Comparison between Two Models of Engineering Students' Intellectual Development

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Abstract

Undergraduate students have their own challenges. Most of them undergo a developmental progress in their learning, in which they gradually change their belief in the nature of knowledge when they learn and gain knowledge from authority figures. In the context of engineering education, intellectual development can be defined as the growth of students in such a way that their brains become more capable of understanding, analyzing and evaluating concepts in understanding the world. Upon entering university, many undergraduate engineering students assumed that there is always a right answer to most of the issues. They will then slowly develop from naive certainty to intelligent confusion. Understanding students' challenges in undergoing intellectual development enables educators to understand students' basis for their persistent efforts in understanding the world. Such insight could help educators to build a suitable guidance and scaffolding to support students' transformation. This paper is comparing between two different models of undergraduates' intellectual development. This paper reviews two prominent models of the intellectual development (William Perry's and Belenky et al.'s) in terms of the concept of intellectual development, their usability and their implications for sciences and engineering education. Perry's model is based on male undergraduates. It reviews how students respond to their challenges on various intellectual and moral issues that they encounter in their life during their studies in the universities. The changes on assumptions and the expectations of students about the teaching and learning follow a predictable pattern. Belenky's study is based on the view of women's knowledge that is similar with those of Perry's. Similarities and differences between the two models as well as the influence of knowledge of intellectual development on instruction are highlighted and discussed in this paper.

Keywords: Intellectual Development, Engineering Undergraduates, Perry's Model, Belenky et al.'s Model

1. Introduction

Intellectual development of an individual is the maturity on their cognitive process which occurs at different rates and different areas of their lives. Piaget (1972) concluded that intellectual development is the result of the interaction between hereditary and environmental factors. He said that students can constantly interact and develop with the world around them. In other words, knowledge is actually invented and continually reinvented. This development, argued by Piaget, can influence every other aspects of human development, such as the emotional, social, and the moral aspects.

Kroll (1992) describes intellectual growth as the development from naive certainty to intelligent confusion. Students who enter undergraduate studies in engineering mostly are at the stage of ignorant certainty. Most of them

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belief that the world are clear, absolute and entirely based on what is being told to them by others such as from parents, teachers, and influential peers. They trust these beliefs without questioning them critically or try to look for evidences to validate their authenticity. Students in this stage view all knowledge as absolute and concrete. They perceive that the role of teachers is to know all the truth and pass it to them while their role as students is to accept all what is being told, replicate and reproduce it on assignments and tests.

Consequently, these assumptions used by students in their learning enables educators to understand how students learn and acquire new knowledge. These help educators to identify students' weaknesses and construct scaffolding to support students not only in acquiring knowledge but also in intellectual development. In the context of engineering education, intellectual development can be defined as the intellectual growth of students in such a way that they become capable of understanding, analyzing and evaluating a concept and make sense of the world around them. Kroll (1992) suggests that students slowly develop from naive certainty to intelligent confusion where intelligent confusion is where an individual is able to recognize that all knowledge are contextual and they have to make judgements based on the evidence and justifications provided in certain context.

Numerous studies demonstrated that different factors could influence intellectual development such as interactions with cultural background, students' emotional states, interpersonal interactions among the students and interaction between instructors and students. All these can influence how students learn and understand the knowledge (the way or pattern of knowing). While students themselves held responsible on their development in intellectual development, the role played by instructors is equally important as their actions and interactions with the students could facilitate students' intellectual development. As an instructor, one should understand the challenges that students face in particular intellectual developmental stages and should explore all the possible strategies that can help in facilitating the teaching and learning process.

To understand how an individual progresses in intellectual development and achieve intellectual maturity, it is important to understand their stages of progression. Numerous researchers actively study and develop intellectual model to describe how an individual achieve intellectual maturity. This paper focuses on two two prominent models of intellectual development in undergraduate students, the model by William Perry (1970) that study on male subjects and a model by Belenky, Clinchy, Goldberger, and Tarule (1986) that views women's development. This paper also explores the implications of intellectual development in teaching and learning of science in the context of engineering education.

2. Models of intellectual development

We know that all students are different at some levels. There are many changes that students undergo during their undergraduate studies. One of the most important changes is in their perception of learning. Therefore, in the context of engineering education, intellectual development can be defined as the intellectual growth of students in such a way that they become capable of understanding, analyzing and evaluating a concept and make sense out of the world around them.

William Perry's (1970) and Belenky, Clinchy, Goldberger, and Tarule's (1986) models are the two prominent and earliest models of intellectual development. Discussions pertaining the two models will focus on the concepts, their usability and explores their implications on sciences and engineering education.

2.1. Perry's Research On Student Development

William G. Perry (1970) developed a longitudinal research to measure the intellectual development of male students in Harvard University during their studies. He chooses 20 students randomly and the result shows students' intellectual maturity had grown over the year. He states that, freshman are usually at dualism (right versus wrong) stage and students will progress to the relativism stage when they are at their senior year.

Perry is one of the first researchers to study the intellectual development among undergraduate students. All the stages in Perry's model are highly relevant to university students' intellectual development progress. Through self-reports, students' experiences and development over the years in university is investigated. Perry found that students' presumptions and expectations on teaching and learning are changing. These are based on a series of the open-ended interviews that he conducted with Harvard undergraduates in the 1950's and 1960's. Perry (1970) demonstrated that there are nine developmental positions for university students' conceptions of knowledge, from absolute position that views the knowledge is either right or wrong to the view that all knowledge is relative as shown in figure 1 (Culver and Hacros, 1982). Figure 1 show that the commitments among the students increase parallel with the development on intellectual. The descriptions of the nine positions applied to the learning situation that suggested by El-Farargy (2009) are as Table 1 below:
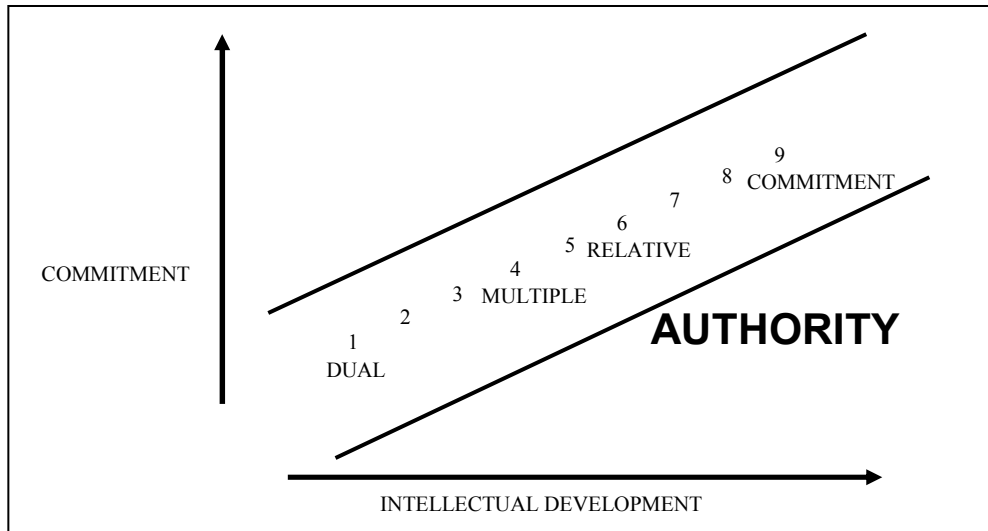

Figure 1. Perry's Model of Intellectual Development

Positions	Descriptions	The learning situation
Position 1 Basic Duality	The views of the knowledge from the students are either correct or incorrect. Knowledge is constructed as an accumulation of facts collected through the hard work	Students in this level are passive who just accept the facts only. They will obtained and understand the knowledge solely from the lecturer. Exams are viewed entirely from a factual objectives perspective
Position 2 Multiplicity Pre-legitimate	This position is about the conflicting opinions that students recognized, which they view some as correct while other as incorrect.	
Position 3 Multiplicity subordinate	Students accepted the diversity and the uncertainty, but this is only because the answer is not yet been found.	Students in this stage are in unclear situation where they need the guidance from the lecture for knowledge, assessment and grading.
Position 4 Advanced Multiplicity	Students acknowledge that anyone is entitled to his or her own opinion, through whether it is right and wrong in the hand of authority.	
Position 5 Relativism	All the knowledge that viewed by the students is in contextual perspective.	In this stage, students view their lecturer as legitimate source of knowledge because they are active constructors of knowledge. The students able make an argument in different contexts and view exams as an opportunity to show and practices their skills, creativity and independent thought. Their relativistic thinking become more confident when comparing between facts and opinions.
Position 6 Commitment foreseen	The students understand that it is necessary for them to be committed to a position within a relativistic world.	
Position 7 Initial commitment	The commitment is made.	
Position 8 Orientation in implications of commitment	The implication of the commitment is explored as one notions of the responsibility.	
Position 9 Developing commitment	Most of the individual situates themselves within an identity that incorporates the multiple responsibility and views commitment as an ongoing process.	

From Perry's (1970) research, he found that most students are in Position 1 when they entered the university. He also found that most students that he teaches reached position 6 by the time they graduated. Students who are in at Position 1 of basic duality appeared to be identified with people who wield authority. Students in Position 2 of Multiplicity Pre-legitimate show that they are able to solve the problems successful, particularly close-ended problem with a single right answer which still views the world in dualistic perspective. At Position 3, the Multiplicity Pre-legitimate stage, students realize that some areas of the knowledge are ambiguous. Progressing to Position 4 shows advanced multiplicity where individual in this stage fights with authority openly and students can solve the problem successfully and creatively. At Position 5 of Relativism, students see everything as relative and everything had common characteristic while absolute situation is only a special case. Position 6 explained a stage of foreseeing commitment where students realize commitment is required but still unable to do it. For engineering students, going through this level can be uncomfortable as it means they are required to commit into engineering. Finally, Position 7 through 9 represents degree and depth of commitment. Students in Position 7 are taking the first responsibility of his life for who he is. While students in Position 8 think that stylistic issues of commitment become important while in Position 9 students have developed a sense of self in both commitment and style and can be reached sometime after graduation.

2.2. Belenky's Model of Intellectual Development

While Perry's work are mainly on the intellectual development in male students, the research reported in *Women's Ways of Knowing* (1986), studied by Mary Field Belenky, Blythe McVicker Clinchy, Nancy Rule Goldberger, and Jill Mattuck Tarule, concentrated on women to address gender differences in intellectual developmental pattern. Women's Way of Knowing by the Belenky et al (1986) report on study of 135 women in their life experiences. They found similarities and some differences in certain way when compared with Perry's findings in the patterns of intellectual development, nothing the lack of research on how women come to understand truth, knowledge, and authority. Based on the interview, these 135 women were examined systematically to identify the five major stages of development on the perspectives of knowing and understanding.

The first stage explained is silent women, who did not understand the view of words as tools. Women in the stages of receiving knowledge is identified as listener who focused on others and believe that all the knowledge is factual, should be memorized and repeated. Women who are in subjective understanding or knowing stage just listen to their instincts or internal voices. They tend to rely more on personal experience as sources of knowing and expressing concern that differences in opinion might sever their relationship with others. Women who are in difference procedural knowing stage talked about an alternative way of knowing using procedures. Finally, some women realize that all knowledge is constructed by judging evidence, needing in make commitments, and should face an additional task. Below are the descriptions on the 5 major stages of the Belenky et al. (1986) model.

2.2.1. Silence

Females' students in this stage are without a true voice. Speaking out will only makes them appeared to be ignorant or bring negative outcomes. Even though they have their own ability, they still lack of confidence with their own ability. This not only causes difficulty for them to learn from their own experience, they also do not have a real sense on themselves.

2.2.2. Received Knowledge

This level is an early position where an individual view knowledge as a fact and the university as the authority who knows all the facts. It is believed that students at this stage believe all the ideas and the answers are either right or wrong. The job of students is to know, memorize on what they learn and reproduce it. This is opposite with the Perry's research on male subjects who students views themselves as "authorities-in-the-making". They show their knowledge that they know or prove themselves. Belenky et al. (1986) model suggested that women are more passive and require recognition or constructive feedback to promote their learning experience (Erickson, B. Peters & Strommer, 2006).

2.2.3. Subjective Knowledge

Students in this level tend to rely more on personal experience as sources of knowing and expressing concern that differences in opinion might sever their relationship with others. Due to the fear of affecting their relationship, they seldom disagree with other and if they disagree, they would reject based on personal knowledge, experience, and intuition which are different than Perry's research where he showed that students responded to the uncertainty strength and pronounce their right by their own opinion. This is due to students investigated in Perry's research learnt to fight for their own opinions with the evidence and reason. They tend to debate with other on their opinion to sharpen their views.

2.2.4. Procedural Knowledge

Procedural knowledge recognized that intuition can be wrong and individual would replace it with observation, analysis, and other people's expertise. Two distinct patter of thinking appear at this level: separate knowing and connected knowing. Separate knowing person thinks by eliminate subjective feelings from their decision making process while connected knowing person believe in others' experience and always understand and empathize other. Separate knowing thinking pattern are similar with Perry's Multiplicity level but more women's cognitive process are following connected knowing pattern.

2.2.5. Constructed Knowledge

Belenky et al. (1986) describe that women at this level acknowledge intuition and also others experiences in their thinking process. Women would also use more complex objective logic and subjective feelings while making decision. Absolute truth is rejected totally at this level where they recognize knowledge is contextual, making it fairly similar with Level 5 of Perry's model.

2.3. The Differences between the Two Models of Intellectual Development.

Perry's and Belenky et al.'s models have slightly different emphases but both of the models describe a similar progression. The differences of the positions between intellectual development model by Perry (1970) and Women's Way of Knowing by Belenky et al. (1986) are summerised in Table 2. The paragraphs followed discuss the similarities and differences between both models in greater detail.

Table 2: The Comparison with Two Models of Intellectual Development

Models	Stages if intellectual development						
Perry's model on men		Position 1 Basic Duality	Position 2 Dualism: Multiplicity Pre-legitimate	Position 3 Multiplicity subordinate	Position 4 Advanced Multiplicity	Position 5 Relativism	Position 6-9 Contextual Relativism Preliminary Commitment
Belenky (Women's Ways of Knowing)	Silence		Received Knowledge	Subjective Knowledge	Hidden Multiplist	Procedural Knowledge: Separate Pattern	Procedural Knowledge: Connected Pattern	Constructed Knowledge

By comparing the two models, we can see the similarities and differences between Perry's findings and *Women's Ways of Knowing* stages in their patterns of intellectual development. At Position 1: *Basic Dualistic* of Perry's Model, students (males) view the world in a dualistic term of right versus wrong. This position shows that men appeared to identify with the authority while women did not (Belenky et al., (1986). The instructor who acts as authority is seen to be responsible in teaching students the truth. Perry (1970) states that this position is naive and deprives the students any alternative to observe their own self. Furthermore, he noted that this position is not

suitable in a pluralistic culture of universities and students should not maintain in this position if they were to continue to stay in the university. Other studies suggested that most students' intellectual development progress starts at this position when admitted into the university due to the homogenous culture or narrow view environment. The pluralistic environment would cause them to lose their innocent quickly in the university (e.g., Moffatt, 1989). Students in basic dualistic position will also try to suit themselves to the new idea of multiplicity. In the study on the development of women, Belenky et al. (1986) included the students from all social classes. They discovered a position before Position 1 from Perry's Model which they called it *Silence*. From the above table, we can see that the first stage of development by Belenky et al. (1986), *silence* is unique to female and was not shown in Perry's Model. Women in this stage are unable to understand and they do not believe learning is useful to them. They also subject themselves to the triviality of authority. *Silent* women are unable to understand their own thoughts and feelings. Although, engineering education instructors tend to be shy from the arguments, there is a clear moral reason to help students moving out from position 1 into position 2.

Based on Table 2, Perry's *Multiplicity Pre-legitimate* stage suggests that students can perceive the existence of multiplicity but they still view the world in a basic dualistic way where there is either right or wrong. Students on this position hold their views that there can only be one correct answer but the authority could show them multiple answers to allow them to progress in their intellectual development. Engineering students in position 2 can solve problems successfully with a right answer. Students in this position also prefer instructors to know the 'correct' knowledge and deliver that knowledge in the right way without confusing them with various issues. This means that students view a good instructor as the one who provides structured instruction and gives students chances to practice their skills. Men and women use language differently in the dualistic position. Generally women prefer to listen while men prefer to engage in talking. In dualistic position, listening to the authorities is the primary focus for women and Belenky et al. (1986) labels it as the *Received Knowledge* level.

Multiplicity Subordinate or Early Multiplicity of Perry's Model suggested that students still believe in dualistic view, but it is caused by the ignorance of authority. Students in this position realize that in some areas, the knowledge has become ambiguous. Individuals in Position 2 believe that honest and hard work would lead to the correct answers while individuals in Position 3 believe that honesty and hardworking do not guarantee the correct answers. One of the biggest challenges in engineering education is to help students to move into position 3 or 4. Students who are good in academic can hide or run away from the challenges of multiplicity through competency (received good grades). Belenky et al (1986) suggested that formal education for women is relatively not important in shifting into multiplicity where Belenky et al (1986) called it *Subjectivism (Subjective Knowledge)*. Women progress to subjectivism after they had some crisis of trust in men with authority in their daily lives. The experiences allow them to know that the world does not work in a dualism mechanism.

In Perry's research, men initially tried to retain a dualistic position but they quickly realize that there is diversity of opinions. They might perceive that the authority wants them to be independent in their cognitive process. However, it would be insufficient for them and they may be tempted to *escape*. Perry's Model suggest that at Position 4 which is called *Advance Multiplicity*, individual are able to fight bravely and openly with the authority, but women in Belenky et al. (1986) fight the authority internally as *Hidden Multiplist*. Women in this stage may be silently being eliminated from the university. Most engineering students are required to achieve at least Position 5 in Perry's Model upon graduation as they can solve the problems professionally and creatively as required by the industry standard. Unfortunately, individual in this stage would not be able to see which problem is much more important than the others. Consequently, the person would be lack of vision in their decision making process.

At Position 5, students see everything is relative to its context not because of requirements by the authority but rather a pattern of cognitive process, which is called *Relativism*. Senior year students in engineering and science are focused in position 5 as they realize everything is relative in advanced classes. Prior to this realization, they may experience some kind of shock. Perry noted that all students in the relativistic position are able to understand that opinions are equal by referring to the evidence. Meanwhile, Belenky et al (1986) noted that all students used the differences logical procedure in position 4, which they called *procedural knowledge*. *Procedural knowledge* is

divided into two approaches: *separated knowledge* and *connected knowledge*. *Separated knowledge* (Palmer, 1983) aims to remove the feelings and personal experiences from logical analysis. *Separated knowledge* is clarified as doubting and argument. However, many women have difficulties to separating feelings and experiences. On the other hand, *connected knowledge* is an emphatic treatment approach towards views and opinions. Individuals operate through this pattern personalized the knowledge and attempt to understand the reason from other's way of thinking. Showing women kindness and encouragement from the authority will able to facilitate their development into Position 5.

Finally, Table 2 shows the position 6 through 9 of *Contextual Relativism and Preliminary Commitment* from Perry's Model which is also seen in Belenky et al. (1986) studies as *Constructed Knowledge*. These positions only represent the degree of the intellectual development and do not clearly define as others positions. Perry stated that students in Position 6 can see the need of commitment but have not made it yet. Position 6 can be a temporary relief before students ready themselves to do the commitment required by them in engineering practice. Individual's intellectual development progress from Position 6 to Position 7 by making a commitment at their free will. At Position 7, Perry suggested that students take their first responsibility for being who they are in their life. Position 8 allows student to see important issues from the commitment made and Position 9 can be reached by students after graduation as the position is about the maturity when the person develops a sense of self in both commitment and style. Belenky et al. (1986) noted that women also make commitments, but it is a commitment of a lifetime rather than a single commitment as shown by the male sample in Perry's Model.

Belenky et al. (1986) added that the commitment positions provide insight on thought processes. *Constructed Knowledge* is used by thought processes to evaluate procedural knowledge gained from others that based on personal experience. *Constructed Knowledge* allows students to integrate thoughts and feelings, which Belenky et al. (1986) perceived it as a shortcoming of objective knowledge. Perry's Model is a model which tends to ignore the specific situation of behavior and knowledge. However, an individual may not only be fitted into one stage only, but they may be in several different stages depending on the situation. Nevertheless, to conceptualize the intellectual development of university students, Perry's Model proved to be very useful.

3. The implication on teaching

To help students grow in their intellectual maturity, it requires balancing between the supports given by the instructors and the challenges that the students are being posed. In other words, it is very important to push students out of their comfort zone. In the context of university setting, students will construct knowledge and skills over the year while the learning processes in university that are very important for their future careers are the ability to integrate, evaluate and applying scientific knowledge (El-Farargy, 2009). Mara & Palmer (2004) state, to encourage the students to grow intellectually, it is desirable to have an epistemological framework in higher education. If students faced challenges that they could not cope, they might rebel and retreat. On the other hand, if the challenges are too easy for students, they would not progress and learn. Therefore, as instructors, th ey must recognize the intellectual maturity stages or level where most of the students are before helping the students to develop in their intellectual maturity.

Through Perry's model, different students may require different learning environment. Three recommendations on the learning environment that can be implemented to encourage the intellectual development to higher positions in Perry's model include: 1) using inquiring as an approach to learn new ideas rather than collecting facts; 2) take risks to learn a solution from its start until completion; and 3) use different steps to analyze various possible solution in solving complex problems that may yield multiple solutions (Culver & Hackos, 1982). Intellectual skills are

required to progress from low to high level in Bloom's hierarchy (Gabrielle & Guest, 2010) which they projected that proper background information and guidance is needed for students in dualistic positions to achieve learning goals and objectives. It is an important exercise for the instructors to prepare active teaching lessons. The activity that can facilitate students' intellectual development is through exercising their thinking skills.

Perry (1970 & 1999) highlighted that instructors should be aware with the ways students learn so that they can guide students effectively to increase their cognitive complexity. For example, engineering freshmen are usually in the dualistic stage of Perry's Model are normally placed in an introductory level class to acquire the basic understanding as well as associated terminologies and definitions. They are also exposed to situations that they would face conflicting interpretations of facts where students would not simply accept what is being told. As they progress to the stage of multiplicity, they can be asked to identify their perspectives and their opinions in such a way that they are required to give justifications and support such as through illustrations or data and also evaluate opinions from others with evidences that are available.

Effective instructors should be able to draw out plan and work with students who have previous experiences or understanding on the subject so that they can expand new information and understanding on prior understanding that students possess (Merriam & Caffarella, 1999). Many students perceive that the role of instructor is to make sure the learning is effective. Therefore, instructors should put their effort by making the class interesting and help students who are facing problem in understanding. Pascarella & Teenzini (2005) said that as instructors, they are expected to be organized to be an effective teaching organization. This means that instructors should be organized on their teaching objectives and methodology.

Perry (1970) recommended the instructor to employ strategies that could help students to progress in their intellectual development. Strategies that instructor could employ can be like assigning open-ended problem in real world setting while having students to work in a small group where they will be exposed to multiplicity of ideas. Others strategies that can be employed include modeling types or patterns of thinking that should be practiced and provide supportive feedback for students at every position of the intellectual development. Other than that, instructor must be able to explain and guide their students to approach the material so that it would not lead to a dualistic analysis. Some of the instructors might even need to take time in teaching their students about the stages of the intellectual growth. Through it, students will be more aware about their own intellectual growth over the time.

4. Conclusions

Most students going to universities will undergo an intellectual developmental progress. The two models that have been described in this paper, specifically models formulated by Perry and Belenky *et. al.* outlined the intellectual development progression. Both models have similar views on the shift and progress of the intellectual development, nevertheless differences could be seen between the two models in terms of the characteristics of the different stages. Such differences are inferred to be gender differences in intellectual development progress as Perry concentrated his study on men while Belenky et al. (1986) studied more on women.

The research done by Perry shows that most students' progression starts from Position 1 when they enter university and they will be in Position 6 when they graduate. Perry said that students in Position 1 and Position 2 are able to proceed from blind acceptance of the authority to the views in multiplicity of authorities at Position 3 and Position 4. The transformation of perspective occurs when they progress from Position 4 to Position 5. Position 6 and Position 7 represent an awareness that needs actual commitment in students' life. Position 8 and Position 9 focus more on how students synthesize all the solutions due to the consequences of their commitments. Position 9 represent about the position of maturity where a few students after graduate has developed a sense of their self in commitment with their style in conclusive way, where they acknowledge that there is no real answer but need their willing to struggle with the suitable process.

On the other hand, Belenky et al also see students' intellectual development progression in five stages starting from the *silence* stage. In this stage, students are unable to understand others' words and unable to voice their own thoughts and feelings. Students' intellectual development progress into the second stage called *received knowledge* where the truth lies in authorities, and students must memorize and reproduce it. Students believe that there is either a right or wrong answer on all problems. Stage three is about *subjective knowing* where students do not only depend on the authorities but they also depend on their personal knowledge, experiences and sense by their heart. Belenky et al. (1986) stated that stage four starts with *procedural knowing* where students are more used to the alternative ways for knowing as their procedures without take the issues to being addressed. This stage is further divided into two different patterns which are known as *separate knowing* and *connected knowing*. Belenky et al. (1986) said students in *separate knowing* are dependent on critical thinking to get the truth from ideas and beliefs while students in *connected knowing* take the opposite assumptions where personal experiences are the most reliable source of knowledge. The last stage formulated by Belenky et al. (1986) in students' intellectual maturity is called the *constructed knowledge* where all students know that all knowledge is constructed views. Making judgment on this stage requires students to use logical objective and subjective thoughts in their decision making process.

From the discussion above, we can see that there are a lot of differences between these two models where some intellectual patterns are shown in Perry's Model but not in the *Women's Way of Knowing*. There are also some similarities between both models. Although Perry focused on the men's perspective while Belenky et al. (1986) focused on the women's perspective, similarities can be found between Position 5 of Perry's Model and *procedural knowledge* in Belenky et al.'s (1986) model. Although Belenky et al. (1986) stated that the preferences for separate and connected knowing is gender-related, they also emphasized that there are as many women on their study described as separated knower as men who are described as connected knower. Others similarities that can be seen in *Women's Way of Knowing* is the *constructed knowledge* that is comparable with Position 6 to 9 on Perry' model (1970). Perry views that students know the need of commitment although they may not have yet to make the commitment while Belenky et al. (1986) also noted that women can also make a commitment even for life rather than men that often make a single commitment.

Some obvious differences on both model of intellectual development can be seen where men view the world in terms of right and wrong in *basic dualistic* at position 1, which is not shown on women (Belenky et al., 1986). However, Belenky et al. see the presence of a *silence* stage before Position 1 in Perry' model where women tend to be shy from arguments and appear to be ignorant to knowledge. Beside that, men and women used different language in dualistic positions, where women tend to listen more while men prefer to talk on. Another difference is that men in *multiplicity subordinate* realize that in some areas, the knowledge is rather ambiguous. Honesty and hard work might not lead to correct answers. Meanwhile in *Subjectivism (Subjective Knowledge),* women appeared to be subjective after they had some crisis of trust on men with authority in their daily lives. Lastly based on these two intellectual models, men and women fight the authority differently where men in Perry's model oppose bravely and openly with the authority while women prefer to fight the authority internally in their mind and heart as *hidden multiplist*.

The view that students progress in their intellectual level through their experiences has implications on the learning process and instructions. Promoting intellectual development requires instructors to challenge students' beliefs about the nature of knowledge, role of authorities, and the procedure that is used for making judgments. However, in the pluralistic nature of university environment, students from all stages of intellectual maturity can be found. Instructor should help students in every stage to develop their intellectual maturity. At the first stage of *Basic Dualistic*, we know that instructor is seen as an authority. In this situation, instructor should teach their students with the correct answer, and if instructors fail to do this, it means they failed to be a good instructor. To be a good instructor for students in *Dualism: Multiplicity Pre-legitimate,* instructors should present the knowledge in a logical way and structured to provide students the chances to practice their skills. They should also able to explain clearly

the way and approach to a topic and knowledge so that it would not lead to the basic duality view. Being a good instructor for students in stage 5 (*Relativism)* requires the instructor to be able to help students adapt at forming rules to develop reason and solutions. They must show the students that good opinion is always supported with reasons.

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