Evaluating the Use of Digital Art Tools for Drawing to Enhance Artistic Ability and Improve Digital Skill among Junior School Students

Aber S. Aboalgasm, Rupert Ward

Abstract—This study investigated some results of the use of digital art tools by junior school children in order to discover if these tools could promote artistic ability and creativity. The study considers the ease of use and usefulness of the tools as well as how to assess artwork produced by digital means. As the use of these tools is a relatively new development in Art education, this study may help educators in their choice of which tools to use and when to use them. The study also aims to present a model for the assessment of students' artistic development and creativity by studying their artistic activity. This model can help in determining differences in students' creative ability and could be useful both for teachers, as a means of assessing digital artwork, and for students, by providing the motivation to use the tools to their fullest extent. Sixteen students aged nine to ten years old were observed and recorded while they used the digital drawing tools. The study found that, according to the students' own statements, it was not the ease of use but the successful effects the tools provided which motivated the children to use them.

Keywords—Artistic ability, creativity, drawing digital tool, TAM model, psychomotor domain.

I. INTRODUCTION

MOST researchers claim that experimentation with this new art form is a good thing. The internet can provide many opportunities for children to develop their creative ability. The future is likely to offer yet more new developments in this field, such as improvements in photography, and the computer may give a strong impetus to new directions in art. Technology is increasingly being recognized as an essential learning tool for promoting the social, linguistic, and cognitive development of young students [1]. Today, the questions that educators ask are not whether, and how much, technology should be used with students in the classroom, but how it should be used, which tools are most useful, and how they are to be assessed. To Art teachers and other professionals, the following is an important topic: the effects of the new technology on artistic creativity. Does use of the new technology act as an aid to a child's artistic development, or is it an obstacle? Does it improve creative art work, or not?

Some critics of the use of computers for art work are concerned about the ever-increasing speed which technology allows and the number of ready-made effects which technology provides, seeing this as a threat to subtlety and originality. Others, however, see new opportunities. Clements and Sarama [2] refer to the ever-improving potential of digital tools to enhance the ability of children to learn, solve problems, and convey their ideas. Faber [3] argues that "the addition of this new technological tool does not threaten traditional drawing, but strengthens it instead to develop a greater understanding of how we see the world and express ideas through drawing".

Another researcher, described as 'the first digital artist' [4] claims that the artist's message reaches the recipient whatever tools are used in the work, and suggests that the key issue is the credibility of the artist and his ability to express his feelings visually. He points out that the use of color in digital art can be controlled and dealt with by sensory skill and craftsmanship, just the same as traditional painting [4]. Couse and Chen [5] adds that "research found software that allows children more control results in children experimenting more and completing more tasks". Overall, the majority of researchers are positive about the potential of digital technology for art, especially if it is combined with traditional methods. The present study is an attempt to add to research on the above topics by collecting data from a project carried out in an English junior school

II. METHODOLOGY

A. Techniques and Procedures

In this study, data has been collected from a sample of 16 students in an art workshop using digital and traditional drawing tools. The sample comprised ten males and five females in an art classroom. The age range chosen was nine to ten years, because at this age, children start to understand more abstract ideas. According to research, they move from passive to active learning and show more complex initiatives. Markopoulos and Bekker [6] state that they "search for adult-like skills by copying illustrations in books and magazines. That is, they show some skills in analysis; they can also visualize what they read". The children in this project chose their tools, and also chose whether to work in groups or individually. They were given ideas and suggestions to stimulate their imagination.

The participants were given the traditional tools of paper, pencils, erasers, and colors to use first. Then they were asked to draw and paint the same ideas using digital tools. The art tools available in the ICT room were 'Tux paint' software and iPads; however, 60% of pupils had access to tablets and iPads

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at home, which may have affected their abilities, also gave them the advantage of more practice on a computer, but none of them had used digital art tools before. The kind of benefit pupils obtained from the use of a digital tool was noted, and which tools attracted pupils to use them. The observer attempted to be completely non-subjective.

A mixed methods design model is the approach most commonly used to achieve concurrent triangulation [7]. In order to collect more data the researcher used semi-structured interviews and a questionnaire at the end of the project, as well as observation throughout, and the whole project was a small-scale Case Study. This "Mixed Methods" approach is the one of most commonly used to collect both quantitative and qualitative data, which were both needed in this study.

It would seem that an equal preference for both qualitative and quantitative approaches can be observed in previous studies, and case studies, questionnaires and observation are the most significant methods used for research involving young children. The researcher should be "committed to helping children use the different methods and equipment and to express their views concerning their likes and dislikes". It is important to "listen to what the children are saying; to be non-judgmental and let children ask their questions" [8]. Children have different ways of expressing themselves and the methods need to capture this expression. The mixed method approach "gives importance to the children's actions and the contexts in which they occur" [9].

III. RESULTS

Fig. 1 is a summary of the results from the data on the use of digital tools in art: Is it enjoyable to use digital tools? Do the children themselves think their work is generally of a better artistic standard when they use digital or traditional tools? What is the researcher's opinion about this? Are their computer skills increased by using them? Do digital tools offer more possibilities in art work than traditional tools? Do these tools motivate them well? Which digital tools are the easiest to use? Which tools are the most useful?
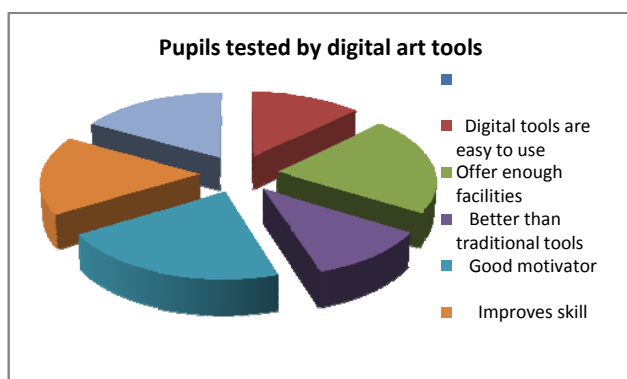

Fig. 1 Summary of information from questionnaire, interviews and observation

Fig. 1 shows summary of information from three methods questionnaire, interviews and observation to assess the

information, data was grouped and analyzed according to Grounded Theory principles [10] .Obviously the researcher had some pre- conceived ideas about what kind of information was needed for her purposes, but the results and conclusions were based entirely on what the data demonstrated . The performance of and with the tools was judged by a modified TAM theory [11]. The classical TAM (Technology Acceptance Model) theory is extremely useful for assessing the usefulness and ease of use of tools [12]. In this case the researcher added the human factor of motivation to the criteria. Motivation was understood as both intrinsic (enjoyment, excitement and personal desire) and extrinsic (visual stimulation and new ideas) [11]. All the data obtained pointed to the conclusion that to these children in these circumstances, satisfaction with the result of using the tools was more important than how easy they were to use. This could help to guide educators' choices when choosing equipment.
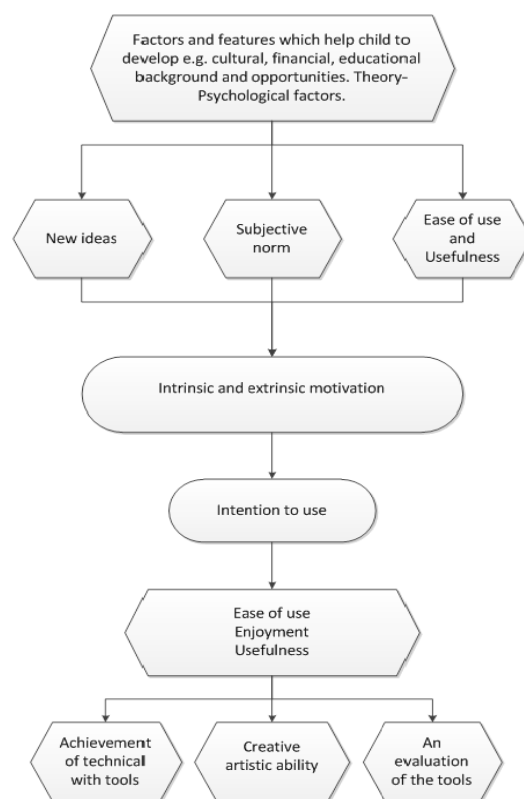
III. MODIFIED TAM MODEL

Fig. 2 Modified TAM Model

IV. DISCUSSION OF RESULTS

The general conclusions when all the data was collated were that the children enjoyed the sessions. More boys than girls claimed to be motivated by digital tools (this matches the traditional view that girls are more conservative than boys), but more girls than boys said that they found the tools quite easy to use (5/11 boys, 4/5 girls). They all felt that the most

useful tools were the best tools. All the pupils struggled with at least some of the tools (Save and Drag were the most difficult) but they were all willing to face the challenges. By the end of the course only 3/16 pupils could not use all the tools properly and 12/16 felt that their computer skills had increased. The researcher's assessment was the same. 8/16 pupils thought that digital tools offered more facilities than traditional tools. Only one pupil disliked using them. The quality of their art work was also better; in the researcher's opinion only three of them had not improved their standard of art work. The most popular tool was the easiest to use (Magic) but all the students said that ease of use of the tools was not as important as producing successful work. After the project was assessed both pupils and researcher felt that the results of using digital tools in art were good. The school had not used them before but will do this from now onwards. The main criticism from the children was that a computer did not offer as much space to work on as traditional materials. As the tablet is even smaller than the computer, it was also less popular.

V. PROJECT PART TWO: AN ARTWORK BASED ON THE TAMAZIGHT ALPHABET

Fig. 3 Letters of the Tamazight alphabet as a part of the project by using digital tools

The intention was to produce a model for assessment of pupils' artistic creativity by studying digital art based on the Tamazight alphabet. Tamazight is an indigenous North African language which is almost completely unknown to most Europeans. It was hoped that the new culture and novel shapes of the letters would please and inspire the pupils to produce work which would be suitable to use for assessing artistic creativity and improvement when using digital tools.

Present research used Tamazight fonts as art work in terms of shapes design historical art. It is a new idea, new project and new way for students in, which can enhances pupil's artistic ability and their creative activity. On the other hand, this relates to promote the appreciation of human, cultural and social concepts and linking these features to technology. Students can develop all these related skills via the utilization of digital art tools. Aboalgasm stated that "cultural factors had a strong influence on ethnic and national ways of thinking. This appeared strongly in the choice of subject matter, artistic approach and the final appearance of the work." [13] The pupils asked to draw Tamazight fonts using traditional methods to involve them.

In the project, the children then drew the same topic with digital software. To begin with, 70% of the sample had no experience with these tools 100% no experience with the topic and no clear idea of what to do. During the study, there was clear evidence of development in their technological skills as well as improvement in their artistic ability, so that by the end they were almost all using the tools correctly and designing their fonts using different shapes, different colours, completing their art work using most of the software available. They were motivated to use certain tools when they understood that these were appropriate for their purposes, and it could be observed that different tools motivated them to create more and better artwork. The stimulus of material from another culture also motivated them to produce creative work. The pupils' progress in designing and drawing was guided and evaluated with the help of the Psychomotor Domain Taxonomy Model. This model relates to all skills which require the use of the muscles of the body, including writing and drawing.

Fig. 3 Letters of the Tamazight alphabet

VI. PSYCHOMOTOR DOMAIN TAXONOMY MODEL USED TO EVALUATE PUPILS' DRAWINGS OF TAMAZIGHT FONTS WITH DIGITAL TOOLS

The psychomotor domain taxonomy relates to skills that require the use of the muscles of the body. These include sports skills, writing skills and drawing skills. Learning these skills involves several stages [14].

There are six levels of the psychomotor domain model, which were put into practice as follows:
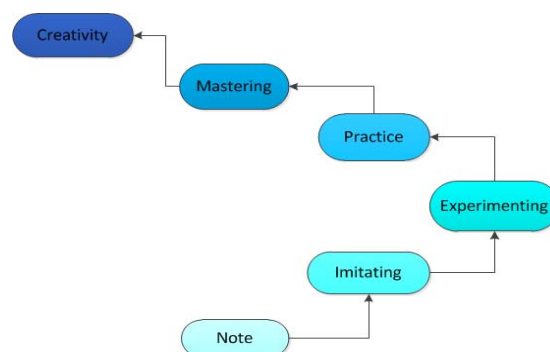
Fig. 2 The psychomotor domain model by Dave version [13]

A. Psychomotor Domain Levels in Pupils Improving Their Skill Using Digital Drawing Tools

The six levels of the psychomotor domain are as follows:

1. The level of observation: This is the lowest level in skill formation. At this level, students simply need to be aware of what is going on around them. In this study the students had had considerable practice with the tools by this time and were able to use most (16/16 students) or all of them (13/16 students). They had no previous awareness of the project they were about to undertake. New ideas can be fundamental in motivating students and they were very excited when given this completely unknown topic , the Tamazight alphabet, to work with .This encouraged them to go on to the next stage.

2. The level of imitation: In this stage the student can use what he/she notes in the work of the teacher or anyone else. The students were encouraged to draw the letters with pencil and paper, traditional tools, in order to become familiar with them and then to imitate them using the digital tools.

3. The level of experimentation: At this level the students should be free from interference so that they can use their imaginations to experiment with the subjects they have already learnt to know at a basic and simple level. At this point the work will start to take on many different forms.

4. The level of practice: The level of practice starts to develop the skill of the student. Performance becomes easier and fewer mistakes are made. In art many different ways to express ideas are allowed and available. In this case they began to configure their ideas with digital tools, which allow them to correct mistakes more easily and quickly than traditional ones ad offer many different effects.

5. The level of proficiency: This level indicates the actual achievement of skills and is characterized by performance with some degree of quality. The students showed their artistic ability, which was enhanced by the skillful use of the digital tools, and the projected work itself began to develop in terms of ideas, shapes and designs based on the Tamazight letters.

The level of creativity: This level refers to a student's ability to develop new kinetic models to meet the needs of a specific problem or position. This results in the creation of new ways to accomplish the desired aims. Of course, the pupils in this project varied in their ability to do this.

This study is therefore based on both the TAM theory, in terms of assessing digital drawing tools, and the psychomotor domain taxonomy, which assesses thinking skills in terms of children's creativity in using digital art.

In general, it can be concluded that the students were successful in their performance. They improved in their concepts of both art and digital technology. The use of TAM theory helped to assess the digital tools, as well as contributing to the students' skills by improving their artistic activity through the utilization of technology-based resources.

B. Assessment of Artistic Creativity

In general, judging by all the standards applied, it can be concluded that the children did a successful project. They also improved their understanding and practice of both art and technology.

Following the stages of the psychomotor domain taxonomy model helped in noting and assessing the pupils' progress generally. The TAM model was used to evaluate the digital art tools and also to assess the users to some extent. The pupils' artistic creativity was judged by traditional criteria of: -- composition, technical skill, choice of colours, originality, continuation, completion, introduction of new elements [15].

Judging artistic creativity is difficult. It is hoped that it is sufficiently dealt with in the categories b, d, e, and f but the new digital artistic tools have added a whole new area of difficulty to artistic criticism. Though it is easy to judge a student's technical skill in using these tools it is harder to evaluate the effects of these skills on artistic achievement. It is also not a simple process to assess how ITC affects motivation, attitude and information-handling and problem-solving capability.
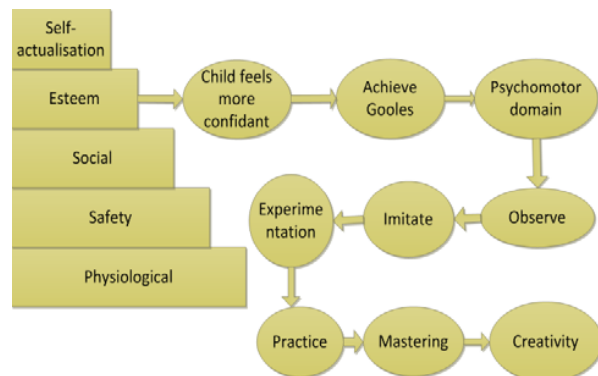

Fig. 3 The process of children learning how to achieve effective learning and improve their artistic ability.

This framework is created to support the teacher in helping the students to increase their artistic ability and creative activity, as well as to enable the assessment of both the development of students' creative ability in art and the effectiveness of the tools. The paper has considered the stage of self-esteem in Maslow theory [16]. This stage is important for young people especially, in the learning phases. Teacher should care about students who wish to achieve creative proficiency, this lead to improve their self-esteem. It was possible to observe how the usefulness of different tools motivated pupils' to create more and better art work and how the effectiveness of tools was motivate them to achieve completion and develop artistic skill and creativity.

VII. CONCLUSION

It is hoped that this work and related studies will lead to successful outcomes, such as a providing a pathway for teachers in making choices about digital resources to be utilized in the art classroom environment. The digital tools

available can enhance pupils' artistic drawing abilities and, as they develop their skill with these digital methods, their cognitive, technical, and social and interactive skills are also improved. Further work could be undertaken to introduce this new digital method of teaching into other school subjects such as geography, math, and science.

The researcher was satisfied that the school project had been successful. The results demonstrated that digital tools can enhance artistic skill and creativity among junior –age students. It provided a guide to the usefulness of various individual tools and also showed that effectiveness of tools was more important than ease of use to these pupils, which may be useful pointers when educators are choosing equipment. The project using Tamazight letters provided a model for how a teacher can guide and evaluate artistic ability and creativity. It was also demonstrated that the children's confidence and their social, technical and cognitive skills (especially in self-understanding) increased.

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