



## Curiosity among Students in Learning the Design and Technology Subject

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## Abstract

Curiosity is needed in Learning Design and Technology (D&T), which is practically work-oriented for students to explore knowledge and develop current skills in designing products. Curiosity can generate creative, critical, and innovative thinking for students in getting ideas and solving problems during the learning process. However, studies have found that students are less curious, ask questions, and are interested in exploring during their lessons. Hence, a case study was conducted to identify students' views on curiosity in learning D&T subjects based on teachers' teaching methods. A total of 11 respondents, 14 years old from lower secondary schools in a district of Selangor, were interviewed. Interviews were done using five dimensions of curiosity through open questions. The researcher also implemented observation of teaching and learning (T&L). The findings showed that the T&L's methods and activities used by teachers can influence the discernment of students as it encourages them to explore in gaining knowledge, experience, and skills in their learning. Finally, this study recommends that further research be conducted in implementing T&L activities that can enhance students' curiosity in their learning.

**Keywords:** Exploration; Driving question; Student inquiry; 21st-century skills; Inquiry learning; Technical and vocational education and training (TVET).

## 1. Introduction

The Design and Technology (D&T) subject is a literacy subject to technical and vocational education and training (TVET). This subject is widely offered in the national curricula of several countries including the United States, England, Canada, China, India, France, Finland, Ireland, New Zealand, South Africa, Singapore, and Malaysia. In Malaysia, the subject offers at level two of primary, lower-middle, and high school education levels, where students are exposed early to skills in design, improvement, and building products by applying various techniques. Technical and Vocational Education and Training (TVET) is generally lifelong learning that includes education, training, and skills development in various fields of employment, production, service, and source of income (UNESCO, 2015). In TVET, the learning process is focused on technology assistance work orientation. Therefore, the presentation of TVET should be student-centred as students need to implement the practical work and be able to apply knowledge and skills in carrying out tasks.

The D&T subject emphasizes on product designs in various fields such as manufacturing, agriculture, system technology, food controls, and food technology. Thus, students are required to explore new strategies and ideas in real life by applying creativity and innovation elements to obtain results with a quality, eco-friendly, authentic, and commercial value (Australian Curriculum Assessment and Reporting Authority ACARA, 2021; Malaysian Curriculum Development Division, 2016; Singapore Curriculum Planning and Development Division, 2016). Hence, students are expected to develop the necessary network of skills during the process of designing through their continuous exploration.

### 1.1. Curiosity in learning

Curiosity is needed in the learning of D&T subjects to encourage students to explore knowledge and develop their current product skills. Curiosity can generate creative, critical, and innovative minds in getting ideas and solving problems during the learning process. According to Dewey (1910), Piaget (1964), Berlyne (1954), and Loewenstein (1994), students can gain meaningful knowledge and experience through the desire to explore in search of information and problem-solving. Dewey thinks that curiosity can make students ready to explore, obtain the necessary information and develop their knowledge. According to him, students will lose interest when learning is based on disseminating and accepting information. Thus, students cannot understand, apply, and evaluate the knowledge gained in real life. In comparison, Piaget (1964) stated that students' cognitive development occurs through the process of assimilation and accommodation based on the adaptation of knowledge or experience derived

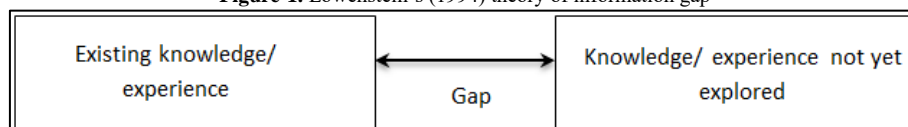
from curiosity and exploration. Piaget (1964) and Vygotsky (1978) also pointed out that students showed a change in their behaviour when curiosity led to exploration through the stimulus given. Curiosity can trigger excitement and make student-focused on learning till he is satisfied with what he wants to know. Therefore, curiosity is the key to the development of students' learning which is triggered through stimuli that leads to exploration in acquiring the necessary knowledge and experience.

However, students' curiosity is influenced by teachers' pedagogy (Ostroff, 2016; Whitehouse *et al.*, 2018). D&T teachers can deliver their teaching lessons using various methods such as project-based learning, problem-based learning, and inquiry-based learning as a way for students to implement exploration, design, and in producing products. Through the appropriate teaching method, teachers can guide students toward self-involvement in learning, and take responsibility for what they need to know and do to produce the products. This situation gives students control and freedom in learning with teachers' supervision as facilitators. When students have a sense of belonging to their learning, students will be more motivated, excited, and stimulated to explore further and make the knowledge and experience gained meaningful (Spencer and Juliani, 2017).

## 1.2. Theory of Curiosity

Berlyne (1954), expressed that curiosity refers to individual responses due to uncertainty over something that he does not know. The uncertainty exists because there is a gap in an individual's knowledge, bringing it to the effort to solve it. In the theory of information gap, Loewenstein (1994) explained that curiosity exists due to uncertainty because there is a gap between what is known to what is not yet known (Figure 1). Based on this theory, students' curiosity will decrease when the information obtained is sufficient to bridge the existing gap.

Figure-1. Loewenstein's (1994) theory of information gap



However, each student has a different level of curiosity based on his impetus to a situation or interest in the existing stimulus. His desire for something exciting encourages him to gain knowledge, understanding, or awareness of something required<sup>5</sup>. Therefore, the desire of the student to know something arises on self-appeal to obtain information due to the upheaval, discrepancies, conflicts, uncertainties, shocks, or gaps in the knowledge that occur within themselves. However, Li (2012) stated a difference in curiosity in learning between students in Asia and the West. These differences are closely related to the different cultures and foundations where Asian students are more formed to develop skills before implementing creativity in learning, while students in the West are more exposed to explorations in understanding something that then leads to skill development. Therefore, Asian students are more likely to repeat learning in ensuring memorization, mastering their knowledge and skills, and answering questions in the exam. This is a different approach used by students in the West as students are more exposed to open minds and critically evaluate information than just memorizing it. The difference in this learning culture forms a student learning style and a way of thinking which implies individual self-development.

### 1.2.1. Dimensions of Curiosity

Studies conducted by Kashdan *et al.* (2018) found that individuals trigger curiosity in different ways, such as through joyous exploration, deprivation sensitivity, stress tolerance, social curiosity, and thrill-seeking. Joyous exploration refers to the enjoyment of an individual's desire to find new information and knowledge that leads to development and learning (Kashdan *et al.*, 2018). This desire is closely linked to motivation within the individual to strive and conduct behaviour to achieve what it has not yet known. In the context of learning, joyous exploration can be enhanced through the support of teaching and technology assistance (Hochberg *et al.*, 2018). For the D&T subject, teachers stimulate students' exploration by linking the need to design products with issues or problems in their daily life. When a student is given the freedom to explore with the teacher's supervision, the student's ability to develop his idea is wider as the student has the desire to build the product he wants to produce.

Curiosity also exists through sensitivity to individual's inability to acquire or do something. The discomfort of what is unknown will lead to exploration to link the knowledge gap, as illustrated in the theory of description of information (Loewenstein, 1994). This situation causes individuals to feel desperate to make exploration without the motivation to gain knowledge. For example, students are unable to build electronic project assignments because of no experience in doing them. This situation makes students aware of their inability to conduct their electronic projects. Hence, students will explore through meaningful impulses in completing their projects.

Stress can cause individuals to lose their curiosity. A study by Pascoe *et al.* (2020) found that stress in learning affects the ability to learn, academic performance, quality and quantity of sleep, physical health, mental health, and materials used by the students. Therefore, students with a high-stress tolerance will be able to go through all concerns and uncertainties in exploring something new, complex, and unexpected. In this regard, teachers are required to support students learning through discussion activities, group work, and others.

Social curiosity forms a sense of belonging in an individual. Previous studies showed that individuals with social curiosity tend to obtain good information, understanding, and interaction (Hartung and Renner, 2013). This causes the formation of togetherness and intimacy, which is required in exploration, especially in pairs or group activities. Individuals with social curiosity are based on their need to know the minds and actions of others through

observation, asking questions, listening, or getting information from other parties. Therefore, learning activities that promote collaboration or discussion can provide space and opportunities for students to express their desire to the teachers and their peers through questioning and their behaviour regarding of what they want to know.

The willingness to accept risks in self causes, students to be open in expressing curiosity. It refers to excitement in making explorations to fulfil their desire by possible approach to obtain what is needed. However, the study by [Kashdan et al. \(2018\)](#) found that there was weak collateral between the dimensions of looking for fun in curiosity of learning. This is likely because the desire to implement the exploration is not to gain knowledge but more towards the interest and excitement of something else.

Although the T&L conducted today emphasizes on the 21st-century strategy, methods, and learning activities, teachers still find it difficult to enhance curiosity among students during the T&L session. Ironically, the lack of curiosity in learning will lead to limitations in expanding ideas and exploring strategies in producing products, thus leading to stereotypes. According to [Engel \(2009\)](#), students' formal learning curiosity decreases as teachers confront time constraints to plan and nurture curiosity in teaching. The study by [Hulme et al. \(2013\)](#) also found that students are motivated towards achievement in learning have lower curiosity than students who are motivated towards mastery in learning. This was demonstrated by the fact that questions raised in class by students who are driven by exam scores are simply intended to gather specific information as opposed to questions raised by students who are motivated by learning mastery, which finally results in knowledge development. In addition, students are also found to have difficulty asking questions when carrying out T&L activities. In this regard, this study aims to explore teachers' teaching towards students' curiosity in learning DT subject in middle-high school.

## 2. Material and Method

### 2.1. Research Design

This case study was conducted to get students' opinions on appropriate behavioural while learning. Case studies are appropriate for getting detailed information in empirical research on current natural phenomena by using evidence from various sources ([Yin, 2018](#)). Collective case studies are appropriate for obtaining detailed information and generating a wider understanding of phenomena such as feelings, individual thinking, or emotional processes that are difficult to obtain through conventional methods ([Brantlinger et al., 2005](#)). The use of this method enables researchers to obtain detailed information on students' perspectives regarding the curiosity in learning towards teaching by DT teachers.

### 2.2. Participants

The researcher used purposive sampling in selecting respondents for the study. The selection of this method is appropriate as the chosen respondents fit the study's criteria and had prior experience in any case against the matter being studied ([Creswell and Poth, 2017](#); [Ellis, 2020](#)). The selection of the participants was based on certain considerations, choosing participants from different groups in T&L activities and taking into account the achievement in other DT subjects. However, according to ethics in conducting the study, the researcher requested the elected participants' approval to be interviewed beforehand. In this regard, researchers needed to build good repo with the entire students before choosing the participants and starting the interview session in providing comfort and avoiding students' dropouts. The number of participants selected in this study was subject to data saturation as the researcher finds the answers given by the participants form the same pattern.

### 2.3. Observation

The researcher observed the teacher's teaching method during the T&L sessions. The researcher observed how the teacher triggering students' curiosity about the lessons delivered, encouraging students to explore and ask questions, and supporting the needs of students in conducting inquiries based on six aspects 1) learning objectives; 2) induction set; 3) T&L activities; 4) teaching aids and learning aids; 5) assessments, and 6) T&L closure. Before the observation was conducted, the teacher introduced the researcher to the students, explaining that the presence of the researcher would not interfere with the learning and assessment of students in the classroom and it does not represent any educational officer who made T&L monitoring to reduce the student's discomfort, if any. There was no description of the study's purpose or observation given to students in preventing discomfort, uncomfortable, unnatural, and biased during the T&L session. This observation was done where the researcher was in one corner of the classroom to avoid any disruption during the T&L. Researchers recorded the T&L in the observation instrument during the observation period based on six identified aspects.

### 2.4. Interview

Data collection through in-depth interview sessions is the root of this study. After the T&L timeout, the researcher chose the participants randomly intended. Participant has the right to reject in-depth interviews to safeguard the ethics of the study, and the researcher needs to get another participant. While waiting to be interviewed, participants are allowed to enter other T&L lessons to prevent disciples of discomfort from waiting long and disturbing the students' emotions. At the beginning of the interview session, the researcher chats freely with the participants until the researcher feels the participants are comfortable and ready. The interviews were conducted with open questions that focused on five dimensions of curiosity ([Kashdan et al., 2018](#)) to get the participants' perspectives on the desire to learn about the subject during the T&L session.

### 3. Results

A total of 11 respondents from 2 schools were interviewed in this study. Respondents are 14 years old students attending daily school and taking D&T subjects. In this study, majority of the respondents are female. Eight of them are females while only three of them are male. The imbalance in the number of respondents by gender is likely due to the number of female students in the classroom for both schools being more than 70.00%.

The interview was focused on every dimension of curiosity to gain students' perspectives regarding their learning during the D&T lesson. Each answer given by respondents was coded into two categories based on positive and negative views. The researcher later coded selective responses based on the answer theme. Analysis was done by obtaining keywords and answers line by line. The results of the interviews identified four positive themes, which are a) enjoy learning new things; b) strive to explore knowledge to complete/solve difficult tasks; c) discussion is done to avoid misunderstanding / obtaining information; d) love the challenge of learning something new. However, some respondents voiced negative views with themes like a) feeling bored / not fond of exploring knowledge; b) depending on the teacher/partner to give instructions/information in learning / acquiring something; c) stopping / less exploring the knowledge when faced with difficulty; d) less fond of doing discussion activities in the group because of uncomfortable/negative attitude of friends, and f) are not convinced of what is done.

The researcher also observed T&L lessons conducted by both teachers. The researcher found both teachers conducting T&L complied with the Standard Document for Curriculum and Assessment. It is found that teacher A was directly using learning standards in Standard Document for Curriculum and Assessment, whilst teacher B categorized learning objectives based on the knowledge, understanding, and skills obtained by students based on Standard Document for Curriculum and Assessment.

Both teachers provided pictures and video stimuli to students during the induction session, asked questions and encouraged students to give opinions. The question asked by teacher A focused on how the traffic light works. After getting answers from the students, the teacher briefly explained the traffic lights' functionality and explained the learning objectives written on the whiteboard. For teacher B, while asking students how the public transportation system door works, the teacher also guided the students by asking questions related to the actual situation, such as accidents that have occurred because the railway door is not properly closed. The doorway is open while moving by showing digital newspaper clippings. Students were found to have been actively involved in the discussion. Then, the teacher briefly explained the learning objectives and activities that would be done throughout the T&L session. Additionally, Teacher B instructed students to complete a question sheet where they were given time to construct at least one question they believed fit the induction session's stimulus, the lesson's goal, and their prior knowledge.

During the T&L session, both teachers delivered the lesson's contents using the slide and learning materials. Teacher A used more lesson time to explain each electronic components to the students. Teacher A asked questions and distributed electronic components during his explanation to the students to make them focus and understand better. For teacher B, students joined their project group and were assigned to identify the electronic components. Students explained the components' information to the group members based on the given information cards, devices, and textbooks. Teacher B also picked a few students to present their understanding of the electronic components to the entire class with guidance from the teacher. Later, teacher B asked students to refer to their project journals to identify and choose which electronic components could be used for the group's project thru group discussions. Students wrote their findings in the project journals.

Encouragement to the questioning from students by teacher A and teacher B during the T&L activity is different. Teacher A asked questions to encourage students to think, but the time given for them to answer was short, and the teacher did not drive students towards getting answers. Whilst for teacher B, both teachers and students asked questions especially related to the contents of the lesson. Students were asked by teacher B to fill out the question that arose during T&L activities in the question sheet that serves as a checklist of whether the question has been answered or not. Teacher B also used projects that need to be built by the students as a tool for students to get their knowledge.

During the last 7-10 minutes of the T&L session, both teachers did their T&L closure session. Teacher A summarised the contents of the lesson to the students and provided homework by referring to the questions in the textbook. As for teacher B, after summarising the learning outcomes, students were required to reflect on their learning and state any issues or problems throughout the T&L session in the reflection sheet.

### 4. Discussion

The curiosity in this study is expressed through students' views on their behaviour based on self-esteem or insistence to explore in obtaining knowledge, understanding, and skills during the T&L session. Based on interviews and observations, the results discussed in this study are the factors that encourage and may prevent the students from exploring their learning. The findings were analyzed through answers obtained from respondents and observations made by the researcher during the T&L sessions.

#### 4.1. Factors that Lead to the Discovery of the Students' Curiosity in Learning

Joyous exploration in learning was reflected by the student's desire to seek knowledge, understanding, experience, and new skills to develop their learning. It triggers students' desire to explore something about which they are unsure and want to learn more through the joy of being able to search for and receive such information or experience. The triggered curiosity can stimulate and maintain students' memory of the knowledge acquired (Oudeyer *et al.*, 2016). In this study, students showed the desire to find new information and knowledge in learning by presenting positive views such as:

"... *It's fun exploring something new ...*" and  
 "... *I love exploring even if not in the direction of the teacher ...*".

Exploration can also be enhanced through teaching and technology assistance support (Hochberg *et al.*, 2018). Both teachers provide authentic materials for students to gain knowledge of electronic devices. The selection of the authentic material provides visual and kinesthetic experiences (touch) to better understand the shape and electronic components. In addition, with the support and explanation given by the teacher, the students' desire to know more about the device arises when teachers are describing the parts of the device and the way how it connects to their prior knowledge of the electric circuit's topic (students have existing knowledge of the electric circuit as the student has learned it on the previous topic). In this regard, teachers' selection of teaching aids in line with the contents of the lesson is important to provide students with the device, verifying the information they acquired through reading and subsequently encouraging them to explore. Furthermore, the teacher also can help students make sound academic, educational, and informed career choices by developing self-reliance and focusing on work activities that are important to them in high quality, current, and comprehensive information on the new knowledge economy and changing workplace (Rashid *et al.*, 2009).

Self-involvement to perform explorations illustrates the excitement of students' desire to explore due to their interests or experiences. The stimulus and driving questions by teacher B to attract attention and students' focus on learning during the induction session, lead students to be more excited in telling their experiences or asking further. This action indirectly brings students to the contents of the lesson related to the function of the electronic components. This situation shows that teachers have succeeded in attracting students to the contents of the lessons and triggering their discomfort of students. The focus given by the student is due to his desire to know more with perseverance and interest, making his learning more valuable (Schmitt and Lahroodi, 2008). Therefore, teachers need to relate the lesson to real-life and its relevance to trigger students' desire to know more and apply their knowledge to what is happening around them.

During explorations, students are likely to go through difficulties and problems. This makes the explorations challenging and, at the same time, can lead to stress. Difficulties and problems arise as students are less knowledgeable about any information needed when performing a given assignment or project. However, students taught by teacher B showed efforts to think creatively in providing recommendations for their project work and welcomed criticisms and questions from the group partners who did not agree with their opinions. Finding from Darby and Rashid (2017) stated through infusion approaches, students were provoked and encouraged to support their arguments with facts and evidence to defend their decisions and ideas resulted trains them to be less dogmatic and willing to change when they have support with evidence. The willingness to accept the challenge or barrier caused the students to be open in expressing their curiosity. This can be seen through student statements:

"... *I love the challenge as it makes me more creative ...*" and  
 "... *By thinking deeper will give me a better idea ...*".

Hence, this finding supports the study conducted by Gross *et al.* (2020), which stated that curiosity is related to creativity. Similarly, the study by Kang *et al.* (2009) showed that students' curiosity increases when they are given trivial questions and when they only have little idea and knowledge of the answers. In this study, students of teacher B used the assignment given to trigger a sense of wanting to explore creative and critical thinking through student discussions during project work. Thus, the teacher can trigger students' curiosity in his teaching by providing challenging stimuli to increase the desire to know more.

The D&T subjects require students to conduct projects either in the form of individuals, in pairs, or in groups according to the planning made by the teachers in their teaching. Through project implementation in pairs or groups, students need to build togetherness in exploring knowledge through good communication and association with friends. This is utilized by teacher B through the implementation of discussion activities during the period of students' learning development which students not only discuss when identifying the functions of each device but also discuss the proposed input devices that will be used for project work with group members based on product functions that will be generated. Understanding between the group member is important to avoid misunderstanding, disagreement, and insufficiency in producing project work, and this was stated by the participant:

"... *We discussed to avoid fights ...*" and  
 "... *I will ask questions if I do not understand what is being discussed in the ...*".

For teacher A, although the discussion was done only on the contents of the lesson, some students stated:

"... *I got more information when discussing with a friend ...*"

This helps the students to get electronic components' functionality information through discussions with friends while creating mind mapping. The differences that can be observed among students taught by teacher A and teacher B are the extent to which they used the knowledge in the T&L session; for example, whether only to identify the functionality of the electronic components solely or to apply the knowledge in selecting the appropriate components for their project.

Usually, students are more interested in communicating with friends who show curiosity in the discussion (Kashdan and Roberts, 2004). The same thing happens to students with good social curiosity, who will be more likely to obtain information than those who are otherwise (Hartung and Renner, 2013). As a result, exploratory activities can be done in groups when students want to learn about their peers' ideas and work by observations, inquiries, listening, or gathering information. Social curiosity may give an impact on the extent to which exploration can be implemented successfully, i.e., whether it can be done by focusing on socializing as a process in obtaining the information needed in their exploration. Finding by Saari and Rashid (2013) stated that the workplace environment helps creativity to flourish among students in the cooperative vocational education program. Social curiosity allows

students to obtain information effectively through good interaction. However, it also may be a barrier to exploration, which brings to social loafing and discomfort among students. Therefore, the teachers need to play their role in controlling, monitoring, and supporting students to engage with their learning with a meaningful exploration.

However, during the exploration process, students must first recognize their knowledge gap and be aware of their inability to understand the need to explore. In this study, some students are sensitive to their inability to carry out learning by doing such as:

*"... I ask teachers or friends to solve the problem ..."* and

*"... I am exploring information to prepare the project at the time set ..."*.

This shows that students are clear with the direction of their learning and what needs to be achieved at the end of the T&L session through the explanation by both teachers on learning objectives at the induction session. Therefore, students show their efforts in acquiring knowledge.

According to the gap theory by Loewenstein (1994), continuous efforts can be triggered if students feel uncomfortable and aware of the knowledge gap that requires them to explore further. This desire is more likely to insist on the problems that need to be handled than it is based on interest. This will lead to the extent to which individuals are willing to explore more. This shows that curiosity can increase the individual's effort and passion for what will be done in fulfilling his desire to acquire something.

In this regard, the questioning made by students can encourage them to explore through the appropriate stimulus and support them in further thinking (Chin, 2006). In addition, students' motivation and interest in the lesson's content can also be enhanced through the students' questions (Chin and Osborne, 2008). Therefore, teachers' encouragement to ask questions is very important in ensuring students are focused and putting effort into exploring new knowledge. This is illustrated by the students of teacher B, who guides them to build essential questions as early as in the induction sessions until the end of T&L sessions. This method enables students to know what is necessary for them to know and how many questions have been answered through the checklist on the question sheet. Students of teacher B also need to give their opinion on whether the learning objectives are achieved in the reflection sheet. The purpose of the student to conduct the inquiry in his learning enables the exploration of snowballing that leads to broader exploration. Emphasis on the technique of asking questions, encouragement to the questioning, and taking control of the presented questions can guide students in their learning and ensure student exploration is focused. As such, teachers must be skilled in the content of their teaching and can be open in exploring with students to acquire new knowledge and experience.

## 4.2. Obstacles in Triggering the Curiosity of Students in Learning

Although teachers have planned their T&L sessions and implemented various activities in their teaching, the findings show that there is still a barrier that causes students not to have the desire to gain knowledge. This can be described through answers like:

*"I'm bored when it is asked to get the information ..."* and

*"... I'm less fond of exploring information ..."*.

This finding showed that there are some students still unclear about the need to explore and possibly unable to associate what they had learned with real-life scenarios. This makes students feel bored and passive in learning. Sometimes students are more comfortable relying on information given by teachers or friends, just like:

*"... I prefer if teachers who provide information or instructions what to do ..."* and *"... Usually I will ask for answers from friends ..."*.

Students' curiosity can engage them in their learning activities (Dewey, 1910; Piaget, 1964). At the same time, the learning environment that encourages students to explore by providing spaces, opportunities, and time required during the learning process also affects students' curiosity (Pluck and Johnson, 2011). In this regard, the selection of T&L activities, driving questions by teachers, and encouragement for questioning by students can help stimulate students' desire to explore their learning.

Driving-question plays an important role in creating students' curiosity (Ostroff, 2016). However, a study shows that questioning methods in teaching sometimes are ineffective as students are just waiting for the information/answers from their teacher as stated:

*"... The teacher will still answer the questions he gives ..."*.

This scenario happens because the teacher is focused in ensuring students to obtain information within the time. For example, when teacher A asked, "Can microswitch be replaced with different electronic components?", various reactions from the students can be seen by the researcher, for example, ignoring questions, looking for answers in the book, or discussing with peers to get answers. The teacher then called one student to answer, and when the student gave the wrong answer, the teacher directly answered without giving others a chance to answer or guiding the student to get the right answer. This action clearly shows that teachers should use the questions to guide students towards achieving the desired knowledge, as stated in the study by Clark and Seider (2017) and Kang *et al.* (2009), rather than directly answering the question themselves.

The findings of this study suggest that some students participated in discussion activities less, because they were uncomfortable with the negative views expressed by their peers. Among the negative views are:

*"... I feel bothered when there is discussion in the group ..."* and

*"... I'm less fond of asking questions because friends do not cooperate ..."*.

This is because they do not understand the purpose of the discussion and find it difficult to obtain information if students have no idea, information, or existing knowledge of the content in the discussion. Student attitudes also play a role in discussion activities. However, teaching methods by teacher B during the students' discussion on project

work were seen to have an impact on the social curiosity of students as they began to pay attention to their peers' explanations. Each group member also asked questions in their group discussion to obtain information. Teacher B also facilitated his students by going from one group to another for monitoring and guiding purposes throughout the T&L session. Thus, the teacher needs to monitor students' conversations during their discussion, using teaching aids, learning aids, and relevant study materials to guide students to meaningful discussions.

Anxiety and discomfort because of no knowledge or sense of uncertainty in exploring something new can lead to stress that causes students to lose their desire to explore. There are a handful of students who stop exploring when facing problems in learning, as stated in negative views:

"... I will lose focus on doing difficult work ..." and

"... I will not continue to explore when I have difficulty preparing work ...".

There are also students who argue that they are less confident in performing explorations such as:

"... Not sure whether the information sought is accurate ..." and

"... Sometimes I think the information I give to a friend is right, sometimes I feel wrong ...".

This finding shows stress can cause students to lose their curiosity. Students are fatigued in carrying out explorations and tend to give up and refuse to continue to explore their learning. However, students with high-stress tolerance will be able to overcome the concerns caused by uncertainty in exploring something new or more difficult. Beswick and Tallmadge (1971), has recommended a reward system as one example of a good stimulus for students to perform explorations. Pressure to earn rewards makes students explore more which brings satisfaction. In this case, the student's curiosity to explore knowledge is not encouraged by his interest in knowing more but tends to get rewards such as scores, merits, gifts, praise, or appreciation.

## 5. Conclusion

In summary, this study identified students' perspectives about curiosity in their learning of the D&T subjects. The findings showed that the students' discovery in learning is driven by the excitement to learn new things through exciting challenges of students to explore, focused discussion activities, stimuli, and direction of clear learning and encouragement to the questionnaire by students. However, some obstacles can interfere with the student's desire to explore as they do not like or get bored performing exploring and conducting discussion activities, students' full dependence on teachers and friends in getting information, easy to give up the exploration when experiencing difficulties and feel uncertain with what he does.

This matter is closely linked to the methods, activities, and materials of T&L used by teachers in their teaching to encourage students to explore. Curiosity can be triggered through students' interest in what he wants to know, which leads to exploration. The existence of students' curiosity in learning will make the knowledge more meaningful to the students. Student's curiosity in acquiring knowledge can be done through proper planning in teaching by using students-centred teaching methods, 21st-century learning activities, and T&L materials. Rewards can also be a positive stimulus for students to start exploring. Therefore, in DT subjects, teachers can use activities in designing and producing products as a process for exploring the knowledge, experience, and skills needed by ensuring that students have enough resources for their learning. Hence, the researcher proposes further studies on teaching methods and T&L activities that can enhance students' curiosity in their learning.

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