Anima, Indonesian Psychological Journal
2011, Vol. 26, No. 3, 220-231

VARK Learning Modalities Score and GPA of First Year College Students

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The goal of this study was to reveal whether there is a difference in VARK learning modalities score between first year psychology and pharnacy college students, whether a difference exists based on gender, and whether there is a relation between the VARK learning modalities score with the grade point average (GPA). This study recruites 464 first year college students (278 subjects from the faculty of pharmacy and 186 subjects from the faculty of psychology) as subjects in the population study. The test of difference on VARK modalities score between faculties and gender didn't show any significant differences ($p > .05$), aside from the kinesthetic modality. The test of correlation between VARK modalities score and GPA showed that there is a significant positive correlation ($p < .05$), so it can be concluded that individuals with high VARK modalities total score tend to have high semester GPA.

Keywords: VARK, pharmacy, psychology, gender, GPA

Tujuan studi ini adalah mengungkap apakah ada perbedaan skor modalitas belajar VARK antara mahasiswa baru fakultas psikologi (FPsi) dan farmasi (FFarm), apakah ada beda berdasarkan gender, dan apakah ada hubungan skor modalitas belajar VARK dan indeks prestasi semester (IPS). Penelitian ini melibatkan 464 mahasiswa baru (n FFarm = 278, n FPsi = 186) dengan menggunakan population study. Uji beda skor modalitas VARK berdasarkan perbedaan fakultas dan jenis kelamin tidak menunjukkan adanya perbedaan ($p > .05$), kecuali modalitas kinestetik. Uji korelasi antara skor modalitas VARK dan IPS menunjukkan adanya korelasi positif yang signifikan ($p < .05$), sehingga dapat disimpulkan bahwa individu yang memiliki skor total modalitas VARK yang tinggi, cenderung memiliki IPS yang tinggi.

Kata kunci : VARK, farmasi, psikologi, jenis kelamin, IPS

Learning styles are now becoming more and more important in the educational world. Since 1991, Dunn framed learning styles as how each learner start to concentrate, process, and keep new or difficult information (Center for Teaching and Learning, 2004). This learning style first came into light when an individual starts to concentrate on a particular material. The method used by an individual cannot be regarded as the same as the method used by another individual, even though they may have similarities in several areas (Fleming, 2001). Performance Learning Systems Incorporation (PLSI) stated that a learning style is a natural way to learn fast, easy, and most effective (in Hartanti & Arhatanto, 2003). While DePorter and Hernacki (2003) defined learning style as a combination of how an individual absorbs, then arranges and processes information.

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Learning style is formed from the start of an individual's preference towards the way to absorb information easily, continuously repeated and forming a habit. This habit produces a particular learning style (Sia & Lasmono, 2003). The easiest way for an individual to absorb information is also called as learning modality (DePorter & Hernacki, 2003).

One of the reasons an individual often faces failure in learning is the individual's lack of knowledge in deciding a compatible strategy. Because of this, finding the correct learning style is an important thing to do, because learning styles are the keys for developing performances in work, school, and situations formed in interpersonal relationships. Finding the learning style is an important thing, as individuals will know how they absorb and process information, and be able to use specific techniques to balance their way of learning and achieving success in learning (DePorter & Hernacki, 2003).

In order to find and explain an individual's learning style, the first step is to identify the modality preference. This is because the learning modalities are related to an individual's attraction in using a particular way in learning, making it easier for the individual to accept and absord information. This is the reason for the researcher's interest in discussing learning modalities.

Learning modalities are often related to sensory or senses, often called as sensory modalities. The preference in learning modalities has three categories: visual, auditory, and kinesthetic/tactile (V,A,K) (New Oceans, 2004). Different from the earlier learning modalities, Fleming (2001) uniquely added read/write into those three categories. Read/write modality is usually a reduction of visual modality. Fleming differentiated visual modality with read/write modality, with read/write modality as visual-verbal and visual modality as non-verbal.

Discussing learning modalities also means discussing an individual's preferences in learning styles. Each individual has their own likes and dislikes towards their learning environment and learning modalities, because each individual has their own unique talents, strengths, and weaknesses (Theroux, 2004). These uniqueness can be encountered in every side of life, starting from the physical look, their way of dressing, appetite, hobby, way of thinking, and learning style (Sia & Lasmono, 2003). As an example, there are individuals that prefer to study in environments with dimmed lights (DePorter & Hernacki, 2003).

College students as individuals also have uniqueness in learning styles, especially learning modalities. Hamalik stated that in high school, students only had to accept materials given by the teachers, being passive with the teachers. While in college, tutors convey materials and also give assignments, demanding college students to be active in searching for other literatures other than the ones given by the tutor to finish the assignment (Merlin, 2003). Because of this, first semester students (in the transition from high school to college), have to really prepare themselves to find the most compatible learning style, so the learning process is more optimal, and later on achieving success in their college life.

Each department in college have different characteristics related to the vision, mission, and courses. In this case, the researcher's interested in discussing the difference between the profile of college students from the faculty of psychology with those from the faculty of pharmacy (especially first year students). The faculty of psychology is related to the materials about human behaviour, while the Faculty of Pharmacy is related to chemical formulas and processes. These are two different things. With these two basic differences in mind, it is assumed that the students also have unique differences that are not affected by the teaching methods in college, but more to their own experiences and interests before entering the college life. This will affect them in accepting, processing, and releasing the information they absorb, which in the end is assumed to be related to their first semester grade point average.

The uniqueness of learning modalities of students is important to be known by tutors, so new informations given by them can be accepted quickly and effecitvely. Even more because learning modalities are the first steps needed to be discovered in deciding learning styles. This is supported and stated by several earlier researches, which were: (a). Fleming invented an instrument to measure unique learning styles in the form of a questionnaire. Sia (2003) had done a reliability and validity test by using psychology students from generation 2002 as subjects. This study stated that as one of the newest instruments, VARK has strengths compared to the other instruments, especially in the response format and VARK score stability (Sia, 2003); (b). A study conducted by Sumantri (2003), related to college students' global learning style, which are internal and external factors affecting learning styles. Sumantri (2003) also stated that the learning modalities being used were visual, auditory, kinesthetic/tactile, and brain dominance modalities; (c). Hartanti and Arhatanto's (2003) study reveals the first year students' learning style profile, though the learning styles used in the study weren't the ones used by Fleming (2001).

Due to the importance to know from the beginning of the learning process, the authors were keen to know, whether there is a difference in VARK learning modalities score of first year students of the two different faculties, between males and females, and whether there's a relation between the VARK learning modalities score with the first semester grade point average.

Theoretically, this study is dedicated to science, especially psychology by revealing a picture about the relation of learning modalities with several university life variables, especially achievement index. Besides that, it is also hoped that this study could be used practically by the two faculties and the students. This study has the goal of giving descriptive data to the faculty members regarding students of the next academic year, so it can promote an alternative in delivering methods. Tutors can decide of an easy teaching strategy so the students can absorb the information quickly. For the students, by knowing their learning modalities profile, they can find a compatible strategy to be used in relation to their modalities. This will help them in receiving new information, especially in classes.

Learning Style

Several sources define learning style uniquely. University of Central Lancashire (2004) defined learning style based on Keefe's opinion in 1979, that learning style is a cognitive character, affection, and psychological factor, functioning as a relatively stable indicator about how the learner accept, interact with, and respond to the learning environment. New England Regional Leadership Program in The Center for Rural Studies for Public Use website (1998) stated that learning style is a unique pattern of behaviour and performance based on the individual's approach in the learning experience. Learning style is an attraction to how an individual learn more comfortably. Haineman (1995) stated the definition of learning style based on several sources and publications, such as (a). In 1981 Ford explained learning style as the adaptive reaction strategy against several learning situations, which may be dependent to several factors like the attraction level, anxiety level, or a mix of other stable types with personality forms and motivations; (b). Kocinski in 1984 defined learning style as an attractive or interesting way to learn and the individual's way to learn something the best way; (c). Borg and Gall in 1993 stated that learning style is an explanation about interaction between different instructional methods with cognitive aspect or the learner's personality, making learning style a term focusing on attitude or trait or treatment interaction.

Rita Dunn defined learning style as each learner's way to start concentrating, processing, and holding new or difficult information (Center for Teaching and Learning, 2004), while Summer Institute Linguistics (SIL) International (1999) explained that learning style is a unique collection of individual preferences, affecting how the individual accept, collect, and process information. With different methods, PSLI in the year 2002 stated that learning style is a natural passage formed by the faster, easiest, and most effective way in learning something (Hartanti & Arhatanto, 2003). On the other hand, DePorter and Hernacki (2003) stated learning style as a combination of how an individual absorbed, then arrange and process information.

There is no standard agreement in defining the definition of learning style, because each source has its own particular attraction in defining it. Based on the definitions above, the authors concluded that learning style is a combination of physical and psychological functions, displayed uniquely in individual preferences in receiving, arranging, processing, and presenting information in an easy, fast, and effective way. With the optimal physical function (medically healthy, not bothering any daily activity) and supported by good psychological function (not under mental pressure, stress, or anxiety), the individual is expected to be able to show its preferences in receiving and presenting information uniquely.

Learning Style Categories

There are many ways to classify learning styles. Generally, learning styles can be categorized into perceptual modality, information process, and individual personality patterns (Learnativity, 2002). The classification are (a). perceptual modality is explained biologically, based on the body's reaction to physical enviroment and the representation of how effective an individual is in adopting data; (b) Information process is the differentiaton in how an individual feel, think, solve problem, and remember the received information. Each individual have something that becomes their favorite, consistency, real way in accepting, organizing, and holding information; (c) Personality patterns are focused on attention, emotion, and values. This pattern can be the predictor of how an individual react and feel different situations.

DePorter and Hernacki (2003) stated that learning style is defined differently, but a general agreement has been reached in relation to learning style categories. Learning style categories are stated in two main individual learning categories, which are the individual's method of absorbing information easily, or commonly known as learning modality, and the way the individual arrange and process information, commonly known as brain dominance.

VARK Learning Modalities

In general, Webster's 1913 Dictionary (2004) defined modalities as a part of the senses, synonym to the sensory modalities involving the sensory system. According to Fleming (2001), learning modalities are an individual's attraction in receiving and presenting information in the learning context. Most individuals have their own preferences to a learning modality. Each information received and released by an individual will involve the whole sensory, but will be focused on one. Individuals with visual learning preference will involve things that stimulate the visual sensory, like graphs, colours, and flowcharts, while auditory individuals will involve things with sound, such as discussions, argumentations, and college classes. This is different with individuals with read/write preference, who will receive information easier by reading or noting down, and releasing information by writing. The most practical ones are individuals with kinesthetic preference, receiving and releasing information easily by real action that's experienced personally (Learnativity, 2002).

Based on A and B, learning style is not similar to learning modality (Fleming, 2001). But even though both are different, learning style have a relation with learning modality. Knowing learning modalities is the first step that must be done by an individual in order to be able to find their learning style. If an individual has found its learning modality, then the individual is able to decide on the techniques that will be used to balance the way of learning, achieving success in learning (DePorter & Hernacki, 2003). Learning modalities are often stated in relation to the sensory system, which encompasses the possessed senses, which are visual, auditory, kinesthetic, and tactile. But Fleming (2001) showed up with a different and unique way in categorizing learning modalities as VARK (Virual, Auditory, Read/Write, Kinesthetic).

VARK learning modalities are related to sensory which are the senses. Visual modality involves the vision sense, aural modality involves the hearing sense, read/write modality involves the vision sense, though different with visual modality. The last is kinesthetic modality which involves movement (Fleming, 2001). Fleming didn't discuss tactile because tactile is categorized into kinesthetic.

VARK Category

VARK in an acronym for Visual, Auditory, Read/Write, and Kinesthetic. VARK is the sensory modality used in information learning. In 1992, Fleming and Mills explained four categories that seemed to reflect the learner's experience (Fleming, 2001).

Visual. This preference includes the picturing of information in the form of charts, graphs, flowcharts, and every symbol of arrows, circles, hierarchies, and other symbols used to show what is explained in words. For the individual with visual preference, a picture may help better than discussion about the same topic because this individual is form-oriented (Learnativity, 2002).

Aural/Auditory. This modality pictures the preference in receiving information using hearing. Individuals using this modality report that the best way to learn is by listening to classes, tutors, tapes, group discussions, chats, or webchats (Fleming, 2001). Learnativity (2002) stated that several researchers said that individuals with auditory learning preference are interactive learners.

Read/Write. This preference is for information shown using words. This preference also focuses on the receive and release of alphabets, so read and write can be done in all kind of forms. This modality is differentiated from visual modality because read/write focuses more on words, while visual involves pictures or symbols (Fleming, 2001). Most individuals assume that reading is a visual behaviour, while in reality, the moment the individual see the words, information is processed by listening to the individual's own self. The reader has the print-oriented label, depending on more words and numbers inside his mind (Learnativity, 2002).

Kinesthetic. Based on the definition, this modality is more focused on perception preference related to the use of experience and practice, like simulation and reality. Through several experiences, different modalities may be needed, but the key is that individuals are related with reality, from experiences, examples, practices, or simulations (Fleming, 2001).

VARK Learning Modalities Dynamics

Fleming (2001) explained learning modalities dynamics in an individual as single preference and multimodals. Single preference refers to individuals with only one dominant and apparent modality. Individuals with multimodals are better than single preference, because these individuals will be more flexible in receiving and releasing information (Fleming, 2001). Individuals with multimodals have at least two modalities. According to Fleming (2001), preference towards a modality owned by an individual is not something that is fixed or unchanged. Individual preferences may change, with the possibility that the change is just one or two points, with generally the same preference. Fleming (2001) also admits that an individual's experience makes it possible for preference change, though further research is needed.

Students of Faculty of Pharmacy and Psychology

College students are individuals studying in university/college (Merlin, 2003). Every prospective student decides to choose a department that they are interested in. In this research, the research subjects are college students from a faculty of pharmacy and a faculty of psychology, which certainly has different characteristics. This is the reason for the authors to have them as subjects, due to the difference in lecture and class implementations. A lecturer of the faculty of pharmacy stated that they have more classes than practice in the curriculum (Ririn, October 20, 2004, private communication).

In general, a faculty of psychology transfers knowledge regarding the human behaviour and mind, and experiences affecting it (Lefrançois, 2000), while University of Surabaya's Faculty of Psychology is more focused in producing alumni that are capable of thinking scientifically, with understanding of psychology theories and observation, also the ability and sharpness in interpreting human abilities, so that they can notice, rate, choose,

apply, and analyse every side of psychology accurately (Universitas Surabaya, 2001).

Gender. Gender is the identity owned by the individual since birth, as the effect of sexual chromosomes (gonosome) in the tissues (Suryo, 1997). In relation to learning modalities, Fleming (2001) stated that there are no significant differences between male and female preferences. Stereotypically, males are often considered to have preference in visual while females have preference in aural. Blackmore (1996) stated that male and female have a different approach in the thinking process.

Achievement index. There are two kinds of achievement index in the Semester Credit System, which are the Semester Grade Point Average (GPA) and the Cumulative Grade Point Average.(CGPA) Semester GPA is the measure of a student's success in a semester, while CGPA is the measure of a student's success starting from the first year to the last (Universitas Surabaya, 2001).

Based on the earlier explanations, the authors state four hypotheses, namely:

First hypothesis: There are score differences between VARK learning modalities in students of the faculty of pharmacy and students of the faculty of psychology.

Second hypothesis: There are score differences between VARK learning modalities on male and female students from both faculties.

Third hypothesis: There is a relation between VARK learning modalities score and the first Semester GPA of the faculty of psychology.

Methods

This study is a descriptive-quantitative entity. To measure the learning modalities variable, the authors used VARK questionnaire version 4.1 designed by Fleming in 1987. This questionnaire consists of 13 questions, with 48 answer options inside. The original questionnaire was in English and has been translated into Indonesian from Fleming's website (Fleming, 2001). This VARK questionnaire has been used in an earlier study conducted by Sia (2003). According to the earlier research, VARK has a good internal consistency (.7127 for VARK questionnaire and .8132 for VARK checklist), and the item validity test showed that every VARK item are considered significant statistically (significance rate $p < .05$ (2-tailed). With this knowledge at hand, VARK instrument is one of the new instruments with an advantage compared to other learning style instruments (Sia, 2003). This research instrument has the speciality of letting the subjects choose more than one answer, if it is appropriate with the subject's current state. This is called by Trochim as the multi-option variable (Sia, 2003). VARK questionnaire has a blueprint based on the question criterias, while the VARK profile is based on four learning modalities considered to be liked by individuals in their learning style. Table 1 shows the blueprint of VARK modalities.

Table 1
VARK Questionnaire Items

Modalities	Items	Total
Visual	1, 5, 9, 13, 16, 20, 24, 28, 34, 38, 45	11
Aural	2, 6, 10, 14, 17, 21, 25, 29, 31, 35, 39, 42, 46	13
Read/ Write	3, 7, 11, 18, 22, 26, 32, 36, 40, 43, 47	11
Kinesthetic	4, 8, 12, 15, 19, 23, 27, 30, 33, 37, 41, 44, 48	13

Note. Example of question (question number 13).

You prefer tutors that frequently use:

a. Diagrams, flow charts, maps, graphs **(visual)**
b. Class discussions or via e-mail, online chat group and guest speakers **(auditory)**
c. Textbooks, handouts, reading references **(read/write)**
d. Field trips, models/examples, laboratories, practical activities **(kinesthetic)**

Subjects of this study are Universitas Surabaya's students from generation 2003 who were studying in the undergraduate program of the faculty of psychology and faculty of pharmacy. They are differentiated in the student numbers, the pharmacy students' student numbers starting with 1, and the psychology students' student numbers starting with 5. Gender is the birth identity of the students, put in the questionnaire answer sheet, which were male and female. The Semester GPA is the measure of a student's success in its first semester, ranging from 0.00 to 4.00.

Data Collection Procedure

The research procedure was conducted in three stages: preparation, execution, and the report of the study results. In the preparation stage, VARK questionnaire was adapted into Indonesian on the transparancy sheet. Data collection was done twice, first done on psychology students on the orientation week of year 2003, while the data collection of the pharmacy students was conducted during the first week of classes, during the Anatomy-Physiology class (H. K. Lasmono, personal communcation, July 30, 2004). The data collection was conducted during the first academic year of 2003-2004. Subjects were also told about the goal of the questionnaire, which is to understand which learning style is preferred. Then subjects were asked to sum the same alphabets chosen, each alphabets representing one learning modality.

Data Analysis Method

In this study, SPSS for Windows version 10.0 was used to test reliability, showing a Vark questionnaire reliability coefficient of .4469. Reliability test was also conducted for every learning modality category and the results were .2495 for visual modality, .5236 for auditory modality, .4165 for read/write modality, and .3553 for kinesthetic modality. The data obtained were a dichotomized data (1–0) for every item, so that the reliability coefficient obtained was a coefficient from Kuder-Richardson 20 (KR20).

Validity testing used item-factor validity with correlation test between subject's response to each item and subject's score on each item category (e.g. a3 correlated to category A). This validation showed a positive significance of 1% , between .12 (item 8 of the visual category) to .508 (item 7 of auditory category and read/). Besides a positive significance of 1% was showed by the correlation between each score to the total score, thus the data could be categorized as statistically valid.

ANOVA was used to test the difference between pharmacy students and psycholoy students, which reveal a fair significant homogenity ($p < .05$), disproving VAR learning modality score difference between pharmacy students and psychology students ($p > .05$), though a difference exists on the kinesthetic modality score ($p = .00$).

The homo-genity score testing to test the difference between males and females showed a non-homogenic data in Visual ($p < .05$), thus a nonparametric test was used (Wilcoxon signed rank test). This test results showed no difference between males and females concerning VARK learning modalities.

To test the third hypothesis, the author used the Pearson product moment correlation to reveal a correlation between learning modality and first semester GPA ($p < .05$)

Results

Data collection was obtained from psychology and pharmacy students as whole population sample. Some of them was dismissed because they did not qualify, some being not from the year 2003. The total subjects was 494 subjects (186 psychology students and 278 pharmacy students), with the dominant proportion being females (see Table 2).

The first Semester GPA from students of the year 2003 ranged from 0 to 3.904. The data are divided into three groups, the distribution are shown on Table 3. The mayority of the subjects have the GPA ranging from 2.00 to 2.50, while the minority have the GPA ranging from 3.50 to 3.999. The overall data of the psychology students can be seen on Table 3.

Table 2
Subject Gender

Gender	Psychology		Pharmacy	
	N	*%*	*N*	*%*
Male	35	18.8	52	18.7
Female	151	81.5	226	81.3
Total	186	100	278	100

Table 3
Subject Semester GPA – Psychology (First Semester 2003-2004)

GPA Distribution	N	%	%
0 – 1.50	16	8.6	25.3
0.501 – 1.999	31	16.7	
2.000 – 2.500	62	33.3	51.6
2.501 – 2.999	34	18.3	
3.000 – 3.500	26	14.0	22.6
3.501 – 3.999	16	8.6	
4.000	0	0	0
Unidentified	1	0.5	0.5
Total	185	100	100

From the collected data, the students' learning modalities profile in VARK categories are highly variable. There are students categorized as unimodal, and there are others categorized as multimodals. The range of multimodals are bi-modals (example: VA, AR, AK), tri-modals (example: ARK, VAR), to every modalities (VARK). The data are shown in Table 4 for each faculty.

In the majority, students from both faculties have uni-modality, but only with slight deviation from multimodals (VARK), which is just 1.51%. While other students can be categorized into having bi-modals and tri-modals. In the total sum, then multimodals (bi-modals, tri-modals, and every modalities) are owned by 304 students (65.52%). This is possibly caused by the female dominance in pharmacy students. According to the Table 5, the combination of modalities from pharmacy and psychology students are not that much different in the comparisons, as both faculties have the highest total for VARK modalities.

Reliability and Validity Testing

In this study, the reliability testing was conducted using the reliability analysis method in SPSS for Windows, version 10.0. Overall test shows that the reliability coefficient for VARK is .4469. Reliability testing is also

Table 4
Psychology and Pharmacy Students' VARK Learning Modalities Profile

Modalities	Pharmacy		Psychology		Total	
	f	%	*f*	%	*f*	%
V	1	.36	0	0	1	.22
A	25	8.99	16	8.6	41	8.84
R	7	2.52	2	1.08	9	1.94
K	59	21.22	50	26.88	109	23.49
Unimodal Total					**160**	34.48
VA	2	.72	3	1.61	5	1.08
VR	0	0	1	0.54	1	.22
VK	0	0	2	1.08	2	.43
AR	4	1.44	7	3.76	11	2.37
AK	26	9.35	12	6.45	38	8.19
RK	7	2.52	0	0	7	1.51
Bi-modal Total					**64**	13.79
VAR	7	2.52	3	1.61	10	2.16
VAK	9	3.24	3	1.61	12	2.59
VRK	4	1.44	0	0	4	.86
ARK	49	17.63	12	6.45	61	13.15
Tri-modal Total					**87**	18.75
VARK	78	28.06	75	40.32	**153**	32.97
Total	278	100	186	100	464	100

Table 5
Descriptive Statistics of VARK Learning Modalities Profile Based on Gender and Faculty

Learning	Faculty of Pharmacy		Faculty of Psychology	
Modalities	M	F	M	F
V	1	0	0	0
A	7	18	1	15
R	2	5	1	1
K	12	47	12	38
Uni-modal	22	70	14	54
VA	1	0	1	2
VR	0	1	0	1
VK	0	0	0	2
AR	0	4	1	6
AK	4	22	3	9
RK	0	7	0	0
Bi-modal	5	34	5	20
VAR	1	6	0	3
VAK	3	6	0	3
VRK	1	3	0	0
ARK	10	39	1	11
Tri-modal	15	54	1	17
VARK	10	68	15	60

Note. M = Male, F = Female

conducted for each learning modalities categori, resulting in the reliability coefficient score of .2495 for visual modality, .5236 for auditory modality, .4164 for read/write modality, and .3553 for kinesthetic modality. The collected and processed data were categorized into dichotomy data (1-0) for each item, resulting in the reliability coeffecient from Kuder-Richardson 20 (KR20).

Validity test in this study was conducted using the item-factor validity with correlation test between subjects' response to each item with subjects' score on each category. Validity testing was done using correlation test between each item with the total score for each item category (for example, a3 correlated with category A). The overall results show that there is a significant positive correlation on the 1% significance rate, between .12 (item 8 visual category) to .508 (item 7 auditory and read/write category). The significant positive correlation on the 1% significance rate's also found on the correlation between the score of each category with the total score. The results show that the data can be considered to be a statistically valid data.

Score Difference Test Between VARK Learning Modalities of Students from the Year 2003 Between Psychology and Pharmacy

Results of the score difference test based on the two faculty categories shows that the data is homogenous for V, A, R, and K ($p > .05$), so it is usable for parametric testing with the results shown in Table 6. It can be concluded in general that there is no difference in VARK learning modalities scores between subjects of both faculties. This can be seen from the significance score of each category (V, A, R) and the total score

(VARK) on the 95% significance rate ($p > .05$), aside from the K category (.00 < .05).

Score Difference Test Between VARK Learning Modalities Score and Student Gender

Results are based on the 95% significance rate. From the data on Table 7, it can be interpreted that there is no VARK score difference between male and female students (.792 > .05). It is the same for each category (V, A, R, K), there is no difference in visual learning modality score (.553 > .05), auditory learning modality score (.639 > .05), read/write learning modality score (.582 > .05), and kinesthetic learning modality score (.248 > .05) between male and female students. But from the homogenity test, category V (visual) is considered to be non-homogenous so retesting needs to be done using non-parametric analysis. The results are the same between parametric testing and non-parametric testing, showing that there is no score difference in visual modality between males and females (.910 > .05).

Correlation Test Between Learning Modality Scores and First Semester GPA, 2003 Generation Psychology Students

Results of the correlation test reveal a positive significant correlation on visual, auditory, and read/write modalities. The correlation between visual modality and GPA is positive but weak (.164), with a significance score of .026 (95% rate). This is not so different with the correlation of read/write modality with GPA, scoring .179 with a significance score of .015 (95% rate). Meanwhile the auditory modality correlates positively with a higher score than visual and read/write (.247), with a signifance score of .001 (95% rate). The last modality is the kinesthetic modality, having no correlation with GPA (see Table 8)

The final hypothesis stated that there is a relation between VARK learning modalities score as a total with first semester GPA in psychology students ($p < .01$). As extra data, the authors want to see if there is a score difference in VARK learning modalities score based on the semester GPA in psychology students.

Discussion

Reliability and Validity Testing

As stated earlyer, reliability scale analysis was used as the reliability test in SPSS for Windows version 10.0. Related to the reliability of the collected research data, the reliability coefficient's was categorized into several groups: .70- .79 (low), .80- .89 (average), .90- .95 (high), .95- .99 (very high) (McCroskey & Feldbaum, 2002). In 2002, Suhr stated that these numbers can be reduced to .60 (for research purposes, not individual diagnostics), even to .40 if used to picture the state of a group with massive size, for example the state of students in a school (cited in Sia, 2003). Based on Suhr's statement, VARK modalities data reliability meets the requirements to answer the authors' goal. The results of the reliability analysis are considered to be low as a general instrument (.4469), but still acceptable, remembering the uniqueness of VARK to enable the subject to give more than one answer, and the fact that reliability and validity testing have been done in earlier researches.

Multi-option response doesn't close the possibility of attracting inconsistency from the subject to decide on their choices, even more so if the data collection situation is laid-back (subjects' seriousness at the minimum). Aside from the relation to the subjects' response, VARK instrument isn't an instrument to measure just one modality, but also to measure multimodals. Based on the results of learning modalities profiles of both

Table 6
VARK Learning Modalities Score Difference Test Between Faculties

Modalities	*F*	*Sig.*
V	1.708	.192
A	.433	.511
R	1.450	.229
K	12.433	.000
TOTAL	1.144	.285

Table 7
VARK Learning Modalities Score Difference Test Between Genders

Learning Modalities	Parametric		Homogenity	Non-Parametric	
	F	*Sig.*		*Z*	*Sig.*
V	.353	.553	.023	-.113	.910
A	.220	.639	.676	-.377	.706
R	.303	.582	.986	-.439	.660
K	1.339	.248	.871	-1.156	.248
TOTAL	.070	.792	.745	-.135	.829

Table 8
Correlation Test: VARK Learning Modalities Score and First Semester GPA

	Learning Modalities	*Pearson Correlation*	*Sig.*
GPA	V	.164*	.026
Semester 1	A	.247**	.001
	R	.179*	.015
	K	-.042	.570
	VARK	.285**	.000

Note. *. Correlation is significant at the 0.05 level (2-tailed), **. Correlation is significant at the 0,01 level (2-tailed)

faculties' students, it is discovered that 65.52% of the subjects are multimodals, meaning that most subjects choose more than one answers, not always focusing on only one modality. This may be the cause of the VARK instrument's low reliability coefficient.

Once again, based on the creator's statement, Fleming (2001), VARK instrument is not a diagnostic tool, but just a reflection of individuals' learning preferences, used as a discussion media as one of the unique learning style instruments. Sia (2003) had done a reliability testing by using internal consistency test (reliability coefficient .7076 - .813).

The validity test being used is the item-factor correlation validity test in correlate analysis. Lemke and Wiersma (1976) stated that instrument validity is how much an instrument measure what is supposed to be measured. The results can be considered to be sufficient, remembering that the instrument is not a diagnostic tool, but just a reflective tool. McCroskey and Feldbaum (2002) stated that validity coefficient is considered to be sufficient ranging from .30 (low) to .69 (very high). The validity coefficient of this study is between .12 to .508, on the significance rate of $p < .01$ (two-tailed). Taking everything into account, the collected data in this study is considered statistically reliable and valid. Aside from that, the results also state that as a unique learning style instrument, VARK can be trusted in measuring or reflecting an individual's learning modality.

Hypothesis Testing

1. Score difference test of VARK learning modalities score between pharmacy and psychology students of generation 2003

The score difference test of VARK learning modalities score shows that there is no significant difference ($p > .05$) between the two groups, except for the kinesthetic modality. The results of the testing describe that between students from pharmacy and psychology, there is no score difference in the visual, auditory, read/write, and VARK modalities as a whole. On the opposite side, the results show that there is a significant difference in kinesthetic learning modality score.

The cause of the lack of difference in VARK modalities score as a whole is assumed to be caused by the fact that the subjects used in this research were considered to be new students. This is further supported by the fact that the data collection was done during the orientation period and the first classes, so the subjects were not fully affected by the change of learning style in college yet. This means that the results are reflections of the preferences the subjects had during their high school years.

Specifically, the data processing results show that there is a difference in kinesthetic modality score between pharmacy students and psychology students. This is caused by several factors, such as the learning method implemented during the subjects' high school years, the individuals' preference in receiving and releasing information easily, and especially each individuals' uniqueness.

By discussing the preference score of each student as individuals, it is possible to find a clue about their decision in picking a department. In frequently asked questions, Fleming (2001) stated that there will be a difference in VARK preferences of individuals from different departments. Those from pharmacy are likely to prefer kinesthetic, related to the individuals' attraction to practice and experiencing the existing reality (Fleming, 2001). These individuals receive and release information easily if they are doing a movement or practice, in both real conditions or in laboratories (Learnativity, 2002).

In general, the faculty of psychology is stated to be the knowledge giver about the human mind, behaviour, and subjective experiences that affects an individual, such as hereditary, environmental, and culturally (Lefrançois, 2000; Weiten, 2004). The range of disciplines learned in the faculty of psychology covers the understanding of psychological theories, observing ability, and thinking scientifically and analytically (Universitas Surabaya, 2001). The practicum as a psychology student is different from a pharmacy student, in both the requirements, tools, and procedures.

The fact that the data collected in this research was collected when the subjects were still first year students, meaning that the difference in kinesthetic modality is not determined by each faculty's curriculum. It is possibly that it is caused by the division during highschool, with pharmacy students mostly coming from the science division. On the other hand, psychology students are more

varied, coming from all three divisions: science, social, and language.

With these results in mind, it can be concluded that generally there is no difference in the learning modalities score between pharmacy and psychology students, aside from the kinesthetic modality score. The difference is possibly caused by the individuals' personal preferences and their learning style during high school, related to their chosen division during that time.

The descriptive percentage of the kinesthetic modality profile between students from both faculties, reveals, that pharmacy students are 5.66% higher compared to the psychology students. This difference is possible due to the fact that for the scoring test, data processing was done using the raw data, while for the profile description, several stages had been done in order to find the learning modalities profile of each student, a descriptive analysis was used.

2. Score difference test between VARK learning modalities and gender difference

The second hypothesis is answered using the results of the score difference test on VARK learning modalities score between genders. The hypothesis is answered with no significant differences on VARK learning modalities score between genders ($p > .05$), for both each category (V, A, R, K) and the score as a whole ($.792 > .05$), despite the stereotype stating that males tend to prefer visual and females prefer auditory. This result supports statistically the statement of Fleming (2001), that there is no significant difference statistically between male and female learning preferences. Fleming's (2001) data stated that there is no apparent difference in the percentage (both male and female having 16% on visual and 18% male with 19% female on auditory) and also that there is no difference in significant modalities pro-file between genders. Based on the results above, it can be concluded that both male and female subjects have similar preferences, or in other words, gender has no significant role in deciding an individual's learning modality. Results also show that there is no differences in learning modalities profile between males and females ($p > .05$).

3. Correlation test between VARK learning modalities score and GPA of psychology students.

This testing is different from the score difference testing done in the early stages. The results show that there is a correlation between the first semester GPA with the learning modalities score in psychology students ($.00 < .05$) on the 1% significance rate.

There is positive correlation between GPA with each VARK category (except K) and the VARK total score. This shows that learning modality have a role in the individual's success in a semester. Auditory and read/write modalities have a big role in the faculty of psychology, showing modalities score differences (besides visual and kinesthetic) between students from different GPA groups. The exceptions are from visual and kinesthetic modalities, possibly caused by 50 of the 186 students have kinesthetic modality profile, with no students having visual modality profile. Aside from that, generally individuals with good multi-modalities score (high VARK total score), tend to have high grade point average, as well.

The correlation between modality scores and GPA was further supported with the difference in modality score between students from different GPA categories. The categories are based on their grade point averages, divided into three groups: 0-1.999, 2.000-2.999, 3.000-3.999. As stated in the earlier paragraph, there are differences in modality scores between students from different categories. But despite the differences, there is no differences based on modality profiles.

In relation to the modality score, the higher the modality total score, then the subject is categorized into multi-modalities. Subjects with the combination of more than one modality tend to have higher GPA. The GPA is used as a measure of achievement in a semester. Fleming (2001) stated that individuals with more than one modality combination (multi-modals) will achieve better success compared to individuals with only one modality. This is because the subject with more than one modality being able to absorb, process, and release information in a more flexible manner.

On the other hand, the difference in modality scores is assumed to be affected by several factors, such as the teaching demands, demanding students to become more active in discussions, assignments, observations, and scientific writings. This is in accordance with Fleming (2001), who stated that college students will have higher percentage in read/write modality compared to high-school students.

As a descriptive comparison, the results of this research can be considered to be quite sufficient with the database distribution achieved by Fleming on 31.243 subjects. Fleming stated that individuals categorized in uni-modal preferences are 41.7%, bi-modals 14,6%, tri-modals 12,8%, and VARK 30.8%.

Table 9
Comparison of VARK Learning Modalities Percentage Between Fleming's and Processed Data

Learning Modalities	*Fleming* (%)	*Results* (%)
Uni-modal	41.7	34.48
Bi-modal	14.6	13.79
Tri-modal	12.8	18.75
VARK	30.8	32.97
	100	100

Based on earlier research about VARK instrument that stated that VARK is sufficient enough to fulfill the requirements as a measuring tool (Sia, 2003), it is now clearer than VARK instrument is special in measuring because of the ability in giving similar results on subjects with different cultures.

Conclusion

Earlier researches have proven that VARK instrument is one of the advantageous learning style instruments, especially in the response format and score stability. Based on those results, VARK instrument can still be used as a media to discover an individual's learning style, commonly known as learning modality. Finding learning modality that is compatible is the first step that needs to be done before knowing other learning styles that are more complex. There are several factors that affects learning style, from both the environment and genetically, though everything goes back to each individuals's personal preferences. There are several things that can be concluded, related to the lack of difference between learning modalities scores of pharmacy and psychology students and the lack of differences between the learning modalities score from students with high school curriculum and students with college curriculum.

This is the reason for the need of further research in relation to the curriculum during high school years and teacher's teaching methods. Every level in school life has different curriculums, highschool level included. It is possible that there is no change or development in learning style during high school, so every student is forced to use the same learning style, resulting in the lack of difference in the results of this study. This is apparent from the results regarding learning modalities profile, with higher score on kinesthetic instead of VARK. It is better for individuals to have VARK learning modalities learning style because it is more flexible than only kinesthetic learning modality.

As for the gender, usually males and females have different life styles and arrangements, especially related to their social role. Despite this apparent fact, the results of this research showed that there is no difference between the learning modalities score of males and females, showing that during highschool, both male and female students were demanded to adapt to the teacher's teaching style instead of discovering their own learning style.

Even so, preferences are preferences. Each individual has their own modality preferences despite possibly being unable to implement it during their highschool life. These preferences from their high school years become the main basis in studing in college, because of the possibility of using a different learning style compared to what they adopt in highschool. Individuals with multimodals preferences (high modality score), are easier to achieve high GPA because these individuals have flexibility in learning style, able to adapt easily with the tutors' teaching style in classes. Individuals with unimodals preference will face difficulties if the tutors do not teach with the individuals' preferred learning modality. These subjects with single preference are recommended to arrange a learning strategy that is compatible with their preferences, which could be read in the website (Fleming, 2001).

Limitations.

This research has several limitations, especially related to the lack of individual data, such as the tutors' learning style, the medias being used, most favorite and least favorite subjects, and other datas related to the discussion of learning modalities. Aside from that, learning modalities are not something that is unchanging, thay need remeasuring at different times. This should be done because modalities can be applied to daily life (Carson, 2004), supporting the need for data about the individuals' intelligence, habits, and preferences in their free time.

Suggestions

By discovering learning modalities, preferences in receiving and releasing information will be discovered as well. This is important in order to reinforce the learning process in each faculty so every students are able to achieve good grade point average. Students are able to use different instruments that are available to measure their learning style, usually related to sensory modalities, including the VARK instrument available on the website (Fleming, 2001).

It is hoped that the results of this research can be considered by the faculties in arranging a more sensitive learning program regarding students' preferences, especially in receiving and releasing information in order to increase their achievement index. For example, by giving oral tests for students with auditory preference in learning.

As for further researches, it is suggested to retest the reliability and validity of the VARK instrument, explain the relation between individual characteristics and specific learning modalities in a qualitative research, discover factors that affect the forming of particular learning modalities in individuals, and implement trainings

for learning strategies for particular learning modalities (as an application of the learning strategy stated by Fleming, 2001).

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