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Learning Trends in the Knowledge Age: Changes in Patterns and Learning Technologies

Dwi Hasmidyani

Faculty of Teacher Training and Education - Sriwijaya University
dwi_hasmidyani@fkip.unsri.ac.id

Abstract. The rapid development of technology and information in this knowledge age has an unavoidable influence on the field of education. The development of science and technology has consequences for the demands of human resources (HR) with good quality. Changing the learning paradigm pattern is needed in order to create human resources that are able to compete globally. The learning pattern in the knowledge age focuses more on independence in learning (student center), proficiency in using technology, an open, flexible and limitless learning process, collaboration, and the ability to carry out investigation and design.

Keywords. Knowledge Age, Learning Pattern, Technology

1. Introduction

The development of human culture consists of four stages which include the agrarian century (before 1880), the industrial century (1880-1985), the information age (1955-2000) and the knowledge age (1995-present). The milestone stages of human civilization were passed through lifelong learning (Dwiyogo, 2013). The knowledge age that has been faced today has an impact on various aspects of life. In the age of knowledge, each individual is required to compete in facing complex challenges, not only in the world of work but also in the world of education and in the social life of society of course.

The development of science and technology causes various changes in cultural values, employment opportunities, education, health, psychology and so on. The effect of these changes in the field of education, in particular, is a change in the perspective of education, the role of parents, teachers / lecturers and the pattern of relations between them. In this 21st century, education is becoming increasingly important because of its role to ensure that students will have learning and innovation skills, skills to use technology and information media, as well as the ability to work, and survive using life skills (Murti, 2015). Jobs in this knowledge age require new combined skills, namely high-order thinking and complex communication (Trilling and Fadel, 2009). Referring to the description above, this paper will discuss learning trends in the knowledge age, learning patterns and educational technology in the knowledge age.

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2. Discussion

2.1. The industrial age versus the knowledge age.

The 21st century is marked by a major shift in business work orientation, from a manufacturing development-oriented business to a service-oriented business. Changes in this field of business affect the process of providing human resources (HR) which of course must be able to face the challenges of the 21st century or the knowledge century. There are fundamental differences in the processing of raw materials between the industrial age and the knowledge age, namely in the manufacturing and assembly processes. Assembly in the century was carried out by skilled personnel who were probably of low to moderate education. Meanwhile, in the knowledge age, the production process must be carried out by knowledgeable personnel and experts in their fields or those who are highly educated. This implies that in the knowledge age, education plays a central role in growing knowledge and skills (Nuraida, 2010, Palomeque, 2020).

Galbreth (1999) suggests that the skills required of workers in the 21st century are different in the industrial century. These skills include; (1) communication skills, (2) creativity and innovation, (3) cooperation and empowerment, (4) information technology literacy, (5) visual skills, (6) problem solving, (7) decision making, (8) development and knowledge management, (9) intelligence. Likewise, the basic skills in the form of 3 M, namely Reading, Writing and Computing, have had to change according to the needs of the information age in the form of 3T, namely Technology, Teams and Transfer. The younger generation must be introduced as early as possible to the media needed in the information age, such as computer technology, internet and smartphones, as well as the skills to work as a team in relation to producing a product that is impossible to do alone. The next skill is transferring products that are owned via the internet (Palomeque, 2020, Tsodikova et al, 2020).

Changes from the industrial age to the knowledge century also have an impact on changes in the field of education, considering that education basically serves to prepare students for its role in the future (Khin, 2021). Learning practices in the industrial age and knowledge age can be seen in Table 1.

Table 1. Type of learning in the industrial age and knowledge age

Industrial Age	**Knowledge Age**
1. Teacher as a guide 2. The teacher as a source of knowledge 3. Learning is directed by the curriculum 4. Learning is strictly directed with limited time 5. Primarily based on facts 6. Is theoretical, principles and survey 7. Repetitions and exercises 8. Rules and procedures 9. Competitive 10. Focus on the class	1. The teacher acts as a facilitator, mentor and consultant. 2. Teachers as study partners 3. Learning is directed by students 4. Learn openly, flexibly and as needed 5. Mainly based on projects and problems 6. Real world, real action and reflection 7. Investigation and design 8. Discovery and creation

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11. The results are predetermined 12. Follow the norm 13. Computer as a learning subject 14. Presentation with static media 15. Communication is limited to the classroom 16. The test is measured by the norm	9. Collaborative 10. Focus on the community 11. The results are open 12. Creative diversity 13. Computers as learning equipment of all kinds 14. Dynamic multimedia interactions 15. Communication without borders around the world 16. Performance is measured by experts, mentors, peers and oneself.

Source: Trilling & Hood (1999)

Some conclusions that can be drawn based on the table above are as follows; (1) there is a change in the role of the teacher who was a source of knowledge, turned into a facilitator. Besides, there are changes in learning time flexibility. (2) Changes in learning practices from fact-based to problem-based. In the industrial age, learning practices that are theoretical, principles and surveys as well as rigid in rules and procedures, turn into contextuals with real action and reflection, investigation and design so as to be able to discover and create something in the knowledge age. (3) In the industrial age, competition and class focus are more important, where tests are measured by predetermined norms and results. Meanwhile, collaboration and focus on society where assessment is carried out with performance, the results are open and rewarding creativity are more concerned in the knowledge age. (4) Changes in information technology, which were static in the industrial age, turned into more dynamic in the knowledge age.

2.2. Learning patterns in the knowledge age.

When viewed from the practice of learning, learning patterns in the 21st century are still dominated by patterns that are often found in the industrial age, even though the paradigm used is far different from the learning patterns in the 21st century. This new learning paradigm provides great opportunities and challenges for the professional development of teachers/lecturer. This paradigm describes a redefinition of the teaching profession and the roles that teachers / lecturers play in the learning process. In addition, the new demands of the knowledge age create a new set of learning principles and behaviors that must be put into practice. Galbreath (1999) argues that the learning approach used in the knowledge age is a mixed approach or a combination of learning approaches from teachers, students, and themselves.

Dwiyogo (2013) states that there are seven basic skills needed to become an independent person in the knowledge age, namely as follows:

1. Think and act critically; able to solve problems, conduct investigations, conduct analysis, and manage projects.
2. Creative; able to create new knowledge, design solutions to problems, and convey something interesting.

3. Collaboration; able to cooperate, make compromises, build consensus and can build a community environment.
4. Mutual understanding; able to establish mutual understanding across cultures, across ethnicities, across knowledge, across organizations and across religions.
5. Communication; able to convey using the media effectively and efficiently.
6. Operating a computer; able to use electronic information effectively and use knowledge tools.
7. Believe in their own abilities.

In conclusion, the learning pattern in the knowledge age focuses more on independence in learning (student center), proficiency in using technology, learning openly, flexibly and without limits, collaboration, and the ability to carry out investigation and design.

2.3. Learning technology in the knowledge age

In learning in the 21st century, teachers are no longer the main source of learning. Students in this case can use any media as a learning resource. For this reason, teachers must have other learning sources besides books, for example integrating print, audio, audio-visual, computer and even smart phone learning resources. According to some experts, other learning resources in the form of learning media have several classifications. Seels and Richey (1994) state that media classification based on the technology used is divided into four types, namely; (1) print technologies, (2) audiovisual technologies, (3) computer-based technologies, (3) integrated technologies. Dwiyogo (2013) generally explains that there are four types of learning media, namely; (1) visual media (graphs, diagrams, charts, charts, posters, caricatures, etc.), (2) audio media (radio, tape recorder, language lab, walkman, etc.), (3) projection media (OHP, projector, in foccus, etc.), (4) audio visual (TV, computer, film, VCD, etc.).

Other experts such as Trilling & Hood (1999) mention that there are 10 learning technology challenges for teachers, technology experts, curriculum makers, program makers and developers, publishers of knowledge materials, engineers, scientists, trainers, teachers, parents, students, and entrepreneurs who want to make valuable contributions to students and workers, namely as follows:

1. A more effective knowledge programming model is needed that is able to balance reality and deep content and effectively combine hands-on activities using kits, design challenges, research laboratories and real-world exploration.
2. A multimedia reference site is required as an accessible learning resource, featuring interactive simulations, comprehensive guides and the latest to link with other web sites.
3. High-quality learning, learning simulation models and simulator learning tools are needed in a complex process.
4. It takes the desired leap in ease of use and yields useful results in information discovery, organizing and reporting tools, particularly for web and data base knowledge content and knowledge activities.
5. It is necessary to develop a data base, share and maintain a much simpler process, so that its use can be made easier in creating a useful online knowledge base.
6. Online collaboration and better communication tools are needed.
7. An online knowledge assessment system is needed that combines simulation, concept mapping, reflective essay questions, portfolio presentations, and reporting of the results of implementation assignments.
8. More space is needed to design and manufacture tools, tools, and useful items, workspaces, laboratories, garages, and so on. This is done by using materials / construction

materials tools, tool storage, safe places to put things together and separately with access to construction tips, online that displays the findings and experiments of other students.

9. It is necessary to implement all educational technology talents as a step towards preparing teachers, parents, and other aid providers and study guides to integrate the use of all types of technology, from owned lenses to supercomputers into the everyday experiences of all students.

10. It takes learning outside the building, taking a breath, taking a walk, smelling the fragrance of flowers, and forgetting about technology at least once a day.

This learning technology challenge emphasizes the facilities and infrastructure needed to support learning in the knowledge age, develops designs and carries out experiments, makes online knowledge assessments, integrates the use of all technology into the daily experiences of all students, and last but not least is refreshing and take a break from technology.

3. Conclusion

The rapid development of science and technology requires the ability to keep up. This is the same as learning in the age of knowledge which requires all individuals to be able to use various technologies that have been created. Learning in the knowledge age uses learning resources that do not only come from the teacher as the main learning resource, but also by utilizing tools and materials. This can be in the form of learning materials that can be obtained from nature and the surrounding environment, various learning media, computer-based interactive learning and the use of the internet as a learning resource. The new paradigm of learning today is no longer a teacher centre but a student centre. This means that students are required to be more independent in learning. This independence of course requires seven basic skills so that students have the ability to compete globally. The seven skills include; (1) Think and act critically, (2) Creative, (3) Collaboration, (4) Mutual understanding, (5) Communication, (6) Using computers, (7) Believe in their own abilities.

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