

CONDUCTING HANDS-ON TASK IN VOCATIONAL EDUCATION: TEACHING METHOD IN AUTOMOTIVE COURSES

Ahmad, A. Nordin, M. K. Ali, D.F. and Nabil, A.
Faculty of Education,
Universiti Teknologi Malaysia, Malaysia.
a-adnan@utm.my

ABSTRACT

This paper discusses the findings from a study on teaching in practical work on automotive courses at Vocational Colleges in Malaysia. The random sampling technique was used in selecting 283 students and 63 teachers as respondents from the automotive courses. The findings of the research indicate that teachers have strong preference in using the demonstration and questioning technique during the set induction stage of teaching. Teachers also prefer group monitoring and problem solving during the teaching phase, and re-explaining and report writing in the post-teaching stage. This research provides the combination of teaching techniques that could be used in teaching vocational skills in general and automotive practical work in particular. This study has concluded that vocational teaching method in automotive practical work to be applied in teaching for other practical courses to improve current practices. Thus, teachers are proposed to use this method to improve students' knowledge in automotive and to develop skills for the current and future workforce.

Keywords: *vocational teaching method, vocational pedagogy, teaching practices.*

1 INTRODUCTION

Learning is a complex process and students often view learning as something done to them by teachers rather than as something they do for themselves. Some view learning as memorizing and about getting things into their head. George (2004) indicates that learning is acquiring facts or procedures that are to be used. It is about learning something so that a learner can do it again when they are asked to, like in an exam. Basically, learning is making sense, about trying to understand things so that a learner can see what is going on. A person who has learned is able to explain things, not just remember them. Learning is useful as it enables a person to perceive the world differently. Thus effective learning is sometimes referred to as personally meaningful learning.

Students learn, with varying degrees of success, through reading, memorizing, thinking, writing, note taking in lectures, observing, listening to and talking with others and by doing things. They may learn in structured situations such as lectures, courses or learning packages; in informal situations, such as browsing through books or on the internet; and through casual conversations with peers. However, the above descriptions of how students learn do not explain how students learn, nor do they account for why students learn. For answers to these questions one has to turn to various perspectives and theories of learning. These may be placed on a continuum with behaviourism at one end and radical humanistic approaches at the other. In between are Gestalt psychology, cognitive psychology, studies of student learning, and constructivist, reflective, and humanist theories. As one moves along the continuum, the theories become less positivistic, less concerned with control and prediction and more ostensibly concerned with social values.

Using the appropriate teaching methods (based on learning theories) is important to facilitate learning, irrespective of disciplines. Learning requires a learner to participate to develop understandings, acquire knowledge, and skills. Practical work in vocational education and training is best suited to achieve the above goals as it requires students to actively participate in completing a task leading to learning. Vocational practical work encourages students to be productive, innovative and enterprising. This involves generating ideas and taking action, as well as developing competencies that satisfy social demands, wants, and opportunity that will extend human capabilities.

2 TEACHING METHOD IN VOCATIONAL EDUCATION

Teaching method in vocational education must be appropriate to the expected learning outcomes of vocational training that are occupational oriented skills in nature. Thus, vocational students are exposed to learning methods that is focusing on job oriented activities and tasks. Vocational education in summary are a component of educational activity oriented to provide the necessary knowledge and skills to perform a particular job task and also to connect the process of

technology transfer, innovation and development (Mohamad et.al, 2014). Vocational students tend to be visual learners where they prefer to learn with pictures, diagrams, flowcharts and demonstrations to understand the learning content better (Mohamad et. al, 2014). Figure 1 illustrates the finding from previous research on the characteristic and attributes of vocational students.

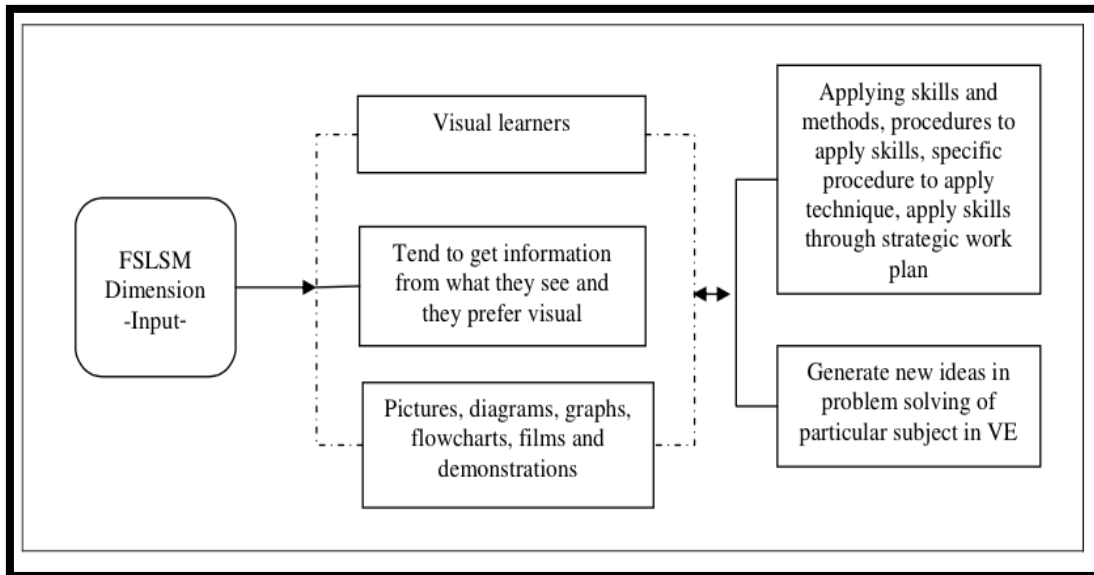


Figure 1: Vocational students' characteristic and attribute

The instructors in the vocational colleges and indeed many TVET institutions are equipped with the traditional teaching methods including lecture methods, discussion methods, case studies, programmed instructions, role play, demonstration, experiments and educational field trips among others. In lecturing there is too little scope for negotiation and construction of meaning. However, using this method – which are teacher centred - encourages students to be passive rather than active participants in the teaching and learning process. The methods do not help develop important skills such as communication skills, interpersonal skills, persuasive skills, creativity skills, problem solving skills and all other skills that would make them better citizens. The method ignores two very important domains of learning including psychomotor and the affective domains. This complicates the “walls” already created by the students due to low self -esteem, brought about by negative reinforcements from teachers and parents. Learning by doing is characteristically the way in which vocational pedagogy is described, but such a simplistic understanding obscures the fact that there is no one definitive notion of vocational pedagogy, just as there is no one idealized notion of a TVET teacher (Wheelahan, 2010). In simple form, the basis of TVET teaching can be schematized as the interrelation between three foundational dimensions (Gamble, 2013)

- Formal subject or technical knowledge,
- Pedagogic expertise,

- Practical workplace experience.

There are various justifications for the need to have pedagogic knowledge base of TVET teaching. Often, TVET instructors do not have the necessary theoretical knowledge and expertise to be effective. A range of entry teaching qualifications are described by the sources cited above, ranging from postgraduate teaching qualifications and associate degrees to various levels of certificates and diplomas. However, there is a tendency, especially in certain Anglophone countries, to base mandatory teaching entry requirements on low-level, standards-based qualifications in order to attract industry experts to Vocational Education and Training (VET) teaching. In other countries, the initial entry bar is being raised (Gamble, 2013) based on concern for quality teaching and learning.

Vocational students' characteristic of learning can be illustrated and defined as in Figure 2. Figure 2 is learning process model - the Dale's Cone of Experience - as proposed by Edgar Dale in the 1960s (Dale, 1969). The classifications of learning in VET based on information-processing theory and were conceptualized for the Automotive Vehicle students to include five learned capabilities: cognitive strategies, verbal information, attitudes, intellectual skills, and motor skills. This classification system is related to the assumptions that learning must emphasize the significance of psychomotor domain learning in addition to Bloom's affective and cognitive domains (Sharda et al., 2014; Mohamad, 2013). Sharda et al. (2004) stated that psychomotor levels of learning include perception, simulation, confirmation, production, and mastery of skills that were previously learnt.

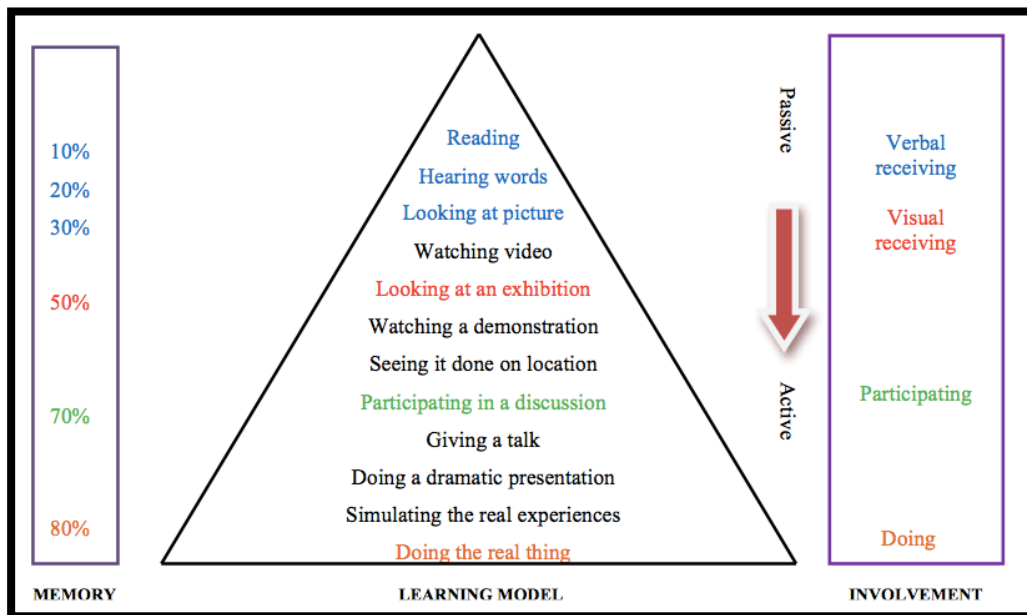


Figure 2: Learning model and VET student preferences

Students need the learning activity to be aligned with their orientation to learning to better understand the subject content. The suitable learning activities can help an individual to become a good learner. Table 1 shows some common learning activities in classrooms that may help students to understand the learning content effectively (Ahmad, 2012). Learning activities include asking questions, planning, monitoring, checking, revising and self-testing.

Table 1: Common learning activities

Type	Description
Asking questions	Defining hypotheses, establishing aims and the parameters of task, discovering audience, relating a task to a previous piece of work
Planning	Deciding on tactics and timetables, reduction of task or problem into components, identification of skills or competencies required
Monitoring	A continuous attempt to match effort, answers and discoveries to initial questions or purposes
Checking	Carrying out a preliminary assessment of performance and results at particular stages of an activity
Revising	A review response to assessment involving redrafting or re calculating or the revision of set goals
Self-testing	Final assessment of both results and performance on task

3 RESEARCH OBJECTIVES

- i) To identify students' preferences in learning automotive practical work based on the teaching and learning phases namely, introduction, body and task conclusion phase of learning.
- ii) To investigate teachers' preferences in conducting automotive practical work based on teaching phases namely, introduction, body and task conclusion phase of teaching.
- iii) To identify the relationship between teaching preferences in automotive practical work (APW) and learning preferences

A survey was conducted on teachers and students to identify their preferences on conducting teaching and learning sessions in the workshop. To make the objectives of the research relevant, this model was modified to serve the purpose of the research. Competency concept proposed by the Ministry of Education (MOE, 2006) required teachers and students on how APW was conducted. Competency is a statement which describes the integrated demonstration of a cluster of related knowledge, skills and attitudes that are observable and measurable, necessary to perform a job independently at a prescribed proficiency level (Earnest, 2001).

4 RESEARCH FINDINGS

4.1 Learning preferences according to APW stages

Table 2 shows the preferred teaching methods for the introduction stage of a practical class. The highest score, 4.67, is the demonstration method followed by sketching diagrams with an explanation before they do the task with a mean of 4.11. However, students do not prefer using the module (3.10) or video (3.15) while the teacher begins the topic for practical task.

Table 2: Preferred learning method for the introduction stage of APW (N=283)

Items	Mean		SD	
	Electric Diesel	Automotive Vehicle	Electric Diesel	Automotive Vehicle
Sketching	4.11	4.13	.478	.470
Demonstration	4.67	4.57	.604	.209
Hands out	3.01	3.07	.526	.436
Video	3.15	3.05	.674	.688
Questioning Technique	3.97	3.86	.548	.518
Use the module	3.10	2.98	.285	.305

Table 3 shows the preferred learning methods for the main part of learning APW in Electric Diesel. Analysis indicates that the method that students prefer is for the teacher to explain the task in small groups with a high mean of (4.12) followed by using module at 3.92 and problem solving at 3.88. Students don't prefer using the teacher guide with a mean of 2.76.

Table 3: Preferred learning method for the main part of learning stage of APW (N=283)

Items	Mean		SD	
	Electric Diesel	Automotive Vehicle	Electric Diesel	Automotive Vehicle
Doing together with teachers	3.70	3.77	.695	.604
Tracing the diagram	3.63	3.66	.542	.634
Teachers explain in small groups	4.12	4.16	.431	.362
Discussion among friend in group	3.77	3.79	.697	.777
Questioning Technique	3.56	3.59	.769	.586
Following a teachers' guide	2.76	2.73	.690	.777
Using the module	3.92	3.89	.782	.717
Sketching	3.72	3.72	.824	.874
Problem solving	3.88	3.88	.821	.770

At the end of the class the teacher will draw conclusions as to what students have done and complete the task given. A few methods were identified and based on the result for Electric Diesel, students liking the teacher to re-explain the entire task given and to make conclusions has a mean of 4.36. Table 4 proved what the students' need. Students also prefer the teacher to ask

them questions with a mean of 4.13 and to make lab reports with a mean of 4.09. Students also prefer the teachers to end the practical class session with a re-explanation of the task given. Results show that students agree with this method with a mean of 4.54 followed by questioning technique at 4.23 and report writing at 4.12. The lowest mean is quiz at 3.65.

Table 4: Preferred learning method for the conclusion stage of APW (N=283)

Items	Mean	SD	Mean	SD
	Electric	Diesel	Automotive	Vehicle
Teacher re-explain	4.36	.457	4.54	.435
Quiz	3.78	.563	3.65	.609
Short conclusion/summary	3.89	.554	3.76	.404
Questioning Technique	4.13	.624	4.23	.688
Report Writing	4.09	.506	4.12	.433
Comparing among group work	3.56	.675	3.86	.711

4.2 Teaching preferences according to APW stages

Table 5 shows the data of teachers' preferences on how to start the introduction session in APW. The highest percentage (95.5%) as shown in Table 5 indicates that demonstration is the most frequent method used by teachers, followed by sketching (84.1%), questioning (81.4%), use the module 79.4%, giving hands out 66.7% and showing video is 63.4%.

Table 5: Preferred teaching methods used in the introduction stage of APW (N=63)

Method	Percentage (%)		
	Not Agree	Not Sure	Agree
Sketching	1.6	19.0	84.1
Demonstration	0.0	4.5	95.5
Questioning technique	4.8	13.8	81.4
Video	31.7	4.9	63.4
Hands out	28.6	4.7	66.7
Use the module	12.7	3.2	79.4

Table 6 shows the data teachers' preferences during the teaching session (body). For most teachers, a monitoring approach with small groups is an effective method when teaching APW (79.4%) followed by using the module at 84.1% and problem solving approach at 76.2%. The smallest number is that of doing without teachers' guide (4.8%). Teachers are almost in agreement with the three methods when teaching the body of APW.

Table 6: Preferred teaching methods used in the teaching stage of APW (N=63)

Method	Percentage (%)		
	Not Agree	Not Sure	Agree
Doing together with teachers	39.7	11.1	49.2
Tracing the diagram	36.5	17.5	46.0
Teachers monitor in group	15.9	4.7	79.4
Discussion among friend in group	54.0	11.1	34.9
Questioning technique	76.2	1.6	22.2
Doing without teachers guide	95.2	0.0	4.8
Use the module	12.7	3.2	84.1
Sketching	47.6	20.7	31.7
Problem solving approach	17.5	6.3	76.2

Table 7 presents the methods that teachers use at the end of the teaching session. 90.4% teachers agree that they re-explain the tasks that have been given and how to solve the problem. 84.1% prefer report writing to ensure that students understand what they are doing. A similar number of teachers prefer students to prepare a report while the lowest items preferred by teachers are quizzes and comparing among group work with 42.9% and 39.7% respectively.

Table 7: Preferred teaching methods used in the conclusion stage of APW (N=63)

Method	Percentage (%)		
	Not Agree	Not Sure	Agree
Teacher re-explains	6.4	3.2	90.4
Quiz	54.0	3.1	42.9
Questioning technique	7.9	19.1	73.0
Report writing	3.2	12.7	84.1
Short conclusion/summary	15.9	4.0	80.1
Comparing among group work	31.7	28.6	39.7

4.3 Relationship between the three most preferred teaching methods

The relationship between the three methods data when starting teaching or when giving students a practical task were analysed. Table 8 illustrates the mean score between six methods of teaching introduction in APW. Correlations were analysed to identify the relationship among three teacher preferred teaching methods for the introduction of APW. The analysis presented in Table 4.14 shows that teachers who prefer to use the demonstration method also tend to use the questioning technique with a correlation value of $r=.85$ which is a strongly positive correlation.

Table 8: Relationship between demonstration, questioning technique, and sketching

		Demonstration	Questioning Technique	Sketching
Demonstration	Pearson correlations	1	.848(**)	-.569 (**)
	p-value (2-tailed)	.	.000	.001
	N	63	63	63
Questioning Technique	Pearson correlations	.848 (**)	1	-.477(**)
	p-value (2-tailed)	.000	.	.009
	N	63	63	63
Sketching	Pearson correlations	-.569(**)	-.477(**)	1
	p-value (2-tailed)	.001	.009	.
	N	63	300	63

** Correlation significant at the 0.01 level (2-tailed)

r=.85 shows strongly positive correlation between demonstration and questions technique

r=-.48 shows weak negative correlation between questions technique and sketching

r=-.56 shows medium negative correlation between demonstration and sketching

There are three methods that teachers prefer to use while teaching APW. They like to monitor in small groups, use the learning module and teach students how to solve the problem. Table 9 presents the data to identify, during teaching activities (body) in automotive practical work, the relationship between the small group monitoring problem solution and the module guide. It shows that teachers prefer to use monitoring in small groups and problem solving approach as the value $r=.73$ strongly indicates a positive correlation

Table 9: Relationship between small group monitoring, problem solution, and module

		Small group monitoring	Problem solution	Module
Small group monitoring	Pearson correlations	1	.729(*)	-.379 (**)
	p-value (2-tailed)	.	.000	.001
	N	63	63	63
Problem solution (trouble shooting)	Pearson correlations	.729 (*)	1	-.477(*)
	p-value (2-tailed)	.019	.	.029
	N	63	63	63
Module	Pearson correlations	-.379(**)	-.477(*)	1
	p-value (2-tailed)	.000	.019	.
	N	63	300	63

** Correlation significant at the 0.01 level (2-tailed)

$r=.73$ shows strongly positive correlation between small group monitoring and problem solution

$r=-.38$ shows weak negative correlation between small group and module guide

$r=-.48$ shows weak negative correlation between module guide and problem solution

Based on mean interpretation, three approaches were the most favoured methods that teachers use to teach conclusion in APW. Inter correlations test was used to identify the relationship. Table 10 presents the correlation analysis to identify the relationship between teacher re-explain and report writing when teaching the conclusion in automotive practical work. The result shows a positive, strong correlation between teacher re-explain and report writing with a value of $r=.73$.

Table 10: Relationship between quiz, questioning technique, and task summary

		Teacher re-explain	Report writing	Summarize the task
Teacher re-explain	Pearson correlations	1	.729(**)	.634 (**)
	p-value. (2-tailed)	.	.000	.001
	N	63	63	63
Report writing	Pearson correlations	.729 (**)	1	.637(**)
	p-value (2-tailed)	.000	.	.009
	N	63	300	63
Summarize the task	Pearson correlations	.634 (**)	.637(**)	1
	p-value (2-tailed)	.001	.009	.
	N	63	63	63

** Correlation significant at the 0.01 level (2-tailed)
 r=.73 positive strong correlation between teacher re-explain and report writing
 r=.64 medium positive correlation between teacher re-explain and summarize the task
 r=.63 medium positive correlation summarize the task and report writing

5.0 Discussion and conclusion

Teachers did not use one single approach in their teaching to make students pay more attention or motivate the learner at the beginning of teaching session. Teachers will use various methods to make teaching more effective (Ahmad et.al, 2013). The previous discussion explained what methods teachers used in each teaching session in APW. For introduction teachers prefer to use demonstration, sketching on whiteboard and questioning technique. These three methods are related to each other and it is this strong relation that makes teachers use them in their teaching. From the research analysis teachers preferred using demonstration with questioning technique during introduction session. Teachers demonstrated with written procedure followed by oral questioning techniques. Enough emphasis cannot be placed on the important of questioning in any teaching situation. The ability to direct thought-through questioning is recognized as one of the most valid proofs of teaching skill. It will encourage students to take more responsibility for their own learning and enable students to bring their own experiences to new a learning situation. The purpose of questioning during teaching is to help students participate actively during lessons and provides an opportunity for students to express their ideas and thoughts. In introduction session when teachers ask students questions they will sometimes give a wrong answer and teachers are responsible for correcting mistakes and guiding the students in a proper direction. These are delicate moments in teacher-student interactions and deserve to be dealt with carefully.

During body session, the strong relation methods are small group and problem solving. In APW students are divided into small groups to do the task so no wonder teachers preferred the small group approach in the body session of APW. It is easy to monitor and each member of each group has their own responsibilities for the task. Small group is a basic of corporative learning (Galina, 1998) and has been practiced for years. Cooperative learning is the instructional use of small groups so that students work together to maximize their own and each

other's learning (Johnson et.al, 1991). At the end of APW teaching the relationship between re-explain and report writing is strong. Teachers prefer to combine these two methods because they will summarize the topic and ask students to explain more details in their report. The report was assumed as evidence for school based assessment and will let the students gain extra knowledge based on the task beyond the curriculum of APW. The students behaviour and psychomotor was measured with their cognitive ability in terms of preparing reports. Santrock (2001) indicated that behaviour should be explained by experiences that can be directly observed and measured. Teachers observed students during APW teaching session so that they would recognize changes in behaviour during the APW session. Furthermore, teaching and learning process is behaviourist approach on covering subject area to engage the facts and problem solving (Holt et.al, 2000). Figure 3 summarize the research finding.

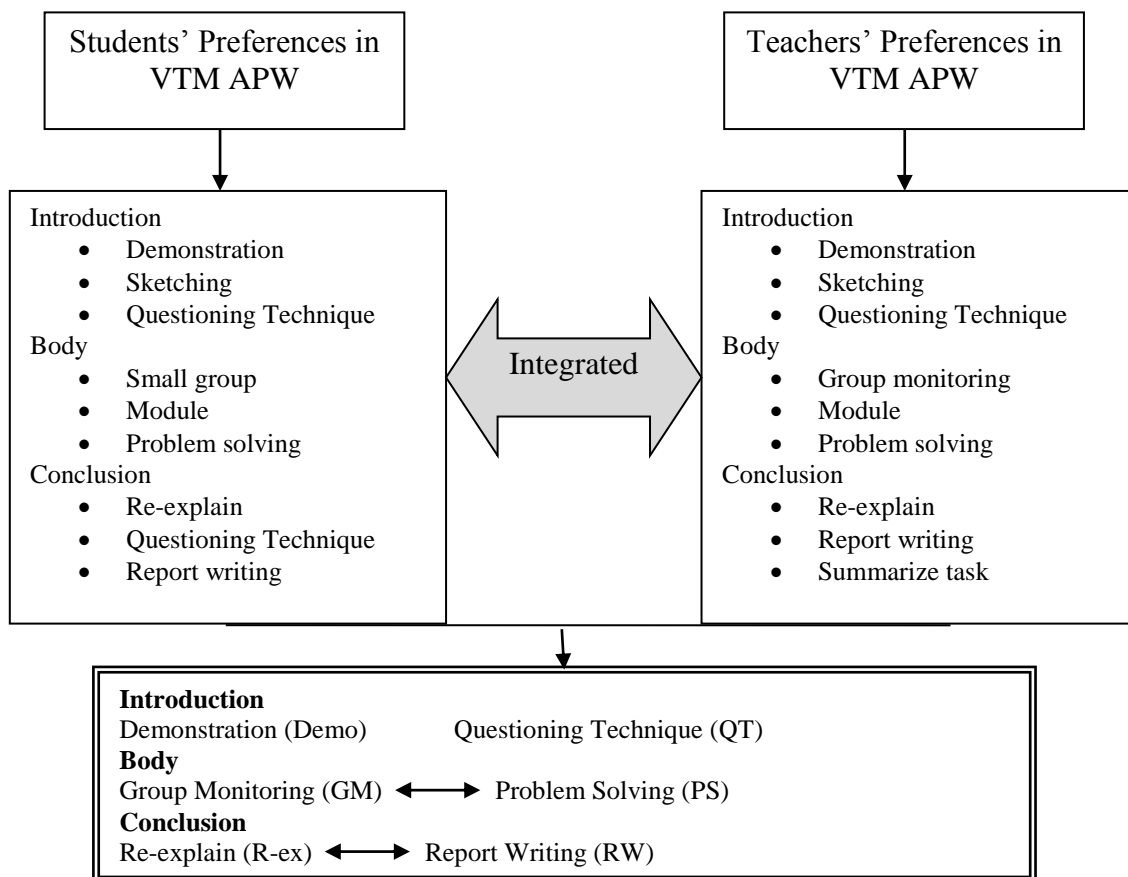


Figure 3: Student-teacher preferences in teaching automotive

References

- Ahmad, A. (2012). Vocational Teaching Method Practices in Automotive Practical Work for Vocational Secondary School. (Doctoral Thesis). Skudai, Malaysia: Universiti Teknologi Malaysia
- Ahmad, A., Kamin, Y., & Minghat, A. D. (2013). A Conceptual Model for Vocational Teaching Method as an Approach to Enhance Student Learning. Proceeding 2nd International Seminar on Quality and Affordable Education (pp. 395-405). Johor Baharu, Malaysia.
- Dale, E. (1969). *Audio-Visual Method in Teaching*, 3rd ed. Holt, Rinehart, New York
- Earnet, Joshua. (2001). *Competency-based Engineering Curricula. An Innovation approach: Proceedings of the International Conference on Engineering Education*. August 6-10 2001. Oslo. Norway
- George B (2004), *How Students Learn*, published as a supplement to the Routledge Falmer Key Guides for Effective Teaching
- Holt, D.G. & Willard-Holt, C. (2000). Let's Get Real: Students solving authentic corporate problems. *Phi Delta Kappan*, 82(3), pp. 243-246. http://www.unevoc.unesco.org/fileadmin/up/2013_epub_revisiting_global_trends_in_tvete_chapter6.pdf, retrieved on April 2nd, 2015
- Mohamad, M.M, Yee, M.H & Tee, T.K. (2014). Conception of learning through learning styles and cognitive dimension in vocational education. *Journal of Technical Education and Training (JTET)*, 6 (1). June 2014, pp. 32-41
- Mohamad, M. M. (2013). Learning Styles and Academic Achievement among Building Construction Students. (Doctoral Thesis). Skudai, Malaysia: Universiti Teknologi Malaysia
- Sharda, U. (2004). *Using Fictional Sources in the Classroom: Applications from Cognitive Psychology*. Review Article. *Educational Psychology*. DOI 10.1007/s10648-012-9204-0
- Santrock, J. W. (2001). *Educational psychology: International edition*. New York: McGraw- Hill Companies, Inc
- Wheelan, L. (2010). The quality of teaching in VET: literature review. LH Martin Institute for Higher Education Leadership and Management. Melbourne Graduate School of Education. University of Melbourne. Available from <http://www.Lhmartinstitute.edu.au/research-and-publications/research/1-study-on-the-quality-of-teaching-in-vet>.