The use of interactive whiteboards as a pedagogical tool in teaching aviation courses

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ABSTRACT: Presentation tools are increasing in popularity for educators who want to share ideas and information with large or small groups of students, and interactive applications are in demand for educators wishing to involve their students in learning with technology. The electronic interactive whiteboard is a device that combines both attributes, offering shared learning experiences for large or small groups, as well as for distance learning. In this article, the authors firstly consider how aviation science lessons could be designed incorporating relevant and interactive software into a sound pedagogical strategy for aviation students. Based on their observations and discussions, the authors can state that there are some benefits to aviation students and faculty (academic staff) in the Department of Aviation at Abu Dhabi University, Abu Dhabi, United Arab Emirates, coming from the use of the interactive whiteboard (IWB) in the teaching process.

INTRODUCTION

Lecturers are continuously seeking methods to maintain student attention and to develop forms of interactivity as a feature of enhanced pedagogy. It is crucial to understand the way through which teachers and students interact and benefit from the use of the technology that is supposed to lead to educational advantage. There has been an increasing awareness of the need to match technology and pedagogy in the development of interactive learning supported by the interactive whiteboard [1].

Enhanced interactivity requires an understanding of the way in which both teachers and students gain from the use of the technology and to demonstrate that there is a progression at all levels in learning to use the equipment and associated software to educational advantage [2].

Using smart teaching techniques, such as the electronic interactive whiteboard (IWB) is becoming more prevalent in schools, colleges and universities [3]. Employing this method of e-learning provides the students with a different experience by making the classroom more interactive and interesting. Interactive applications are in demand for educators who want to involve their students in learning with this kind of technology.

THE INTERACTIVE WHITEBOARD (IWB)

At the 2003 World Summit on the Information Society, Kofi Annan proclaimed that rapid technology advancements can …*propel to improve standards of living for millions of people on this planet*. He also foresaw that the power of these tools will increasingly be felt in all areas of life, with a growing influence on economic, societal and educational aspects. In just a few short years, classrooms across the world have been transformed: today, students routinely have their own laptops and participate in projects through the use of electronic devices.

In 1986, David Martin and Nancy Knowlton were driving through upstate New York when Martin first described a product idea that he had been working on, to Knowlton. A year later, SMART was founded. Originally, the company was the Canadian distributor for a US projector company and revenue was generated through projector sales. That revenue was directed toward the research and development of the SMART board interactive whiteboard, which would combine the simplicity of a whiteboard with the power of a computer.

Smart class or e-class is an innovative educational experience for students [4]. Engineering, and aviation in particular, have benefitted from the use of currently available electronic devices and features**.** Visual aids to teaching, including as an example the possibility of watching videos on related subject matter, provide more varied teaching strategies;

thereby, enhancing the student's motivation to learn and resulting in a better learning experience for the student and a more organised teacher.

The specific teaching and learning method chosen undoubtedly influences not only the objectives and outcomes of the lesson, but also the assessment of the course and quality assurance. Irrespective of the teaching style and pedagogical approach used, a good teacher needs to include interactive learning, which includes active involvement and participation in order to ensure that the student is not passive in class [5]. Being able to motivate students and successfully engage them in active learning ensures that students do not take a passive role in their learning and also provides them with an optimum learning experience [6].

The IWB is a device that can enrich the learning experiences of both large and small groups of students, as well as for distance learning [7].

Teaching small groups facilitates active participation, and exploring ideas and concepts, which enhance critical thinking, consolidating learning from different parts of a programme and retaining information whilst also providing a conducive environment to develop transferable skills. These skills include study and communication, teamwork, problem-solving and personal development [8]).

On the other hand, large group teaching, typically in the traditional lecture style, is a good method for the simple transfer of knowledge and information. Engaging students to participate actively when teaching in a large group is more difficult to do, and may require the teacher to employ a combination of additional skills and strategies. However, when successfully engaging large numbers of students, difficult concepts can be discussed, new information can be effectively transmitted whilst simultaneously also increasing motivation and enthusiasm [9].

SKILLS

In 2010, Melamed and Salant identified the following five skills that a graduate should be equipped with in this era; namely,

a) information skills to gather, analyse, process and connect information;
b) problem-solving, critical thinking and creative thinking;
c) communication and cooperation skills including the ability to work in a team;
d) skills to use technology tools; and
e) learning skills, particularly developing autonomous learning, self-directed learning skills [10].

Airmanship can be defined as

> *…the consistent use of good judgment and well-developed skills to accomplish flight objectives. This consistency is founded on a cornerstone of uncompromising flight discipline and is developed through systematic skill acquisition and proficiency. A high state of situational awareness completes the airmanship picture and is obtained through knowledge of one's self, aircraft, environment, team and risk* [6].

With specific focus on students who are studying aviation, whether it is to become pilot or work in other areas of the aviation industry, certain skills have been identified as being an integral part of being a good pilot. These are, *inter alia*, related to flying the aircraft including operation, control, monitoring and evaluating equipment or systems, good co-ordination or thinking skills, such as communication, leadership, observational skills, critical thinking, judgment and decision making.

The Bachelor of Science in the Aviation Programme at Abu Dhabi University (ADU) has been designed in such a way as to provide students with both knowledge to become professional airline pilots or other key personnel in the aviation industry and to equip students with the required skills to perform their tasks, and discharge their duties and responsibilities in a professional manner.

There is evidence that teachers continuously seek innovative methods to maintain a student's attention and to develop some forms of interactivity as a feature of enhanced pedagogy. In line with this, faculty at ADU have increasingly become aware of the need to match technology and pedagogy in the development of interactive learning for students registered in the Bachelor of Aviation Programme and focus was given to the interactive whiteboard.

BENEFITS - FACULTY

Enhanced interactivity requires an understanding of the way in which both teachers and students gain from the use of the technology. It must be able to demonstrate that there is a progression at all levels in learning to use the equipment and associated software to educational advantage. The changes that occur as the technology is introduced, the learning processes as teachers become more fluent with the hardware and software, were enhanced as faculty members became more used to, and comfortable with, using this technology.

Teachers consider that offering students a degree of control over their own learning can provide challenge, motivation and engagement for a wide range of student groups [11]. Some teachers pointed out that, despite the extra time they had to put in, the IWB helped them organise their teaching, including planning lessons, managing documents, and so on. A few others noticed that the IWB helped students concentrate. A small number of teachers - particularly mathematics and science teachers - emphasised the impacts on learning certain concepts. A few others mentioned the ability to …*communicate with others, in front of the students, from the front of the class* [12].

The IWB will also benefit teaching in the theoretical courses, which form a major part of the Bachelor of Science in Aviation Programme as learning is enhanced when using the IWB as a result of the use of this innovative method, which creates a more hands-on, enjoyable and interactive lesson that also increases motivation to learn and improves concentration.

BENEFITS - STUDENTS

A benefit of using the IWB is that it enhances the student's ability to create a mental picture of intricate concepts [7] and enhances their understanding of complex systems [8]. This would undoubtedly provide a great benefit as a teaching tool for aviation students who often have difficulty understanding the aircraft engines' performance and the aerodynamics of the aircraft, both of which are central to understanding the operation of the aircraft.

Significant improvement in student attitudes towards both using computers in instruction and towards writing instructions are some other benefits of having the IWB in the classroom. According to the students, the main benefit is having permanent Internet access in class. They also appreciate the visual support for teaching, being able to watch videos, the recording of the lectures including the inputs during class, their greater motivation to learn, more varied teaching strategies, saving time (when there are no technical problems), having a more organised teacher, communicating with classmates and doing interactive activities.

CONCLUSIONS

Nowadays, there is a critical need to integrate technology into education. In this sense, the classroom integration of certain technology tools, such as the IWB, may be more complicated and time-consuming than others, but at the same time, the use of the IWB has already shown real pedagogical potential.

Moreover, because technology has invaded every corner of our lives, it becomes increasingly vital for upcoming generations to acquire technology skills, if they want to succeed professionally and socially. There is every reason to believe that being able to self-train, self-learn and communicate via technology will be the *sine qua non* condition for adapting to, and fully participating in, societies that are in permanent flux. Equally, there is every reason to believe that learning with technology is a key competency that will enable youth to succeed at school, and more broadly, in the knowledge society in which we now live.

The aim of this article is to enhance how the interactive whiteboard (IWB) may be used even at the university level and the associated benefits and challenges. It is worth noting that the IWB offers significant benefits for classroom use, such as Internet access, visual teaching support, video presentation, the option to record each step of the interactive lesson including the students' interventions, motivation to learn, more effective learning and efficient organisation.

From this point of view, this means that judicious use of educational technology, when accompanied by adequate training, would be liable to have positive impacts on students' academic outcomes. Furthermore, the fact that the impacts on the students depended mainly on how the teacher used the IWB in class must be highlighted. Hence, although the IWB has enormous educational potential, it is up to teachers and students to take advantage of all that the IWB has to offer in order to realise that potential.

The authors' experience is fairly consistent with those of Khambari and colleagues, who observed a certain amount of conflict between open teaching approaches (also called student-centred learning, among others) and use of the IWB, where the teacher usually stands in front of the class and delivers a lecture-style lesson [13]. It is also possible that some teachers do not use the IWB interactively with their students, because they do not want to deal with all the technical issues. The overall experience showed that the more the students worked with the IWB, the more positive their perceptions of its impacts on their academic achievement, school motivation, concentration in class and overall satisfaction of studying.

There is an exciting new world of educational treasures to explore, and teachers who take the plunge will reap the rewards.

REFERENCES

1. Bernabeo R.A. and Fasti Orsoni, M.N.Z., The Interactive whiteboard (IWB) for teaching and the experimentation for students with learning difficulties. Paper presented at a conference in Locarno, Switzerland (2011).

2. DiGregorio, P. and Sobel-Lojeski, K., The effects of interactive whiteboards (IWBs) on student performance and learning: a literature review. *J. of Educational Technol. Systems*, 38, **3**, 255-312 (2009-2010).
3. Dostal, J., Reflections on the use of interactive whiteboards in instruction in international context. *The New Educational Review*, 25, **3**, 205-220 (2011).
4. Hennessy, S., Warwick, P., Brown, L., Rawlins, D. and Neale, C., *Developing Interactive Teaching and Learning using the IWB: Teacher Resource*. Milton Keynes: Open University Press (2014).
5. Kennewell, S. and Beauchamp, G., The features of interactive whiteboards and their influence on learning. *Learning, Media and Technol.*, 32, **3**, 227-241 (2007).
6. Michaelides-Mateou, S. and Thatcher, S.J., Pedagogical approaches in aviation education: large versus small classes. *World Trans. on Engng. and Technol. Educ.*, 14, **2**, 308-312 (2016).
7. McCrorie, P., *Teaching and Leading Small Groups*. Edinburgh, UK: Association for the Study of Medical Education. (Understanding Medical Education), 32 (2006).
8. Mills D. and Alexander P., Small Group Teaching: a Toolkit for Learning, The Higher Education Academy (2013), 12 February 2016, http://docplayer.net/255626-Small-group-teaching-a-toolkit-for-learning-david-mills-and-patrick-alexander-march-2013.html
9. Mildenhall, P., Swan, P., Northcote, M. and Marshall, L., Virtual Manipulatives on the Interactive Whiteboard: a Preliminary Investigation, (2008). 22 November 2016, http://research.avondale.edu.au/cgi/viewcontent.cgi?article=1023&context=ed u_papers
10. Melamed, A. and Salant, A., 21st Century Skills - a Global Review. Mofet Institute (2010) (in Hebrew).
11. Morgan, G., Improving Student Engagement: Use of the Interactive Whiteboard as an Instructional Tool to Improve Engagement and Behavior in the Junior High Classroom. (Unpublished Dissertation). Liberty University Virginia, (2008), http://digitalcommons.liberty.edu/cgi/viewcontent.cgi?article=1140&context=doctoral
12. Steinert, Y. and Linda, S.S., Interactive lecturing: strategies for increasing participation in large group presentations. *Medical Teacher*, 21, **1** (1999). 15 February 2016, http://med.ubc.ca/files/2012/03/Interactive-Lecturing-Strategies.pdf
13. Karsenti, T., The Interactive Whiteboard (IWB): Uses, Benefits, and Challenges. A Survey of 11,683 Students and 1,131 Teachers. Montreal: CRIFPE (2016).