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RESEARCH ARTICLE

The Vark Learning Styles among University Students of Business Schools

Los estilos de aprendizaje Vark en estudiantes universitarios de las escuelas de negocios

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Summary

The aim of this research was to know the learning styles in the students of the business schools of a private university in the Department of Lambayeque. An applied survey, a test of VARK learning styles, was applied to 218 university students (71 students of Administration and 147 students of International Business Administration), from the II to X term of the business schools of said University. During the first semester of the 2018, it was found that 25.5% of students have a multimodal learning style. It was also found that age is significantly associated with learning styles. Finally, a significant relationship between the learning style and the professional school is demonstrated. On the one hand the Administration students have mostly a multimodal learning style (two or more styles), while international business students have a reading/writing learning style.

Keywords: Learning Styles; VARK; Multimodal Learning; Reading/Writing Learning; Undergraduate Students.

Resumen

La presente investigación tuvo como objetivo conocer los estilos de aprendizaje en los estudiantes de las escuelas de negocios de una universidad privada del departamento de Lambayeque. Mediante una encuesta aplicada, prueba de estilos de aprendizaje VARK, a 218 universitarios/as (71 estudiantes de Administración y 147 estudiantes de Administración de Negocios Internacionales), del II al X ciclo de las escuelas de negocios de dicha universidad durante el primer semestre del 2018. Se encontró que el 25.5% de los/as estudiantes tienen un estilo de aprendizaje multimodal; asimismo, se halló que la edad está asociada significativamente a los estilos de aprendizaje. Finalmente, se demuestra una relación significativa del estilo de aprendizaje y la escuela profesional, de un lado los/las estudiantes de Administración tienen en su mayoría un estilo de aprendizaje multimodal (dos o más estilos); mientras que los/las estudiantes de Negocios Internacionales tienen un estilo de aprendizaje lecto/escritora.

Palabras clave: Estilos de aprendizaje; VARK; Aprendizaje multimodal; Aprendizaje lecto/escritora; Estudiantes de pregrado.

Introduction

In the tertiary education sector, specifically in universities, the academy constantly makes contributions to strengthen the abilities of the students in order to improve their academic performance. Research works address from diagnoses to know the external and internal problems that influence the academic performance (Chilca, 2017; Gul, et al., 2016; Chafloque, et al., 2018) and topics on how to improve the academic performance through study habits (Espinoza, 2017; Hernández, Rodríguez & Vargas, 2012; Otero & Torres, 2005), teaching methodologies (Palazón, Gómez, Cándido, Concepción, & Gómez, 2011; Gonzalez & María, 2007), environments and scenarios for a better learning, (García - Valcárcel & Tejedor, s.f.), learning styles (Estrada, 2018; Freiberg, Ledesma & Fernández, 2017; Acevedo, Tirado & Montero, 2015; Ortiz, Sánchez & Lozano, 2013; Esguerra & Guerrero, 2010; Gonzáles, Constanza, & Padilla, 2010) and family environment (Torres & Rodríguez, 2006; Covadonga, 2001).

When a teacher concludes a class or learning session, the teacher conducts an evaluation of the topics addressed, through questions, exams or rubrics. The teacher will take into account the different criteria according to the competency he wants to reach (López, et al., 2014). Although the class session is developed in similar conditions for the group of students (same center of studies, same professional school, same pre-requirements acquired, similar intellectual capacity, similar age, similar teacher), the results of the evaluation show that not all the students achieve a satisfactory learning. This does not mean that a student has less abilities than others, but there are different learning styles (Martín–García, 2003; Barrio & Nicasio, 2000; Cano, 2000)

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and that each student has different abilities or that they can vary as the time goes by (Gómez del Valle, 2003; Ordoñez, Rodriguez, & Plaza, 2003).

Learning involves a series of "biological and psychological processes that occur in the cerebral cortex that thanks to the mediatization of thinking" (Díaz, 2012, page 6), the student ends up modifying the information as part of his knowledge, skill, attitude and experiences that he is acquiring when interacting with the external environment. That is, we can talk about learning when there is a lasting change, for which the phase of doing is important

Kolb (1975) takes as a starting point Piaget's theory and he considers learning in 4 stages that are going to occur as a continuous spiral and if all of them are achieved, learning ends up being significant for the student.

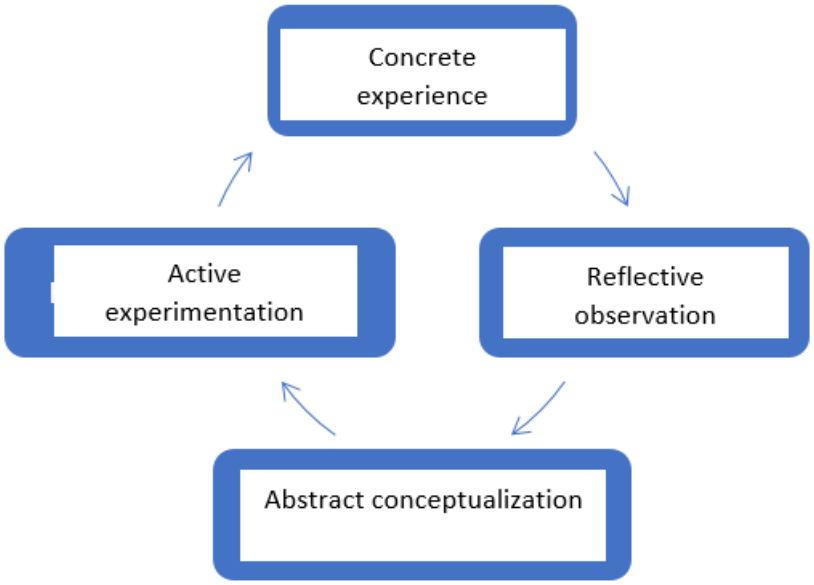

Figure 1. Stages of the learning cycle according to David Kolb (Source: Diaz, 2012)

Each student, depending on his particular circumstances, interest, preference or pleasure, will feel more comfortable in some stages, such is the case that if a student learns and enjoys the moments that include experience training activities, he is considered as an active students. On the other hand, we have students who are passionate through observation and in the middle of it they reflect, they are considered reflective students. Other group of students prefers the phases where knowledge is shared through concepts, theories, laws, etc. This group is considered as theoretical students. Finally, there are students who like more the moments where they learn by doing and this group of students are considered as pragmatists. (Diaz, 2012).

Richard Bandler and Jhon Grinder propose postulates that contribute to the Neuro-Linguistic Programming (NLP), which state that the individual tends to have a behavior produced and programmable, where the emotional state will be determined by the sensory perception, evidenced through a communication that can be verbal and non-verbal (Vinyamata, 2011; Bórquez, 2002). The NLP divides the sensory perceptions into three systems: visual, auditory, kinesthetic.

In this work, we use the model proposed by Neil Fleming and Collen Mills, who finished in 2006 the development of a simple instrument in order to determine the preferences of sensory modality when processing the information, they call it VARK: Visual, Auditory, reading/writing and kinesthetic (García Nájera, 2007). For Lozano (2004), the VARK model supposes that each student can identify his own learning style, be aware of their sensory preferences (Sarmiento,

Mayté, & Tuyub, 2017), adapt to the teaching style of the teacher and act on his own modality, in order to increase the use of their learning (Núñez, Hernández, Tomás, & Felipe, 2013). The VARK model provides a quantification of preferences of the students in each one of the four sensory modes (Gonzáles, Alonso, & Rangel, 2012). Figure 2 shows the activities that can be employed and that can support each learning style.

Figure 2. Activities proposed for each VARK learning style. (Source: Hawk & Shah, 2007)

Many people will have a dominant representation system or in some case, they combine both systems. Then, a classroom with a group of students with similar characteristics and each one of them with different dominant sensory representation system, the teacher should incorporate the methodological strategies that benefit all the learning styles, from the moment of motivation to the part of the evaluation of knowledge learnt. (Varela, 2006).
In this context and taking into account that there are several learning styles in university students, the aim of this study is to analyze the learning styles of the undergraduate students at a private university of the city of Chiclayo.

The knowledge generated through this research will allow knowing the existing relationship between the academic and demographic characteristics and the learning style, as well as to accurately understand the learning styles by professional schools. Based on the evidence generated, managers, teacher and students of the university under study could be involved, so that they can commit to implementing actions to improve learning styles according to the professional school.

Method

Research Design

The research design used was non-experimental, descriptive-correlational.

Population and Sample

The population was composed of all the students (men and women) who were studying the second and tenth term of the business schools, in the 2018-I semester of a private university in the city of Chiclayo. The population was composed of 135 students of the professional school of administration and 251 students of the professional school of international business administration.

The type of sampling used was probabilistic stratified by the professional school, with 97% of confidence and 5% of error, so there were only 71 students of the professional school of

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administration and 147 students of the professional school of international business administration.

In addition, 218 students participated: 134 women with an average age of 20.87 (D.E. 2.03) and 80 men with an average age of 21.64 (D.E. 2.20). Students surveyed belonged to the professional schools of administration and international business administration from the second and tenth term. The study period was during the academic 2018 – 1 semester. Table 1 shows the demographic and academic characteristics of the students surveyed.

Table 1.
Demographic and academic characteristics of the sample.

Administration (71)	International Business Administration (147)
Sex Women= 57.7% Men = 42.3% *Age* 21.17 (D.E. 2.26) *Occupation* Only study = 65.7% Study and work = 34.3% *Year of admission to the university* 2014.66 (D.E. 1.69) *Term enrolled* 5.97 (D.E. 2.42) *Courses enrolled* 6.43 (D.E. 1.57) *Courses enrolled* General courses = 7.6% Introductory courses = 28.8% Training courses = 45.5% Final courses = 18.2% *Grade point average* 13.70 (D.E. 1.52)	*Sex* Women = 64.6% Men = 35.4% *Age* 21.00 (D.E. 2.06) *Occupation* Only study = 75.5% Study and work = 24.5% *Year of admission to the university* 2014.17 (D.E. 1.89) *Term enrolled* 6.40 (D.E. 6.43) *Courses enrolled* 7.56 (D.E. 684) *Courses enrolled* General courses = 4.1% Introductory courses = 36.6% Training courses = 28.3% Final courses = 31.0% *Grade point average* 13.29 (D.E. 1.49)

Instrument

The study used a questionnaire structured as a self-report, which has demographic and academic questions as well as the learning style scale.

Learning style scales: the test "VARK Model" was used, it is an instrument proposed by Fleming & Mills (1992). They design an instrument that takes into account the way in which people process information according to their sensory modality preference. For Lozano (2004), the VARK model at the beginning identified the sight, hearing and the movement as learning styles, which are just those that mark the first learning of the person since he was born, and then once they acquire the reading-writing skill, they have a new way of acquiring and filtering information.

Such is the case that at the beginning, the VARK model included only 13 questions, then in 2006, 16 questions with 4 answers each. (Fleming, 2006).

Translated from English to Spanish, revised by experts in the area of education regarding the level of relevance, intelligibility, definition and syntactic formulation of each question. (See Appendix1).

Authors such as Gónzales, Alonso, & Rangel (2012), Nuñez, Hernández, Tomás, & Felipe (2013) Dania & Marchisio(2013 - 2014) and Castillo & Mendoza (2015) use the VARK model in order to evaluate the learning style in a population with similar characteristics to those of this research (university students).

Statistical Analysis

The statistical data processing was conducted by using the statistical software SPSS 22.0 for Windows. To determine the relationship between the variables that characterize the students of the professional business schools, the independence test was used. In addition, an ANOVA was conducted in order to find out if there were significant differences in the average age of the students for each learning style of the student.

Validity and Reliability

For the reliability analysis of the scale, the reliability coefficient Cronbach's Alpha was used. The learning style scale (α=0.528) obtained a lower Alpha than the expected (α = 0.706). This is due to the fact that the scale presents excluding data. This does not indicate any problem, since the learning style are different and this can exclude the other.

The VARK test was validated by Leite, Svinicki & Yuying (2009) through a confirmatory factor analysis, obtaining scores of 0.85; 0.82; 0.84 and 0.77 for each sub-scale, considering it as an appropriate test.

The construct validity analysis was conducted through the Principal Component Analysis (PCA) with Varimax rotation. The 16 items under study provided a factor solution of 6 components with a total variance of 52.53% of the original data.

Procedure

The survey was administered and assisted in person by trained professionals. The students were informed about the objectives and scopes of the study. Confidentiality and anonymity were guaranteed. Their participation was voluntary, without any kind of academic, economic or other incentives. The students completed the survey during class hours, the average time was 15 minutes.

Results

The VARK model takes into account four learning styles: visual, auditory, reading-writing and kinesthetic. In addition, 29.5% of students perceive the information through written words and showed in handouts or books. While 19.3% of students learn doing or experimenting, for instance, in laboratories or exercises applied. In similar percentage, 17.4% of students learn by hearing and talking, that is, when they participate in the classroom, they learn more. Finally, 8.3% of them perceive information through images that could include figures, symbols, charts, slices and others. For Fleming (2006), a person can present 1 or more learning styles; 25.7% of the students of the professional schools of administration and international business administration have a multimodal learning style (see Figure 3).

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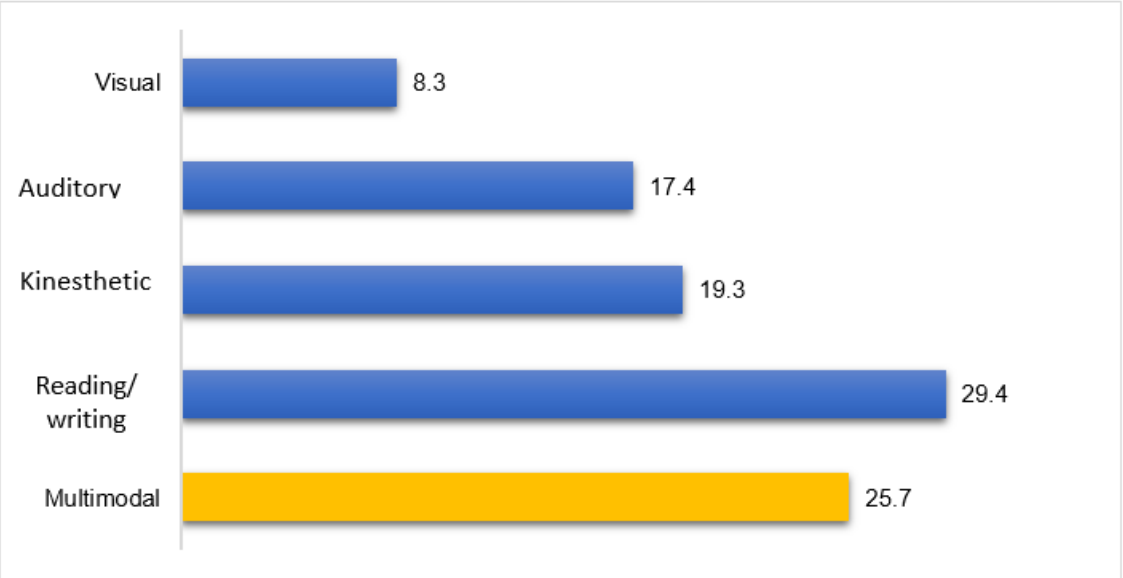

Figure 3. Learning styles of students of the business schools - VARK

This research associated the socio-demographic and academic characteristics with the learning styles. It found significant relationships with age and the professional school. According to age, in students aged 18 predominate the auditory learning style, in students aged 19-23 predominate the reading/writing learning style, in students aged 24 predominate auditory learning style, and in students aged 25-26, the learning style that is applied by most of the students is kinesthetic.

Another important aspect analyzed is the learning style that stands out in every student, taking into account his age and the type of course he studies. In students aged 18-23, the learning style that predominates is the reading/writing, especially in students who are studying general courses, introductory courses, professional training courses and research training courses.

Table 2.
Characteristics of the students of the Business Schools according to learning styles.

Characteristics	Learning Styles				
	V	A	R	K	Multimodal
Sex					
Masculine	22.2	33.3	43.1	45.2	33.9
Feminine	77.8	66.7	56.9	54.8	66.1
Academic situation					
Only study	73.2	59.5	75.0	83.3	72.6
Study and work	26.8	40.5	25.0	16.7	27.4
Professional school*					
Administration	27.8	42.1	28.1	19.0	42.9
International business administration	72.2	57.9	71.9	81.0	57.1
Work experience					
Yes	50.0	54.1	55.0	67.6	50.9
No	50.0	45.9	50..	32.4	49.1
Age **					
18 – 20 years	38.9	45.9	39.7	41.5	32.1
21 – 23 years	38.9	21.6	54.0	51.2	50.0
24 – 26 years	22.2	32.4	6.3	7.3	17.9
Academic performance					
Less than 11.9	11.8	10.5	9.5	9.5	47.3
12 – 13.9	35.3	42.1	58.7	58.7	14.5
More than 14	52.9	47.4	31.7	31.7	38.2

Note: *p-value<.05, ** p-value <.01

This research found a significant association between learning styles and professional school. In addition, 35.6% of students that belong to the professional school of administration have a multimodal learning style (including 2 or more learning styles). On the other hand, the students that belong to the professional school of international business administration have a reading/writing learning style (32.0%) (See Table 3).

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Table 3.
Learning styles according to the professional business school.

Learning Styles*	Professional School	
	Administration	International business administration
V	6.8	8.7
A	21.9	14.7
R	24.7	32.0
K	11.0	23.3
Multimodal	35.6	21.3

*P-value <.05

The curriculum of the professional business schools is divided by areas or type of information that the student is acquiring: general training courses, introductory courses, professional courses and research courses. Table 4 shows that kinesthetic learning predominates in the group of students studying general training courses (31.6%). Most of the students studying introductory courses and research training courses have a reading/writing learning (27.1%). Finally, the group of students studying professional training courses have a multimodal learning style (34.7%). Despite finding obvious results, no significant association was found between variables.

Table 4.
Learning styles and type of course

Type of course	Learning Style				
	V	A	R	K	Multimodal
General training	9.1	18.2	27.3	36.4	9.1
Introductory training	6.6	18.4	31.6	22.4	21.1
Professional training	5.6	15.3	31.9	12.5	34.7
Research training	13.6	18.6	27.1	18.6	22.0

Table 4 shows the relationship between academic performance and learning styles, although there is no a significant association. We can observe signs that students who have an academic performance lower than 11.9, have a multimodal learning style, while the students who have an academic performance from 12 to 13.9 have a reading/writing learning. Finally, students with an academic performance higher than 14 have two learning styles: multimodal and kinesthetic.

Table 5.
Learning styles and academic performance.

Learning styles	Academic Performance		
	Less than 11.99	From 12 to 13.99	More than 14
V	8.3	5.7	9.9
A	16.7	15.2	19.8
R	25.0	37.1	22.0
K	16.7	16.2	24.2
Multimodal	33.3	25.7	24.2

A variance analysis showed that there are significant differences in learning styles and the age of the student. The auditory learning style will have more influence according to the age of the student, being the students aged 24 who use more this learning style (F: 2.896, P-value=0.004).

Discussion

Studying the learning styles helps to understand the process of perceiving and processing the information in this case of the undergraduate students (Alonso, & Rangel, 2012; Nuñez, Hernández, Tomás, & Felipe, 2013; Dania & Marchisio, 2013 – 2014; Castillo & Mendoza, 2015). This study showed that 25.5% of the students have a multimodal learning style. Varela (2006) mentions Fleming, who provides a significant contribution to education by suggesting that teachers should know and adapt the learning sessions to the preferences the students have for receiving information and as a consequence, facilitate learning for an optimal performance.

The curriculum of each professional school has a series of courses that will contribute to the professional training of students according to the specialty chosen. Most of the students of the professional school of administration has a multimodeal learning (two or more styles), which is typical of a business administrator who must have the skills to organize, research, analyze, propose, execute and make sound decisions, having an integral, critical and innovative vision (FCARRHH, 2018). On the other hand, most of the students of the professional school of international business administration has a reading/writing learning style, which is typical of the training they are receiving, in which when making decisions, they need to know and have a vision of the company in a global context, for which they should read about the external and internal reality of a country (FCARRHH, 2018). Nuñez, Hernández, Tomás, & Felipe (2013) in the research they did on students of the professional school of Computer Science, they found that they have a kinesthesic learning style, bearing relation with the development of most of their courses that involve practical activities, movements, time space, that is, they learn by doing. It is very important to know learning styles according to the professional training of the students, so that the courses included in the curriculum use teaching techniques, evaluation systems and activities that help to train professionally competent students.

In this study, the academic performance is not associated with the learning style in a significant way, similar conclusion found in other research works (Chafloque, et al., 2018; Acevedo, Tirado, & Montero; 2015; Ortiz, Sánchez, & Lozano, 2013; Gonzáles, Constanza, &

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Padilla, 2010) indicating that others are the factors that influence the academic performance (environmental, physical, emotional, etc.). However, it is necessary to know if the teacher are considered the learning style of the students to give their learning sessions according to Gónzales, Alonso, & Rangel (2012).

The age is significantly associated with the learnign styles. In the group of the youngest students (aged 18-23) mostly predominate a single learning style. In students aged 24-26 predominate the multimodal learning style. Martín & Rodríguez (2003) say that as people get older, they lose that dominant character (referring to the learning style), since they start to combine different styles according to the moment, which reinforces their hypothesis that lies in the fact that the older the poeple, there is interindividual vairability. The research works of Gómez del Valle (2003) and Ordoñez, Rodriguez, & Plaza, (2003) suggest to conduct a longitudinal study to see if the age has impact on the definition of learning style.

Sex and learning style are not associated in a significant manner, so both men and women have mostly reading/writing and multimodal learning style. Barrio & Nicasio, (2000), Cano (2000) indicate that there are differences in learning styles according to the sex of the students. In the same line, Martín–García (2003) explains that the learning style is not associated with sociodemographic variables (sex, marital status and level of education).

According to the objectives set, the learning styles of the students of the Business Schools are described, finding that according to the professional school, the student has a marked learning style (Administration: Multimodal, International Business Administration: reading/writing). In addition, there are no significant association between learning styles and academic performance of the sudents, sex, occupational situation, type of course and professional experience. Likewise, there is no significant association betwen the learning style and the age of the students, finding that as getting older, learning style stops being just one.

Finally, it is necessary to study other variables such as motivation, study habits, environments for learning, etc. to know if the variables mentioned when they are related with learning styles help to improve the academic performance.

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Appendixes

Appendix 1. VARK questionnaire

1. You are helping a person who wants to go to the airport, downtown or to the train station. you: a. Would go with the person b. Would tell him how to get there c. Would give him directions in writing (without map) d. Would give him a map	2. You are planning a vacation for a group of people and you would like the feedback of them about the plan, you: a. Would describe some of the attractive places of the trip b. Would use a map or a website to show the places. c. Would give a copy of the printed itinerary. d. Would call them, write them or send them an e-mail.
3. You are not sure if a word is written as "environment" or "enviroment", you: a. Would see the words in your mind and choose the one that looks better. b. Would think in how each word sounds better and would choose the one that looks better. c. Would look it up in the dictionary. d. Would write both words and choose one of them.	4. You will cook a special dish for your family, you: a. Would cook something that you know without instructions. b. Would ask friends for suggestions. c. Would leaf through a cookbook to have ideas from the photographs. d. Would use a cookbook that you know that there is a good recipe.
5. You are about to buy a digital camera or a mobile phone. In addition to the price, what else influences in your decision? a. You use it or approve it b. The details about the characteristics of the equipment. c. The design of the equipment is modern and looks good. d. The comments of the seller about the characteristics of the equipment.	6. A group of tourists wants to know about the parks or wild life reserves in your area, you: a. Would give them a talk about parks and wild life reserves. b. Would show the figures of Internet, photographs or book with images. c. Would take them to a park or reserve and walk with them. d. Would give them books or brochures about parks and wild life reserves.
7. Remember when you learned how to do something new. Avoid choosing a physical skill, such as riding a bicycle. How do you learn better? a. Seeing a demonstration b. Listening to someone's explanation and asking questions c. Following visual clues in diagrams and graphs. d. Following written instructions in a manual or text book.	8. In addition to the price, what else would influence more in your decision to buy a new non-fiction book? a. The appearance find you attractive. b. A quick reading of some parts of the book c. A friend talks about the book and recommends it to you. d. It has stories, experiences and examples of real life.
9. You have a problem with your knee. You would prefer that the doctor: a. Gives you a web address or something to read about it. b. Uses a plastic model of a knee to show you what is wrong. c. Describes you what is wrong.	10. You are using a book. CD or website to learn how to take photographs with your new digital camera. You would like to have: a. The opportunity to ask questions and to have more information about the camera and its characteristics.

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d. Shows you with a diagram what is wrong.	b. Clearly written instructions, with characteristics and points about what to do. c. Diagrams showing the camera and what each of its parts does. d. Many examples of good and bad photographs and how to improve them.

11. You want to learn a new program, skill or computer game, you must: a. See a demonstration b. Listen to someone's explanation and ask questions. c. Follow visual clues in diagrams and graphs. d. Follow written instructions in a manual or text book.	12. You prefer a teacher or a speaker who uses: a. Demonstrations, models or practical sessions. b. Questions and answers, talks, groups of discussion or orators invited. c. Brochures, books or readings. d. Diagrams, schemes or graphs.
13. You like the websites that have: a. Things that you can click, move or test. b. An interesting design and visual characteristics. c. Interesting written descriptions and explanations. d. Audio channels to listen to music, programs or interviews.	14. You have finished a competition or a test and you would like a feedback: a. Using examples of what you have do. b. Using a written description of your results. c. Listening to someone doing a detailed review of your performance. d. Using graphs that show what you have achieved.
15. You would choose your food in a restaurant or café, you: a. Would choose something that you have already tried in that place b. Would listen to the waiter or ask your friends for recommendations c. Would choose from the menu. d. Would observe what others are eating or take pictures of each dish.	16. You have to make an important speech for a conference or an special occasion, you: a. Would prepare diagrams or obtain graphs that help you to explain the ideas. b. Would write some key words and practice your speech repeatedly. c. Would write your speech and learn it by reading it several times. d. Would get many examples or stories you make the talk real and practical.

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