VI меѓународен балкански конгрес за образование и наука: СОВРЕМЕНОТО ОПШТЕСТВО И ОБРАЗОВАНИЕТО

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INFORMATION TECHNOLOGY AND LEARNING STYLES

Abstract
Students differ in the way they learn. Some students want to see the material in order to learn it, while others need only to hear it. Some students want to have some time to think and reflect on the new materials, while others prefer to do some physical activity related to it. Some students would rather work alone, while others want to talk and share their ideas with other students. As teachers we have to be aware of this fact and provide conditions for learning for all kinds of learners, which means that we have to employ a wide range of techniques and activities to cater for the needs of all learners. Using technology is one of the ways to address the different learners' needs because it makes it possible to combine many elements so that learners with different styles can benefit from the same activity. This paper discusses the possibilities that information technology offers for satisfying the needs of learners with different learning styles, which is one of the aims of modern education.

Key words: *information technology, learning styles, learning style models, tools, techniques and activities.*

Introduction

One of the factors that determine the success in learning is the learning style that the learner uses in approaching the tasks and processing information. Learning styles, according to Keefe (1979) are "characteristic cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment". Dunn and Griggs (1988: 3) define the learning style as 'the biologically and developmentally imposed set of characteristics that make the same teaching method wonderful for some and terrible for others'. Research has shown that students have different preferences and use different methods in learning. Some students prefer to work with facts and figures and need concrete examples in order to grasp the new material, while others are more comfortable with theoretical explanations and abstractions; some prefer to interact with others and retain the information better if they are involved in pair and group activities, others prefer to work alone and have time for thinking and reflection; some like to see visual presentation of the informa-

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tion in the form of pictures, graphs, diagrams, video presentations, etc., while others prefer verbal explanations.

Skehan (1998: 237) points out that 'the style someone adopts may partly reflect personal preference rather than innate endowment'. This implies that students may not be aware of their different abilities, and by adopting a style they feel most comfortable with they ignore other possible ways that may help them improve their learning experience and miss the opportunity to discover other ways of learning and approaching tasks which can be useful for them. Furthermore, the aim of education is to equip students with the skills and abilities that will enable them to function effectively as professionals, so that if they learn only in their preferred style, they will not develop the variety of skills they need in order to be successful as students and professionals. On the other hand, if the teacher teaches in a way that is not compatible with the student's learning style, the student may feel frustrated and develop negative attitude towards learning. Thus, teachers should strive to satisfy the needs of the learners by using their preferred style of teaching and learning, and at the same time expand their preferences by utilizing different teaching and learning styles, so that part of the time students feel comfortable with their learning style, but they are also given opportunities to experience and discover other learning styles and approaches that will enable them to develop versatile skills and abilities and reach their potential both as students and professionals.

Learning style models

Several learning style models have been developed in order to describe and explain the different learning styles. Teachers need to be aware of the different learning style in order to provide a variety of teaching methods and select classroom activities to match the learning styles of their students. Felder and Brent (2005: 58-59) remark that the concept of learning styles is not universally accepted and that learning style models have been criticised for having no sound theoretical basis. However, studies in this area show 'a clear and consistent picture of learning style differences and their effects on student performance and attitudes'. Moreover, the use of a broad range of learning styles has consistently proved more successful than the use of a limited number of learning styles.

Myers-Briggs Type Indicator (MBTI)

This model is based on Carl Jung's theory of psychological types and has been used to classify learning styles in many disciplines. Students' profiles are identified along four dimensions: orientation to life (extroverted/introverted), perception (sensing/intuitive), decision making (thinking/feeling), and attitudes to the outside world (judgment/perception):

- *extraverts* (try things out, focus on the outer world of people) or *introverts* (think things through, focus on the inner world of ideas);
- *sensors* (practical, detail-oriented, focus on facts and procedures) or *intuitors* (imaginative, concept-oriented, focus on meanings and possibilities);

- *thinkers* (sceptical, tend to make decisions based on logic and rules) or *feelers* (appreciative, tend to make decisions based on personal and humanistic considerations);
- *judgers* (set and follow agendas, seek closure even with incomplete data) or *perceivers* (adapt to changing circumstances, resist closure to obtain more data).

<div align="right">(Felder and Brent, 2005; Montgomery and Groat, 1998)</div>

Students can be said to belong to one of the 16 MBTI categories based on their preferences, strengths and weaknesses. Thus, a student who is introverted, sensing, feeling and judging would be categorized as having an ISFJ personality (Montgomery and Groat, 1998: 2).

Kolb's Learning Style Model
This model is based on the assumption that all learning entails a cycle of learning modes, but each individual is likely to feel most comfortable in one of the four modes of the cycle based on her/his preference along two dimensions: perception (abstract/concrete) and processing (active/reflective):
- *Type 1* (concrete, reflective). A characteristic question of this learning type is *"Why?"* Type 1 learners respond well to explanations of how course material relates to their experience, their interests, and their future careers. To be effective with Type 1 students, the instructor should function as a *motivator*.
- *Type 2* (abstract, reflective). A characteristic question of this learning type is *"What?"* Type 2 learners respond to information presented in an organized, logical fashion and benefit if they have time for reflection. To be effective, the instructor should function as an *expert*.
- *Type 3* (abstract, active). A characteristic question of this learning type is *"How?"* Type 3 learners respond to having opportunities to work actively on well-defined tasks and to learn by trial-and-error in an environment that allows them to fail safely. To be effective, the instructor should function as a *coach*, providing guided practice and feedback.
- *Type 4* (concrete, active). A characteristic question of this learning type is *"What if?"* Type 4 learners like applying course material in new situations to solve real problems. To be effective, the instructor should stay out of the way, maximizing opportunities for the students to discover things for themselves.

<div align="right">(Felder, 1996)</div>

According to this model, each academic field can be matched with different learning styles. Thus, the concrete/reflective style is predominant in the social sciences and humanities, the abstract/reflective style is characteristic for the physical sciences, the abstract/active style is mostly used in science-based professions such as engineering, and the concrete/active style reflects the more social professions such as education (Montgomery and Groat, 1998: 3).

Felder-Silverman Learning Style Model

The Felder-Silverman Learning Style Model consists of five dimensions, two of which correspond to some of the dimensions in the two previous models:

- *sensing learners* (concrete, practical, oriented toward facts and procedures) or *intuitive learners* (conceptual, innovative, oriented toward theories and meanings);
- *visual learners* (prefer visual representations of presented material--pictures, diagrams, flow charts) *or verbal learners* (prefer written and spoken explanations);
- *inductive learners* (prefer presentations that proceed from the specific to the general) or *deductive learners* (prefer presentations that go from the general to the specific);
- *active learners* (learn by trying things out, working with others) or *reflective   learners* (learn by thinking things through, working alone);
- *sequential learners* (linear, orderly, learn in small incremental steps) or *global learners* (holistic, systems thinkers, learn in large leaps).

Felder (1996) offers some strategies for teachers to ensure that the way the information is presented would appeal to a range of learning styles: teaching theoretical material by first presenting phenomena and problems that relate to the theory (sensing, inductive, global); balancing conceptual information (intuitive) with concrete information (sensing); making extensive use of sketches, plots, schematics, vector diagrams, computer graphics, and physical demonstrations (visual) in addition to oral and written explanations and derivations (verbal) in lectures and readings; giving some experimental observations before presenting the general principle, and have the students (preferably working in groups) see how far they can get toward inferring the latter (inductive); providing class time for students to think about the material being presented (reflective) and for active student participation (active); demonstrating the logical flow of individual course topics (sequential), but also pointing out connections between the current material and other relevant material in the same course, in other courses in the same discipline, in other disciplines, and in everyday experience (global).

O'Connor (2011) states that despite the wide range of models, the concept of learning styles is very useful for teachers because it provides a stable-enough characterization to plan pedagogical strategies. He offers some general conclusions for teachers that seem to cut across the various models:

- Students will learn better when using preferences in which they're successful.
- Students will be better learners when they can expand their preferences.
- When teaching accommodates various preferences, more students will be successful.
- Teachers can construct activities that include specific (& multiple) learning preferences.
- This can be done by adding alternatives or, completing learning cycles that incorporate all styles or, by utilizing holistic, complex tasks.

The role of information technology

Today, in the era of information technology, computers have become an indispensable part of teaching and learning. It is believed that by using technology students will become more motivated and will participate more actively in the classroom activities, and that it can help them develop their problem-solving and critical thinking skills. However, technology by itself cannot accomplish anything if it is not used properly by teachers and students. Technology offers enormous possibilities, but it should not be used for its own sake. When planning lessons, teachers should consider the objectives of the lesson and the learning styles of the students before deciding on the method that he/she would use in that particular lesson and selecting the types of activities through which these objectives can be best achieved. Moreover, they should also have in mind the basic conditions for effective lessons – coherence and variety (Harmer, 1998: 133). As with traditional activities, teachers need to make sure that there are different types of computer-based activities that are connected and form a logical whole. It is impossible to mention all the possible uses of information technology in teaching and learning, as the possibilities are limitless. So, we will suggest only a few ways of using techno-logy in and outside the classroom:

- Electronic mail, forums, online groups, list servers, social networking sites allow active, extrovert and verbal learners to interact with others, ask questions, share ideas, take part in discussions, etc.
- Blogging, surfing the net, using encyclopaedic collections, dictionaries, electronic books, database programmes, problem-solving games and activities, individual projects, digital portfolios etc. can be useful for reflective, introvert and analytical learners as they can work at their own pace and have time to think and reflect on the material they are learning and the task they are doing.
- Software such as PowerPoint, Macromedia Flash, CAD, Photoshop, CorelDraw, Paint, Visual Artwork, mind mapping software, video creating software, graphic organizers, animation software and so on can help visual learners as they learn best by visualising, imagining and seeing things.
- For active, concrete, experiential, analytical and sensing learners, web-based activities such as Web Quest, Scavenger Hunt, Filamentality, as well as educational networks such as The National Geographic Kids Network, Science Toolkit, Personal Science Lab or Electronic Field Trips offer possibilities for analytical thinking, experimenting, presenting the results of their experiments on the computer using presentation software etc.
- Programmed instruction combined with online tests and quizzes with provided feedback are suitable for sequential, reflective and introvert learners who need structure and who prefer individual learning to pair or group activities.
- Hypermedia applications are good for global, inductive, concrete learners as the information is presented in a non-sequential way, so that learners can navigate through the material as they wish by using various links that lead to other texts, video, audio or graphics and synthesise the different pieces of information into a meaningful whole.

Conclusion

Students come to the classroom equipped with different skills and abilities and a preferred way of learning. In order to teach successfully, teachers need to employ a variety of teaching methods and techniques to cater for the needs of all learners. When there is a mismatch between the teaching style and the students' learning styles, the objectives of the course cannot be achieved and the teaching and learning experience will be full of frustrations and disappointments. Therefore, in order to be effective teachers, they need to recognize the different learning styles of the students in the classroom and adapt the teaching to suit their learning preferences. However, it is neither possible nor desirable for learners to learn exclusively in the way they feel most comfortable with. So, the best learning experience for learners would be to learn partly in the way they prefer, and partly in less preferred ways in order to develop different skills and abilities that they need to be successful both in their studies and in their future professions.

One of the ways to address different learning styles and to broaden students' learning preferences is by using technology and computers. Information technology offers numerous options through computer programmes, different software applications and web-based activities. A lot of technology-based activities include different media formats and require different skills so that the same activity can be suitable for learners with different learning styles at the same time. When used appropriately, technology can enrich students' learning experiences, it can increase their motivation, and it can help them reach their potential in an interesting and enjoyable way.

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