

The Use of Artificial Intelligence and Robotics -Related Films as a Tool to Introduce the Middle School Students to Artificial Intelligence and Robotics.

Tahani A. Ghobon

School of Engineering Technology
Al Hussein Technical University, Jordan
tahani.ghobon@htu.edu.jo

Amjed S. Al-Fahoum

Hijjawi Faculty for Engineering Technology
Yarmouk University, Jordan
afahoum@yu.edu.jo

Momtaz Abadir

School of Engineering Technology
Al Hussein Technical University, Jordan
momtaz.abadir@htu.edu.jo

Abstract

Artificial intelligence and robotics-based films contribute significantly to the films industry, it is evidenced that it is proportion as part of the film business was increased rapidly during last decade. This was observed due to the increases in the artificial intelligence and robotics technology which have been attracting wide spectrum of the communities' category. Therefore, this paper aim to investigate the impact of this type of films on the middle school students' group. The proposed methodology of this study is made to measure various aspects for the middle school students as follows: (1) Introducing such technological topics and (2) Increasing the creativity and imagination skills. A survey to evaluate the impact on middle school students was conducted that consists of a list questionnaire before and after watching a pre-selected film clips related to artificial intelligence and robotics. It was evidenced that such as films type have initial positive effects on the students' motivations, inspiration and creativity.

Keywords: Artificial Intelligence, Robotics, Educations, Films.

استخدام الأفلام المتعلقة بالذكاء الاصطناعي والروبوتات كأداة لتعريف طلاب المدارس الإعدادية بالذكاء الاصطناعي والروبوتات.

ممتاز أبادير

كلية الهندسة التكنولوجية
جامعة الحسين التقنية

أمجد الفاهوم

كلية الحياوي للهندسة التكنولوجية
جامعة اليرموك

تهاني غبون

كلية الهندسة التكنولوجية
جامعة الحسين التقنية

الملخص

تساهم الأفلام القائمة على الذكاء الاصطناعي والروبوتات بشكل كبير في صناعة الأفلام، ومن الواضح أن أعدادها متناسبة مع أعمال السينما التي زادت بسرعة خلال العقد الماضي. وقد لوحظت هذه النسب المتزايدة منها بسبب التطور غير المسبوق في مفاهيم ومشاريع الذكاء الاصطناعي وتكنولوجيا الروبوتات التي اجتذبت طيفاً واسعاً من فئة المجتمعات. لذلك، يهدف هذا البحث إلى التحقق من تأثير هذا النوع من الأفلام على مجموعة من طلاب المرحلة الإعدادية. تم إعداد المنهجية المقترحة لهذه الدراسة لقياس الجوانب المختلفة لطلاب المرحلة الإعدادية على النحو التالي: (1) إدخال مثل هذه الموضوعات التكنولوجية و (2) زيادة مهارات الإبداع والتخيل. تم إجراء استبيان لتقييم الأثر على طلاب المدارس الإعدادية قبل وبعد مشاهدة مقاطع فيلم محددة مسبقاً تتعلق بالذكاء الاصطناعي والروبوتات. أظهرت نتائج الاستبيان أن مثل هذا النوع من الأفلام له آثار إيجابية أولية على دوافع الطلاب وإلهامهم وإبداعهم.

كلمات مفتاحية: الذكاء الاصطناعي، الروبوتات، التعليم، الأفلام.

Introduction

Films are one of the most frequent sources of entertainment that a person can easily approach at any time. Moreover, films have a significant impact on society and individuals, it is well evidenced that films can also be used as a teaching tool for several topics. Artificial intelligence and robotics are currently employed in numerous sectors and have become an essential part of human day-to-day life activities.

Artificial intelligence which is the science and engineering of making artificial machines (McCarthy, 2004), is employed in variety of fields such as education (Chen et al., 2020), fashion and apparel industry (Giri, et al., 2019), ophthalmology (Lu et al., 2018), conceptual architecture design (Pena et al., 2021), agriculture (Eli-Chukwu, 2019), and medicine (Kaul et al., 2020).

On the other hand, robotics, according to the oxford English dictionary, the definition of the robot is “a machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer” (Ben-Ari & Mondada, 2018). Many advantages of robots appear to be most observable in productivity, safety, time, and cost optimization (Singh et al., 2013). Additionally, robotics is implemented in several fields such as urology (Thaly et al., 2007), healthcare (Kyrarini et al., 2021), learning (Johal et al., 2018), food industry (Iqbal et al., 2017).

Based on the previous literature survey, it is worth mentioning that artificial intelligence and robotics have become a part of our lives and in the future, they will be used more and more, so it is important to increase the culture of the future generation about this technology. Hence, it vital to establish available and easeful tools to spread the awareness of the recipients for such a technology.

Numerous studies have been undertaken to examine how movies alter people's attitudes, for example, how watching movies can have a substantial good or bad impact on adolescents' behavior (Udofia & Anyim, 2017). When exposed to smoking characters, as opposed to non-smoking ones, smokers who watch movies with smoking cues smoked more cigarettes (Lochbuehler et al., 2010). Movies have an impact on tourism as well. Some of the locations featured in movies are very alluring to moviegoers and will continue to fascinate tourists year-round, long after the film's initial release. The demand for tourism may therefore be influenced by movies in a significant way (Vagionis & Loumioti, 2011). A survey demonstrates that attitudes have shifted, for example, after watching the movie “The Day After Tomorrow,” whose story revolves around the sudden shift of the Earth's climate into a new ice age. People who have seen the film realized that their responsibility to conserve the planet and preserve the climate is increasing (Lowe et al., 2006).

It is worth noting that the impact of artificial intelligence and robotic related films on motivation, inspiration, imagination and knowledge has been referred to in many reliable scientific references. For example, science fiction films play an effective role in motivating people to develop new concepts of what can be invented, and they also spark people's interest in the fields of artificial intelligence and robotics (Lorenčík et al., 2013). Moreover, science fiction films have an unlimited effect on society and technological progress, as a study showed that unconventional orientation of science fiction films can improve the technological creativity of middle school students and improve their ability to design their projects and make improvements to existing ones (Lin et al., 2013).

There are several artificial intelligence and robotics-related films that have cinematic and scientific values that can be presented to students such as *Metropolis*, *2001: Space Odyssey*,

Blade Runner, The Terminator film series, Robocop, The Matrix film series, A.I Artificial Intelligence, I Robot, Transformers film series, Wall-E, Moon, Robot & Frank, Her, Oblivion, The Machine, Interstellar, Ex Machina, Chappie, Blade Runner 2049, Upgrade, Alita: Battle Angel, Oxygen, and much more. The students can become more familiar with technology and become more inspired to study more about it by watching this kind of films. Teachers should choose films appropriate for the age group that will watch the films or select specific clips from these films.

Several papers have pointed out the importance of using films as a tool in teaching some topics. Sharma (2022) discussed the use of films as a tool to teach English to non-native speakers (ESL). Hofmann (2018) discussed the animated films potential for teaching English as a foreign language (EFL). Yilmaz (2020) discussed teaching Turkish as a foreign language through films. Abuhassna and Awae (2021) discussed the impact of using animated films in teaching Arabic as a foreign language to non-native speakers. Di Palma (2009) discussed teaching geography using films. Lee and Lo (2014) discussed teaching management using film. Proctor and Adler (1991) discussed teaching interpersonal communication with feature films. Baños and Bosch (2015) discussed using feature films in teaching in medical schools. Soner and Mumcu (2021) discussed the use of films in nursing education in Turkey. Derelioğlu and Şar (2010) discussed the use of films in history education in primary schools.

The aim of this paper is to study the role of artificial intelligence and robotics-related films in students' way of thinking. It is performed to evaluate and measure the impact of introducing students to artificial intelligence and robotics as well as its effect on students' motivation, inspiration, imagination and knowledge.

Methodology

Questionnaire was conducted to evaluate the students' motivational, inspirational, and imaginal knowledge and initiative. The methodology was divided into two parts as follows:

1. The students answered the following questions before watching the films clips.
2. The students answered the same questions in part.1, but after watching the films clips.

Part.1

The table below describes each question and the corresponding metrics (i.e., creativity, motivational, inspirational, imaginal and knowledge).

Table1

The questions and the corresponding metrics

Questions	Metrics
1. What major do you want to study at the university, would you like to study majors related to artificial intelligence or robotics?	Inspirational and motivational
2. Have you ever heard of the term artificial intelligence and robotics?	Knowledge
3. What are artificial intelligence and robotics?	Knowledge
Express your opinion by answering the following questions:	
4. Do you think that the presence of artificial intelligence and robotics will be positive or negative for the future of human life?	Imagination
5. Can you trust artificial intelligence and robotics and let such a technology to do medical tests or surgery or other medical treatment for you?	Imagination

6. Would you like to have a robot or based artificial intelligence services in the future? Suggest tasks you want artificial intelligence and robots to do for you.	Motivation and Creativity
7. This question was asked after watching clips from the movie 2001: Space Odyssey. Did you sympathize with HAL 9000 or was it worth it?	Imagination

Part.2

At this stage, the group was required to answer the same questions after watching the clips that were carefully selected to fit the students. The film selection is illustrated in the table. 2. The table also demonstrates other related information about the films (e.g., genre, film rating, release date, director, IMDB rating, and Rotten Tomatoes rating).

Table 2

Information about the films, genre, film rating, release date, director, IMDB rating, and Rotten Tomatoes rating.

Film	Genre	Film Rating	Release Date	Director	IMDB Rating	Rotten Tomatoes Rating (TOMATOMETER)
2001: Space Odyssey	Adventure, Sci-Fi	G	1968	Stanley Kubrick	8.3	92%
A.I. Artificial Intelligence	Drama, Sci-Fi	PG-13	2001	Steven Spielberg	7.2	75%
I, Robot	Action, Mystery, Sci-Fi, Thriller	PG-13	2004	Alex Proyas	7.1	56%
Interstellar	Adventure, Drama, Sci-Fi	PG-13	2014	Christopher Nolan	8.6	73%

Results

In general, it was clearly observed that a high percentage of students show no interests in majors related to modern technology includes on artificial intelligence and robotics. The main findings that were collected for part.1 are as follows:

1. No student has chosen any major related to computer science or artificial intelligence.
2. 50% of the students did not know about the term artificial intelligence before
3. The students tried to define the term artificial intelligence, but their answers were considered poor.
4. All students were unable to express their opinions and were not able to answer questions 4 to 7.

On contrary, after watching the clips, students' definitions of artificial intelligence and robotics greatly improved, and they suggested additional possible forms and features that could be applied in the field of artificial intelligence and robotics. It was clearly noticed that the students build initial potential to express their opinion about the field of study. In figure.1, 67%

of the students showed a desire to study related majors in the field of artificial intelligence and robotics.

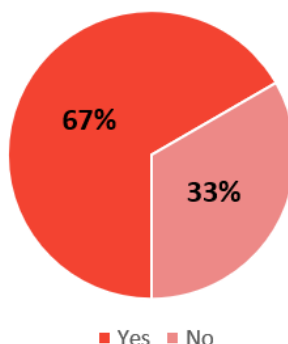


Fig. 1: Statistical answer to question 1 in the questionnaire after watching film clips.

A significant increase of the students' desire towards undergraduate specialists related to artificial intelligence and robotics was observed in the sample after watching the pre-selected clips, whereas there was no interest prior to these clips. The majors that was mainly preferred by students prior to the clips are as follows: medicine, pharmacy, healthcare, medical technology, law, engineering, sport, and languages.

42 of the sample proportion believed that the presence of artificial intelligence and robotics have a positive impact on human life, while 58% believed that the presence of artificial intelligence and robotics would have a negative impact, Fig. 2.

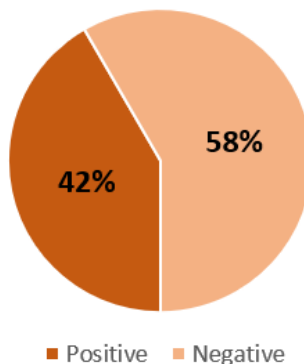


Fig. 2: Statistical answer to question 4 in the questionnaire after watching film clips

Moreover, 33% of the students answered that they could trust artificial intelligence and robots and let them perform medical tests or surgeries for them, while 67% answered they did not trust artificial intelligence. Fig. 3.

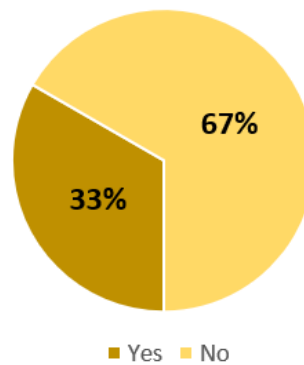


Fig. 3: Statistical answer to question 5 in the questionnaire after watching film clips

The nature of movies that were watched by the students sample mainly includes on scenes which describes the revolution of robotics and its crucial impact on the mankind. Additionally, it includes on other scene that show the way that robotics attempted to impose its own authority and control on earth. Based on Figs. 2 and 3, the highest percentage of students believe that the existence of artificial intelligence and robotics technology would has negative on the mankind and environment. They also showed less confidence about utilizing robotics on daily basis activities of humans as evidenced from the results of Figs.2 and 3. This outcome is significantly important when it comes to select the clips that required to motivate or inspire middle school students' group.

On the other hand, 92% of the students answered that they would like to have a robot that helps them with day-to-day and household chores, whereas only 8% do not wish to have a robot in their home as presented in Figure.4. However, both groups in this sample they suggest additional possible creative tasks and forms that artificial intelligence and robotics can provide.

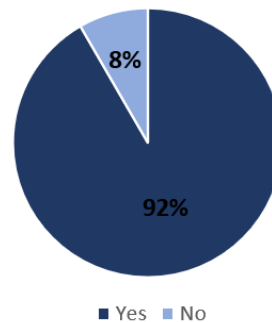


Fig. 4: Statistical answer to question 6 in the questionnaire after watching film clips

50% of the students showed their sympathy for HAL-9000 and 50% answered that he deserved the punishment and sanction by astronaut because of its unassigned actions. Fig. 5.

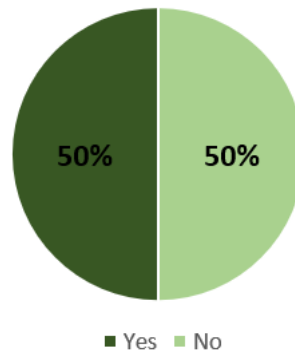


Fig. 5: Statistical answer to question 7 in the questionnaire after watching film clips

Discussion

The results clearly showed that watching films related to artificial intelligence and robotics increased the desire of students participating in the study to be interested in this field and pushed them to study disciplines related to its topics. It also contributed to enriching their thinking to become more creative and able to provide innovative proposals for artificial intelligence and robots to perform tasks that did not appear in watched films. The films also helped them create their own vision of what the future with artificial intelligence and robotics would look like. Their vision of what the future with AI and robotics might look like, as well as their confidence in AI, has been greatly influenced by the image presented in these films on the different themes and areas presented.

In reference to the outcomes, we strongly endorse the use of films as a teaching tool, but it must be emphasized again that trainers must select and watch films very carefully before showing them to pupils. They need to ensure that such movies are appropriate for their age and free of any scenes which don't fit the main purpose of the lesson. The objective of the viewing process should take into account the level, age and gender of students. Care must also be taken to choose films of cinematic, scientific and creative value that increase the students' desire and passion towards science and innovation. In addition, it will early open their minds broadly to the fields of artificial intelligence and robotics and how to harness them to reach practical ideas that contribute to solving the problems and issues of society. Hence, the results of the study reinforce directing students to think outside the scope of tradition and providing them with creative and critical thinking pathways to decide with confidence and responsibility.

Conclusions

This research represents a true representation of the role of films based on artificial intelligence and automation in changing the traditional thinking pattern of school students and urging them to be creative and critically think of the observed issues in front of them. It will contribute to crystallizing their opinions and ideas early towards technical projects and maximizing the role of science and technology in solving their societal problems. They started to believe in its ability to improve their lives at acceptable and reasonable costs regardless of their standards of living.

The results of the study also indicate the ability of these films to change previous stereotypes, urge viewers to respect the values of science and innovation, and motivate them to study related sciences. It is worth noting that the data and results of the study show that the use of such films as educational tools will affect the students' desire and behavior, especially if the

clips are carefully selected based on knowledge and the psychological impact on viewers before offering them to students.

References

- Abuhassna, H., & Awae, F. (2021). The Effect of Employing Animated Films in Teaching Arabic as a Foreign Language (AFL) to Non-Native Speakers in Thailand Schools. *Innovative Teaching and Learning Journal*, 5(2), 1-10.
- Baños, J. E., & Bosch, F. (2015). Using feature films as a teaching tool in medical schools. *Educación médica*, 16(4), 206-211.
- Ben-Ari, M., & Mondada, F. (2018). Robots and their applications. In *Elements of robotics* (1-20). Springer, Cham.
- Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *Ieee Access*, 8, 75264-75278.
- Derelioğlu, Y., & Şar, E. (2010). The use of films on history education in primary schools: Problems and suggestions. *Procedia-Social and Behavioral Sciences*, 9, 2017-2020.
- Di Palma, M. T. (2009). Teaching geography using films: A proposal. *Journal of Geography*, 108(2), 47-56.
- Eli-Chukwu, N. C. (2019). Applications of artificial intelligence in agriculture: A review. *Engineering, Technology & Applied Science Research*, 9(4), 4377-4383.
- Giri, C., Jain, S., Zeng, X., & Bruniaux, P. (2019). A detailed review of artificial intelligence applied in the fashion and apparel industry. *IEEE Access*, 7, 95376-95396.
- Hofmann, J. (2018). Pixar films, popular culture, and language teaching: The potential of animated films for Teaching English as a Foreign Language. *Global Studies of Childhood*, 8(3), 267-280.
- Iqbal, J., Khan, Z. H., & Khalid, A. (2017). Prospects of robotics in food industry. *Food Science and Technology*, 37, 159-165.
- Johal, W., Castellano, G., Tanaka, F., & Okita, S. (2018). Robots for learning. *International Journal of Social Robotics*, 10 (3), 293-294.
- Kaul, V., Enslin, S., & Gross, S. A. (2020). History of artificial intelligence in medicine. *Gastrointestinal endoscopy*, 92(4), 807-812.
- Kyranini, M., Lygerakis, F., Rajavenkatanarayanan, A., Sevastopoulos, C., Nambiappan, H. R., Chaitanya, K. K., ... & Makedon, F. (2021). A survey of robots in healthcare. *Technologies*, 9(1), 8.
- Lee, V., & Lo, A. (2014). From theory to practice: Teaching management using films through deductive and inductive processes. *The International Journal of Management Education*, 12(1), 44-54.
- Lin, K. Y., Tsai, F. H., Chien, H. M., & Chang, L. T. (2013). Effects of a science fiction film on the technological creativity of middle school students. *Eurasia Journal of Mathematics, Science and Technology Education*, 9(2), 191-200.
- Lochbuehler, K., Peters, M., Scholte, R. H., & Engels, R. C. (2010). Effects of smoking cues in movies on immediate smoking behavior. *Nicotine & Tobacco Research*, 12(9), 913-918.
- Lorenčík, D., Tarhaničová, M., & Sinčák, P. (2013). Influence of sci-fi films on artificial intelligence and vice-versa. In *2013 IEEE 11th international symposium on applied machine intelligence and informatics (SAMII)* (27-31). IEEE.
- Lowe, T., Brown, K., Dessai, S., de França Doria, M., Haynes, K., & Vincent, K. (2006). Does tomorrow ever come? Disaster narrative and public perceptions of climate change. *Public understanding of science*, 15(4), 435-457.

- Lu, W., Tong, Y., Yu, Y., Xing, Y., Chen, C., & Shen, Y. (2018). Applications of artificial intelligence in ophthalmology: general overview. *Journal of ophthalmology*, 2018.
- McCarthy, J. (2004). What is artificial intelligence. URL: <http://www-formal.stanford.edu/jmc/whatisai.html>.
- Pena, M. L. C., Carballal, A., Rodríguez-Fernández, N., Santos, I., & Romero, J. (2021). Artificial intelligence applied to conceptual design. A review of its use in architecture. *Automation in Construction*, 124, 103550.
- Proctor, R. F., & Adler, R. B. (1991). Teaching interpersonal communication with feature films. *Communication Education*, 40(4), 393-400.
- Sharma, N. (2022). Using Films as a Teaching Device for the Non-Native Speakers of English.
- Singh, B., Sellappan, N., & Kumaradhas, P. (2013). Evolution of industrial robots and their applications. *International Journal of emerging technology and advanced engineering*, 3(5), 763-768.
- Soner, G., & Mumcu, N. (2021). Use of Films in Nursing Education in Turkey. *Journal of Education and Research in Nursing*, 18(4), 436-441.
- Thaly, R., Shah, K., & Patel, V. R. (2007). Applications of robots in urology. *Journal of Robotic Surgery*, 1(1), 3-17.
- Udofia, N. A., & Anyim, J. S. (2017). Assessing the Impact of Modern Movies on Students—A Prospective Study. *Journal of Culture, Society and Development*, 31, 1-11.
- Vagionis, N., & Loumioti, M. (2011). Movies as a tool of modern tourist marketing. *Tourismos*, 6(2), 353-362.
- Yilmaz, F. (2020). Using Films to Teach Turkish as a Foreign Language: A Study of Classroom Practice. *Educational Research and Reviews*, 15(6), 282-289.