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Self-Directed Learning Capacity by Differentiated Teaching – A Case Study of High School Students

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Abstract		Review Article

Self-directed learning (SDL) capacity is one of the core common values of students, as defined in the Vietnam General Education Curriculum 2018 (VGEC). Because of the students' variety in capacity and needs, educators are challenged to assist in the development of self-directed learning skills and to encourage learners to more freely use self-direction in their learning activities by personalization and differentiation in teaching practices. However, previous works on SDL in Informatics for Vietnamese students mainly focus on educators' teaching without considering academic diversity. Our work introduces differentiated teaching and criteria to classify students in Informatics. On the basis of criteria, we designed a procedure to develop SDL capacity in Informatics for high school students. We also provide an implementation setting applying our method which uses the combination of cognitive capacity, personality classification and dependability criteria. The SDL capacity assessment can be used in addition to evaluate the improvement on students' SDL capacity scores.

Keywords: Differentiated teaching, Informatics teaching, self-directed learning capacity.

1. INTRODUCTION

Differentiated teaching, which was first introduced in the work of Tomlinson (1999), is a key high-impact teaching strategy used by teachers to craft lessons that provide the right amount of support and challenge to every student. It is widely applied to a wide range of fields in education, to provide high-quality, evidence-based instruction that meets all students' needs depending on their starting level and what they are expected to learn in that lesson. On the other hand, in VGEC, Informatics teaching plays a key role to develop the skills and abilities to seek, select, receive, and expand knowledge sources, not only in Informatics but also in other subjects. Our work introduces a differentiated teaching paradigm applied in Informatics teaching for high school students to develop their SDL capacity and readiness.

Differentiated teaching is a fundamental pedagogy including constructive instructions adapted to what students already know. It is fundamental in inclusive education where students have different academicals situations, circumstances, different skills and learning needs (Gregory & Chapman, 2002; Heacox, 2002; Soldengeld & Schultz, 2008; Tomlinson, 1999, 2000, 2001). In a regular classroom setting with differentiated teaching, students attain their own results by appropriate guidance and being responsible for the knowledge they gain (Craib, 2011).

Differentiated instruction is a mandatory tool to reach important goals of general education declared in VGEC, which is to help learners to be more responsible in their learning, to have benefited from their knowledge and to maintain the self-directed learning ability not only in professional work but also their personal lives. However, in traditional teaching methods where teachers appeared to be more concentrate on maintaining routine in large classrooms than matching instruction to individual differences, have poor performance in SDL capacity and academical achievement (Zigmond, 1990, Scott, 2002).

As stated in General Education Program in Informatics (VGEC, 2018), developing students' SDL readiness and capacity is a key goal to meet the

changing demands in education. However, it is shown by Kamran (Muhammad Kamran, 2019) that conventional teaching methods in Vietnamese education standard results in deficiencies and students' failure to reach their own goals. This finding is also supported in the work of Thuy (Thuy, 2011), Tao (Tao, 2019) and Tuyen (Tuyen, 2007). On the other hand, multiple works have focused on the application of differentiated teaching methods for Vietnamese situations and cultures. Example includes work of Hung (Hung, 2008) and Lam (Lam, 2020).

Although differentiated teaching methods are researched widely and apply to limited subjects in high school, researchers only focus on the diversity of learners in traditional classroom settings. Little attention has been paid to guidance for students in learning outside classrooms taking into account the wide gap between academically advanced and less academically advanced groups. As consequence, students have low performance and results in low SDL capacity and readiness, particularly students in mountainous areas (Thuy *et al.*, 2021). Moreover, the poor performance of differentiated teaching is due to the lack of criteria to bring different avenues to the learners to gain the content of the given course, thereby adapting to meet the wide gap of student requirements.

In this paper, we propose the process of guiding students to self-study on the basis of classification criteria to divide differentiating learners, which is in need after the goals of general education in Informatics have been identified in VGEC (VGEC). The main contributions of this paper are as in the following:

– Propose a new procedure applying differentiated teaching to develop SDL capacity of students in Informatics.
– Recommend a recommendation to divide students into groups and apply an appropriate method in each group in order to develop their SDL capacity.

The rest of the paper is organized as follows. After introducing a state-of-the-art differentiated teaching method in the literature Section 2, we present our procedure which includes 3 steps to develop students' SDL capacity on Informatics in Section 3. In Section 4, we describe our setting implementation recommend in which, we use the combination of different criteria to divide students into groups. Finally, we conclude this paper in Section 5.

2. LITERATURE REVIEW
2.1. Differentiated Teaching
According to Tomlinson (2000) differentiated teaching is not a strategy but the way in which we think of our learners, teaching and the learning process. In order to define and differentiate one's own teaching correctly, it is the responsibility of the teacher to get to know his or her learners (Manning, Stanford & Reeves, 2010). Differentiated teaching is therefore responsive teaching rather than 'one size fits all teaching', consequently starting where the learners are and reaching the capacity of each learner by bridging the gaps in understanding (Cox, 2008). Through this way of teaching teachers start to know their learners by changing the classroom environment, to see their learners' capacity levels, learning preferences and interests, and needs more clearly (Cox, 2008). This can be done by grouping learners accordingly and organizing teaching around a flexible content, process and product (Levy, 2008). Content refers to what we teach and a learner learns and is differentiated by interest; process refers to the way we teach and the activities a learner engages in while learning, and is differentiated by capacity; and product refers to the activities completed during lessons which demonstrate how learning has occurred, and is differentiated by learning preferences (Cox, 2008; Levy, 2008; Ellis, Gable, Gregg & Rock, 2008, in Manning *et al.*, 2010). With the tools of differentiated teaching, we can keep the focus on teaching all the learners equitably and take each learner as far as he or she can go on their educational path (Levy, 2008) which will result in the teacher's "growth towards professional expertise" (Tomlinson, 2000, p.31). Differentiation is therefore doing "whatever it takes to ensure that struggling and advanced learners, students with varied cultural heritages, and children with different background experiences all grow as much as they possibly can each day, each week, and throughout the year" (Tomlinson, 1999b, p.2).

2.2. Criteria to Differentiate Students in the Learning Process
To divide learners into groups with different features, one needs to take into account criteria to identify goals, needs and tasks of each individual. In this section, we review 5 main factors that educators use to classify students in differentiated teaching.

Cognitive Capacity
Bloom's taxonomy was first introduced in 1956 as a hierarchical framework for classifying students in the cognitive domain (Bloom *et al.*, 1956). The framework was first used to exchange test items among faculty at various universities to create sets of items, each accessing one educational objective. The original Taxonomy includes definitions of six main categories in the cognitive domain: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. With the exception of Application, each of these was broken into subcategories.

On the basis of the original Bloom's taxonomy, multiple approaches are introduced to apply the framework in high school education. Anderson *et al.*, (2001) presented a revised version that includes more useful and comprehensive additions of how the

taxonomy intersects and acts upon different types and levels of knowledge, i.e. factual, conceptual, procedural and metacognitive. Also, the taxonomy is widely used to access students' learning and educators' teaching method. Moreover, one can use the taxonomy to access and differentiate students based on their cognitive and metacognitive capacity.

Psychological Personality

Psychological personality is one of the important factors that educators use to provide differentiated instructions to students in classrooms. Carl Jung introduced the concept of psychological types in one of his most famous and important works, the book Psychological Types (C. G. Jung, 1971). It was later revisited and further developed by Katherine Briggs and her daughter Isabel Myers into a practical self-report assessment tool called the Myers–Briggs Type Indicator (MBTI) (Myers, 1987). By using their tool to measure one's psychological types, an individual receives a group of four letters, which indicate their preferences for each dimension: Introvert (I) or Extravert (E), Sensing (S) or Intuition (N), Thinking (T) or Feeling (F), and Judging (J) or Perceiving (P).

On the other hand, to understand the connection between learners' personality and their academic behaviors, the Big-Five personality framework (Salgado Jesus, 1997), a hierarchical model of personality traits with five broad factors, has become the most widely used and extensively researched model in the literature. It represents personality at the broadest level of abstraction. Each bipolar factor in its dimension (e.g., Sensing vs. Intuition) outlines several more particular facets/characters (e.g., Sociability). These facets then classify a huge number of more specific traits.

Using psychological personality assessments brings important factors to educators whose responsibility is to classify class into groups and provide appropriate differentiated instructions to each group. Moreover, these assessments determine if the personality types or any of the major traits significantly contributed to the effectiveness of teaching methods (DJ Teachout, 2001).

Type of Learner

Performance of learners is different in learning activities despite the same instructions provided by the same teacher, with the same teaching method (Razavi, 2014; Reid, 1998). Types of learners, which are identified by their preference, play a vital role in the learning process (Mackey, Gass, & McDonough, 2000). It is also stated in works of Lee *et al.,* (Lee & Kim, 2014) and the work of Rubin (Rubin, 2011) that different types of learners perform differently while they are engaged in various learning situations.

First introduced by Kolb in 1984 (Kolb, 1984), the concept of learning style has enjoyed considerable support and has become the most widely used and extensively researched tools to improve teaching and learning quality in higher education. Kolb also (Kolb *et al.,* 2001) introduced a four-stage cycle of learning: Concrete experience, reflective observation, abstract conceptualization and active experimentation. On the basis of the four-stage learning cycle, Kolb's learning theory specified four distinct learning styles: Diverging, assimilating, converging, and accommodating. On the other hand, Reid (1995) has divided students' learning styles into three major categories: cognitive, sensory, and personality. Each of these is further classified into different subcategories. For instance, sensory style is comprised of perceptual or environmental style. In particular, perceptual learning style associated with four types of students: auditory, visual, tactile, and kinaesthetic learners.

Addressing a students' learning style during academic lessons will most likely improve their academical achievement. Even if the final assessment of the lessons is not a match for the learner's preferences, the performance of students is significantly improved in comparison to the result of traditional teaching methods where learning styles of each student is not recognized (Tomlinson *et al.,* 2003). By the identification of their lesser preferred learning styles, teachers should provide instructions and activities designed in ways that offer each individual opportunity to learn effectively. Moreover, learning plans and provisions that are typically available to learners are evaluated and developed to be more appropriate learning opportunities. However, little attention has been paid to the relationship between SDL capacity and different learning styles.

Cognitive Style

In 1948, Asch and Witkin (Asch *et al.,* 1948) introduced an apparatus called the Rod and Frame Test and Embedded Figures Test to classify participants into field-dependent or field-independent. Field-independent is a cognitive style in which the person consistently relies more on internal referents (bodily sensation cues) than on external referents (environmental cues). In contrast, field-dependent cognitive style is defined by a relative inability to distinguish detail from other information around it.

It is shown a strong relationship between learners' SDL capacity and their cognitive styles. Students with independent cognitive style often have the ability to be independent and autonomous in exploring and discovering knowledge, but introspective, paying little attention to the surroundings. On the contrary, students with dependent cognitive style need attention and help of others in their learning process, extrovert and have the ability to socialize. For this reason, successful self-directed learners exhibit

characteristics close to those of the field-dependent cognitive style in a number of significant ways.

Intellectual Ability

In traditional psychometric views on intelligence, people have only one single type of intelligence which is mainly exposed in cognitive abilities. In the book *Frames of Mind: The Theory of Multiple Intelligences*, Gardner (Gardner, 1983) first introduced his theory that challenged the traditional notion by broadening the definition of intelligence. In particular, he suggested that people have 8 different kinds of "intelligences": Linguistic, Logical/Mathematical, Spatial, Bodily-Kinesthetic, Musical, Interpersonal, Intrapersonal, and Naturalist. While a student might be particularly strong in a specific area, he or she most likely have multiple capacities. For instance, an individual might be strong in verbal, musical, and naturalistic intelligence. Gardner also stated that the linguistic and logical-mathematical modalities are most important for students to learn in school and society.

On the other hand, psychologist Robert J. Sternberg has proposed the triarchic theory of intelligence which is originated as an alternative to the concept of traditional general intelligence theory (Sternberg, 1985). In his theory, intelligence ability is divided into 3 types: practical (the ability to adapt to different situations), creative (the ability to create new ideas), and analytical (the ability to analyze information and solve problems). He also stated that intelligence isn't fixed, but rather comprises a set of abilities that can be developed.

For differentiated teaching methods in Vietnam, educators only focus on intellectual ability which is provided in academic report cards. Overlooking psychological and cognitive factors leads to poor performance of differentiated teaching in high school in Vietnam. Our research utilizes 5 factors mentioned above and guides students to self-identify their own goals, tasks, resource and strategy in learning Informatics, which leads to significant improvement in students' SDL readiness and capacity.

2.3. Self-Directed Learning Capacity

In the last few decades, self-directed learning has emerged and been widely exploded in the world of academic research and education. Knowles first introduced the concept of self-directed learning in his original work (Knowles, 1975). In his work, self-directed learners are defined as proactive students who take the initiative in their learning, actively control and influence their learning processes. Four factors compromise the SDL capacity are described in the following:

- Ability of recognition the demand of self-learning. Students recognize the importance of self-learning also have the motivation to learn and desire to jump into learning processes.
- Ability of goals of learning identification: Students need to identify the goals of learning, including external goals and internal goals. For instance, response to teachers' requests is an external goal while satisfying learners' own needs and interests is an internal goal.
- Ability of learning tasks identification: it is the students' ability to estimate time resource should be used to complete each task; complete the assigned work before doing the extra work; understand the lesson in class before trying to discover more on their own; find out what's relevant or extended from the lesson. Moreover, it is also the skills to seriously implement assigned learning tasks: prioritize completing all assigned assignments before doing other things; do the exercises carefully and check the results.
- Ability of learning resources identification: To have effective self-learning process, learners need to find, evaluate and choose appropriate sources of materials for different learning purposes and tasks. In addition, they also need to recognize, adapt and take advantage of learning conditions and circumstances.
- Ability of learning strategies identification. This ability is expressed in several behaviors as follow:
  - Design students' own learning method.
  - Use methods to record/write information in suitable forms (papers, files in computer). They are convenient for memorizing, using, and supplementing when necessary.
  - Decision making skills. In some certain conditions, students decide to change the direction of learning.
  - Self-seeking and self-actualization opportunities to grow and fulfill one's potential.
  - Evaluate the study plan and adjust it on the basis of the evaluation.
  - Realize any mistake made and realize any limitation in the learning process (including assessment).
  - Use the knowledge learned from the learning processes and learning experience to apply it to other situations. Also, self-adjust the learning method anytime needed (including assessment).
- Ability of self-evaluation: Students show the ability to evaluate his/her learning process, include: (1) Determine the effect of the learning process: regulate the current learning method and the knowledge that is concentrated and identify the appropriate goals are set or not and (2) determine what should be done to improve the quality of learning: learning

methods, knowledge understanding, goals, study schedule and daily activities. For instance: Student should identify parts of their knowledge and skills which are still unclear or are insufficient to meet the learning goals. They should determine parts of the lesson which are need to be more explored and discovered. Also, they should know whether the time schedule for learning and for daily activities is set appropriately?

The general education program in Vietnam (VEGC, 2018) concentrates on improving the learners' SDL capacity, which is defined as one of the most important roles of the general education curriculum. In the next section, we describe our proposed procedure to apply differentiated teaching to improve SDL capacity for students in Informatics.

3. The Proposed Process of Guiding Students to Self-Study Based on Differentiating Criteria

In this session, we present our proposed process for educators to guide students to develop their SDL capacity and capacity on the basis of differentiating criteria. The process includes four steps as in the following:

- Step 1: Identify and classify students according to differentiation criteria
- Step 2: Develop a plan to guide students in self-study in the direction of differentiation
- Step 3: Implement the plan, evaluate the SDL capacity and make adjustments

We describe each step in the following.

3.1. Identify and Classify Students According to Differentiation Criteria

The most important step before providing appropriate instructions to each learner is to identify their academical features, what they want and need. In this paper, the use of the combination of 5 differentiated factors helps us to overcome the weakness of the differentiated teaching application in Vietnam, where students' academical report cards are the only source to differentiate them into groups.

Table 1: Tools to classify students by differentiation criteria

Criteria	Type	Tools
Intellectual ability	Students only stop at the level of knowledge	Academic report card, academic record, knowledge test at the beginning of the school year. It is prepared and stored carefully at high schools in Vietnam.
	Students understand the knowledge	
	Students apply knowledge in life.	
	Students evaluate, analyze and create based on existing knowledge	
Psychological personality	16 types	Academic records with comments from junior teachers and psychological tests: http://www.humanmetrics.com/personality
Learner types	Diverging	Observation table of the behavior of students
	Assimilating	
	Converging	
	Accommodating	
Cognitive style	Independent	Observation table of the behavior of students
	Dependent	
Intellectual ability	Analyze	The first test of the school year with different types of questions and tests: https://www.idrlabs.com/multiple-intelligences/test.php
	Creative or synthetic intelligence	
	Practical intelligence	

In order to guide students to self-study in the direction of differentiation, teachers need to be able to classify students' objects. Most high school students have revealed their personal elements from previous grades. Teachers can track students' academic records, use initial assessments or psychological tests to get accurate information about each group of students. Table 1 below is a suggestion of tools for teachers to classify students according to the criteria presented above.

3.2. Develop a Plan to Guide Students to Self-Study in the Direction of Differentiation

On the basis of the classification, educators develop a plan helping students to be self-reliant in their learning process. The results of the plan are to identify their self-study needs, determine their learning goals, learning resources, learning resources, learning strategies and evaluate learning outcomes.

Identify Learning Needs

Teachers guide students to identify their own learning needs and motivations on the basis of their classification group. For example, learning needs of students with extroverted personality are mainly to impress other people such as their parents, teachers, or friends. In contrast, learning needs of students with an introverted personality is to experience and enjoy their own learning process. Similarly, for students with average cognitive ability, their learning needs are

simply to perceive the knowledge provided by the teacher, while students with higher cognitive ability have higher learning needs such as exploring and discovering new knowledge to enrich their existing knowledge.

Identify Learning Goals

Learning goals can be divided into external objectives and internal objectives. Another classification of learning goals is goals in short, medium and long term. On the basis of the classification, educators help them to determine appropriate goals for each category. For example, the goal for average students is only to do all the exercises in the textbook and the exercises assigned by the teacher; students with good cognitive ability can set goals to do advanced exercises, exercises in reference books, and self-made exercises. Divergent or assimilated learners only aim to understand the knowledge provided, while convergent and adaptive learners have the goal of applying that knowledge to problem solving in real life. Students with dependent learning styles always need the guidance of teachers or parents and relatives to complete their learning goals; and students with independent learning style, the goal is to own knowledge, form skills and abilities for themselves.

Identify Learning Resources

To identify learning resources, students analyze knowledge and skills they can attain from different learning resources; exploit the learning media that is most suitable for them. For example, in the subject Algorithms, students with dependent learning styles will only use learning resources provided by teachers such as textbooks, exercise books, and video lectures. In contrast, students with independent learning styles actively search for resources on the Internet, which can be videos that teach advanced skills or use another graphic software with more advanced features.

Define a Learning Strategy

Learning strategy is greatly influenced by the individual traits of each learner. To define a strategy for each student's learning process; one determines learning methods and make a plan for the whole learning process. For students with good cognitive ability, they often have their own learning methods and make a study plan suitable for themselves. In contrast, the students with average cognitive ability needs assistance in determining which learning methods are appropriate, as well as how to plan their learning. For students with practical intelligence type, their learning methods need to be associated with physical activities, such as walking while studying and memorizing. Moreover, students with creative intelligence type need to associate lesson content with works of art or map, visualized, and musicalized knowledge. Students with analytical intelligence may simply write the content of the lesson in their notebooks and read it aloud to memorize and understand. On the other hand, for students with extroverted personalities, a feasible learning strategy is to create competition and emulation with other students. In contrast, teachers can direct students with introverted personality into the learning strategy of achieving each level in the student's own process.

Similar to learning strategy, making a study plan and a timetable for studying is highly depended on individual traits and the goals they determined in the previous steps. For example, introvert students want to increase their time studying at home while extrovert learners only use effectively time study in class.

Assess Learning Outcomes

Students assess their learning outcomes based on the goals identified, evaluate their learning methods and evaluate the shortcomings that need to be improved.

3.3. Implement the Plan, Evaluate Result and Adjust

After having plans to guide students in self-study, teachers can support them in each component capacity, assign learning tasks for students to learn on their own, and encourage them to learn on their own. The table below is the criteria and their manifestation we use in teaching the module Graphic Software, of the Informatics program grade 11th.

Table 2: Criteria to estimate the SDL capacity of student on Graphic Software teaching

Criteria	Manifestation in the module Graphic Software
Identify learning goals	Identify the right learning goals: • Ability to use some basic functions of graphic design software. • Create simple, useful and practical digital products such as logo, banner, advertising topics, posters, greeting cards, etc. • Define goals that are suitable for each student, such as: creating digital products according to the student's needs, the product possesses the own technical and aesthetic creativity; digital products are associated with a real-life event that they are responsible to design and implement; or products must have high aesthetics and their own identity. • For the selected topic, define clear and detailed goals. For example: how detailed should the product be, what knowledge and skills should be applied in the process.
Identify learning task	• Identify the right learning task: • Practice the tasks and exercises given by the teacher in the classroom.

Criteria	Manifestation in the module Graphic Software
	• Learn to manipulate different graphic design software • Expanding knowledge through additional readings, searching for more documents on the Internet. • Identify learning tasks based on achieved results.
Identify learning resources	• Use the right working process to work with computers and graphic design software • Use the search engine to find information for the requested graphic product. • Select the information suitable for the project • Exploiting open learning resources to gain more knowledge about word processing. • Share projects with teachers and other groups through digital tools such as Padlet, Google Drive, etc. • Depending on specific circumstances, the project can be carried out at school or at home.
Identify learning strategy	• Set a timetable for each exercise and task. Have a clear plan on the resources and tools to use (guidance from teachers, books, classmates and resources on the Internet) • Record knowledge gained. • Observe and learn from students' own work and comments from teachers and class members. • Evaluate and adjust the learning plan after finishing each lesson and task given by the teacher.
Assessment	Using assessment support tools such as checklists, rubrics to assess the learning process: • Did the learning go as planned? • What are the current learning methods and tools being used? • What knowledge is being concentrated? • Evaluate the level of completion. Find some factors of the learning process needed to be improve, set a plan to improve them. Assess learning outcomes by: • How much knowledge related to graphic design software • What knowledge has been applied to complete the tasks? • What knowledge is known but not yet used?

4. The Proposed Implementation of the Differentiated Teaching Method

In this implementation, we suggest to combine the cognitive criteria, personality criteria and student's learning style to classify students into groups. More precise, Table 3 describes the used criteria in details, and groups of student are described in Table 4.

Table 3: Criteria in proposed method

Diffirentiate Criteria	Classification
Cognitive Capacity	Students merely know the knowledge.
	Students understand the knowledge.
	Students are able to apply the knowledge to do exercises and solve problems in real life.
	Students are able to evaluate, analyse and create, on the basis of taught knowledge.
Personality	Introvert
	Extravert
Learning style	Independent
	Dependent.

The combination of 3 criteria leads to 16 groups, as described in Table 4 below:

Table 4: Groups of students

Group	Classification
KII	Know the knowledge/Introvert/Independent
KID	Know the knowledge / Introvert /Dependent
KEI	Know the knowledge /Extravert/Independent
KED	Know the knowledge /Extravert/Dependent
UII	Understand the knowledge/Introvert/Independent
UID	Understand the knowledge /Introvert/Dependent
UEI	Understand the knowledge /Extravert/Independent
UED	Understand the knowledge /Extravert/Dependent

Group	Classification
AII	Be able to apply the knowledge/ Introvert/Independent
AID	Be able to apply the knowledge / Introvert/Dependent
AEI	Be able to apply the knowledge / Extravert/Independent
AED	Be able to apply the knowledge / Extravert/Dependent
EcaII	Be able to evaluate, analyse and create/Introvert/Independent
EcaID	Be able to evaluate, analyse and create /Introvert/Dependent
EcaEI	Be able to evaluate, analyse and create /Extravert/Independent
EcaED	Be able to evaluate, analyse and create /Extravert/Dependent

In reality, the proposed diffirentiate teaching method is not straightforward with the educators. It requires much conciousness, passion and time from teachers to observe all the behavioral expression of their students to label them to appropriate groups. Only by a proper labelling process, relevents and suitable lessons could be provided to each group. In addition, educators need to be flexible in asigning tasks and exercises to students, not just stick to the personality classifications and learning styles. Part of the reason is that one important purpose of education is to provide a comprehensive development to the learners, avoid students from being imprisoned by their possessed knowledge and skills. As consequence, educators should be encoraged to push students to challenging missions, which may help them to discover and develop domains and skills they don't know before via their own SDL capacity.

5. CONCLUSION

For high performance in Informatics teaching, an appropriate differentiated teaching must be applied Vietnamese students with differences situations and circumstances, as mentioned in VGEC. This paper addresses criteria to classify students into group on the basis of their cognitive capacity, psychological personality, types of learner, cognitive style and intellectual ability. We introduce a novel procedure which guide students develop their SDL capacity in Informatics within 3 steps.

Differentiated teaching is a measure that needs a long and consistent implementation throughout the learning process. This measure is suitable for gifted class environments where it is necessary to allocate students into groups of equal ability to focus on fostering students' learning ability. However, this measure can also be applied to mixed groups of students with different self-study abilities by assigning students to perform collective tasks so that each student can support each other and progress throughout the course.

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