such as pictures, diagrams, flow charts, time lines, films, and demonstrations	Wikis, Games and simulations, eBooks, Slideshows, Sounds and streaming video, Animations, Videoconference
	Verbal	Like to get more out of words, textual representations, written and spoken explanations.	Forums, Audio/videoconference, Podcast, Videoconference, Discussion panel, Brainstorming, Question and answer method
Processing	Active	Learn best by working actively with the learning material. Like to be more interested in communication with others. Like group work	Forums, Blogs, Wikis, Chat and email, Role playing, Discussion panel, Brainstorming, Project design method
	Reflective	Prefer to think about the material. Like working alone	Tutorial, Internet research, eBooks, Presentation, Case study, Question and answer method
Understanding	Sequential	Learn in linear steps Tend to follow logical stepwise paths in finding solutions.	Audio-conference, eBooks, Tutorial, Presentation, Question and answer method
	Global	Tend to learn in large jumps and tend to be interested in overviews. Solve complex problems quickly once they have grasped the big picture	Forums, Blogs, Wikis, Chat and email, Role playing, Brainstorming, Case study, Project design method

4. AN EXAMPLE FOR USING THE FLOWCHART (AKIŞ ŞEMASININ KULLANIMINA İLİŞKİN BİR ÖRNEK)

The following example illustrates how online technologies can be used according to the flowchart (Appendix 1) on strong and weak acids and bases. Learners prefer to use different teaching resources by following the flowchart as they have different learning styles and tend to learn in different ways. First, the learners will be asked whether they are sequential or global learners. As sequential learners learn in small steps and have a linear learning progress, a tutorial which includes step by step instructions can be offered to the students. For example, first the properties of strong and weak acids and bases and specific examples will be presented and then the description of the topic can be given out. In contrast, global learners like to see the whole picture; it can be useful for them to receive general principles before they learn the details. For instance, first the description of the strong and weak acids and bases can be given and then more specific examples of the relationships between the subjects can be offered. Some learners may be well balanced on both dimensions of the learning styles. In this situation, it can be suggested to the learners to choose the option that they think is most appropriate for them.

After completing the first step, they will move to the second step on the flowchart, which aims to determine if the learner is sensitive or intuitive. Sensitive learners prefer practical content and methods that allow the solution of problems. Students can begin with a daily life example for learning acids and bases such as HCl, one of the common strong acids, which reacts completely with water to produce hydronium ions. In addition, a table which shows the properties of strong and weak acids and bases will be given to the students. Following the above steps, theoretical knowledge, question and answer method, and related problems about the topic can be used. Intuitive learners, by contrast, prefer concepts and exposition strategies. Therefore, theoretical knowledge and related examples can be presented to the learners. They can be forwarded to a forum in order to discuss the topic and communicate with others. Likewise, a role playing method such as asking learners to come up with a role play to explain how strong acids and bases ionize in water.

The aim of the third step of the flowchart is to determine the visual and verbal learners. While animations and simulations can be presented for visual learners, some videos that include the explanations of the topic can be presented to the verbal learners. Additionally, an offer to go to a forum to discuss the topic as intuitive learners will be made.

The last step aims to offer examples for active and reflective learners. Active learners have a tendency to practice with new information and prefer to learn with others. Therefore, experiments can be done in the laboratory as groups. The requested homework must include work in groups such as preparing a presentation on using strong and weak acids and bases in daily life. In addition, learners can discuss the topic on forums. On the other hand, reflective learners tend to learn alone. The requested homework must be prepared alone on the same topic.

5. DISCUSSION (TARTIŞMA)

Many instructors and faculties have attempted to put instructional materials on chemistry as well many other science subjects on the Internet. Educational systems generally, however, offer single and standardized teaching resources to all learners. Many researchers agree on the fact that the importance of applying these

learning materials should be that they designed for all kinds of learning styles. Generally, many instructors are not able to put into practice such an approach, the reasons for that are course time constraints, unavailability of the appropriate resources, etc. Thus, blended learning which combines face to face and online learning can be suitable in order to ensure this aim. In this study, therefore, the authors suggested a flowchart as a guide to help students learn acids and bases more effectively with respect to their learning styles in an online part of blended environment. FSLSM including *Sensitive/Intuitive, Visual/Verbal, Active/Reflexive, and Sequential/Global* were considered when developing the flowchart. Online technology enhanced examples have also been presented for using the flowchart based on these learning styles.

A future study will be conducted on the efficacy of the online technologies on acids and bases by using the flowchart that was suggested in this study. Various learning materials will be developed based on the learning styles of students and they will be offered in Moodle Learning Management System (LMS). Students will be asked to use the flowchart and choose the most appropriate materials on the LMS. It is hoped that the flowchart will be useful to educators when preparing online technologies within the blended learning environments, especially for science topics. In addition, learners will be able to efficiently improve their learning process on acids and bases with such methods and also be satisfied with the personalized online material.

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NOTICE (NOT)

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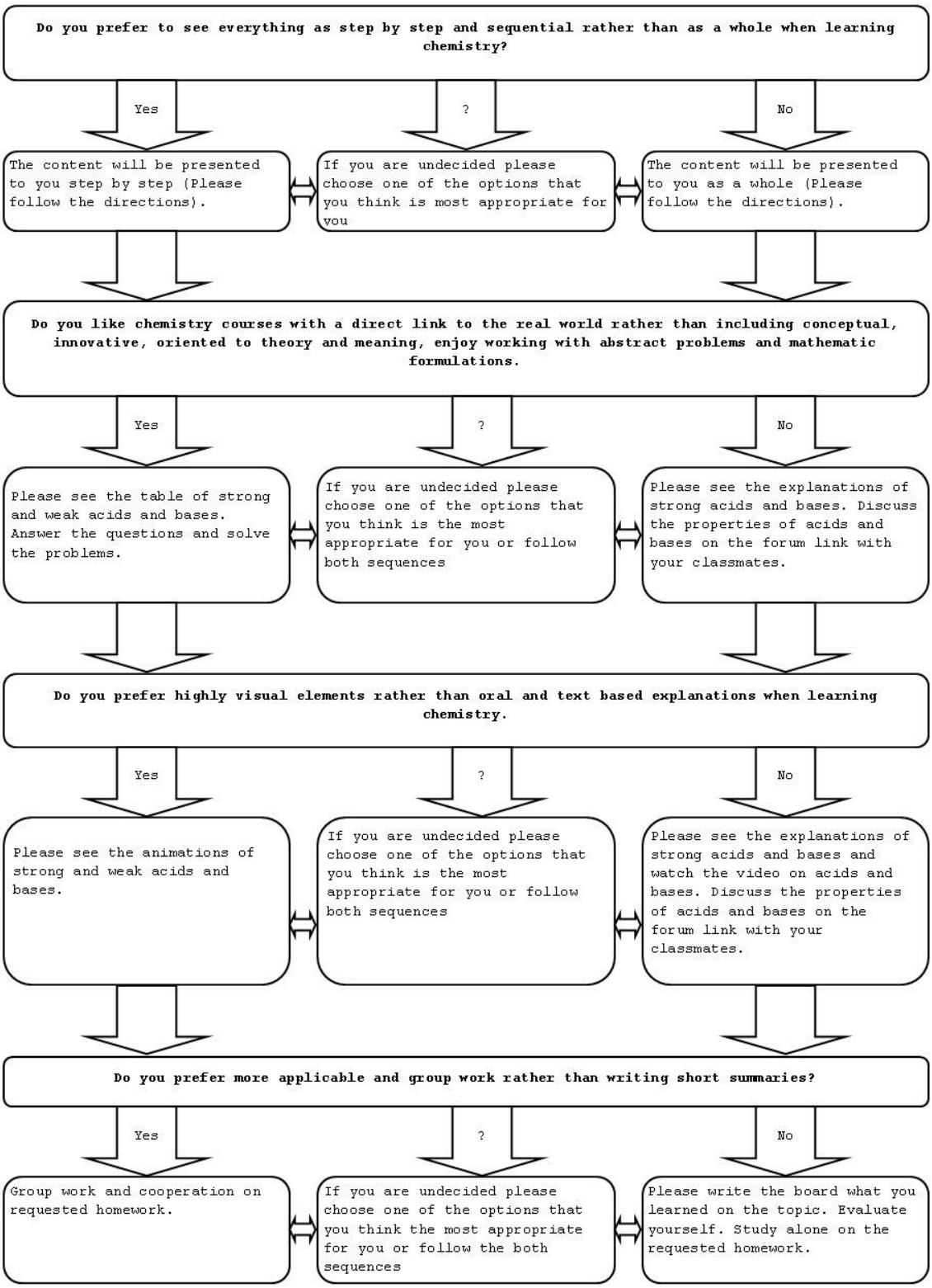
APPENDIX (EK)



Appendix 1. A learning style flowchart on acids and bases
(Ek 1. Asit ve bazlar ünitesi için öğrenme stilleri akış şeması)