

IDENTIFICATION OF CONNECTIVITY AND CITIZENSHIP ABILITY OF BIOLOGY STUDENTS AT SMAN 12 PADANG

Nurulita Spahira Anjani Putri W¹, Relsas Yogica², Ardi³, Rahmadhani Fitri⁴

Universitas Negeri Padang
nurullitashafira8@gmail.com

Abstract

This study aims to find out how connectivity and citizenship skills are part of the 21st Century 6C skills in biology students. This is important to know because currently students are in the era of revolution 4.0 and will continue to compete with the times, where preparations for the future job market are more focused on soft skills than hard skills. This type of research is a quantitative descriptive research. The sample in this study were students in class XI-IPA with a total sampling technique of 180 people. The instrument used is a questionnaire with a Likert scale. Data collection technique with a closed questionnaire. The data analysis technique is by converting students' raw scores. Based on the research, it was found that the connectivity ability of the students was 81.62% which was included in the "very high" category, while in the citizenship ability the results obtained were 79.70% which were included in the "very high" category. Based on the results of the study it was found that students were able to compete with the times in the future.

Keywords : Identification ; 21st Century Skills ; Connectivity ; Citizenship ; 6C Skills

INTRODUCTION

Currently we live in the 21st Century, where in this Century we continue to experience developments in Science and Technology (IPTEK), especially in the educational aspect. At present the development of the world has entered the 4.0 revolution era and will soon enter the 5.0 era which is marked by advances in information technology, the internet and communication. In the 21st century, the education system is developing rapidly to follow the needs of global education. This global educational need has made the Ministry of Education and Culture develop a system to improve the quality of educational practice and prepare graduates who are qualified and able to face a global society in the future, keep

abreast of world developments, and be able to keep up with future job demands (Shabrina & Astuti, 2022).

In the 4.0 revolution era, according to Montessori et al. (2023), intelligence in work is no longer focused on hard skills but focuses on soft skills. Soft skills are character traits and interpersonal skills that characterize one's relationships with others. According to Purnami & Rohayati (2016), soft skills are a group of personality traits that are accepted by society such as the ability to communicate, language, one's habits, one's friendliness, and optimism that characterizes relationships with other people. Soft skills in the education system can be directed towards 21st Century skills and applied to the applicable curriculum. According to Murti (2013), currently the curriculum in Indonesia has adopted 21st Century skills to perfect the education curriculum in Indonesia.

The curriculum that is being developed and implemented in Indonesia is the independent learning curriculum. According to Rahayu et al. (2022), the concept of an independent learning curriculum is acceptable because it is in accordance with the vision and mission of Indonesian education in the future to create quality students who are able to compete in various fields of life in the future. The vision and mission of Indonesian education to create quality students can be directed towards the skills of the 21st Century 6C. According to Choo (2022), these 21st Century 6C skills are skills suitable for adoption into the curriculum, namely critical thinking, creativity, collaboration, communication, connectivity and citizenship.

These 21st Century skills can be described as follows: Critical thinking refers to the way students filter, analyze and question any information they may find in various media, be it written, spoken or broadcast and synthesize this information according to students' understanding. Creativity, refers to the ability of students to use their knowledge or talents to create something new, or to produce something in another way. Collaboration, refers to the way students use various personalities, talents, and knowledge to work together and produce something new. Communication refers to the way students present ideas and information in a clear and meaningful way. Communication has four objectives, namely informing, instructing, motivating, and persuading listeners.

Connectivity, refers to as part of the global world students always use technology which is part of everyday life, students must be able to relate to their friends and other people around them in building a better world, and in the process the teacher must foster in making

students become responsible, caring and contributing citizens. Citizenship , refers to students' ability to relate to everything that surrounds them, to know and appreciate where they come from, and the values and beliefs held by their society, and their history as a society (Miller, 2015).

Based on an interview conducted with a biology teacher at SMAN 12 Padang, currently the biology teacher at the school is still training students with 21st Century 4C skills, namely critical thinking, creativity, collaboration, and communication. According to Choo (2022), even though there are two additional skills that are important for students, namely connectivity and citizenship. If the teacher includes these two skills according to McGraw-Hill & Ennis (2018), it will be useful for students to face job demands and be able to compete with other Human Resources (HR) in the future.

Learning is a process of interaction between students and teachers. According to Tabun et al. (2022), in the learning process there is a process of changing the personality of students in the form of skills in changing the behavior of thinking, behaving, and acting. The existence of a learning process will form abilities that will improve the quality of students as Human Resources (HR) in the future, especially for students in biology learning.

Biology learning according to Ulfa (2016), is a branch of Natural Sciences which has an important role to improve the quality of education, especially to produce quality students. Biology is a science that contains facts, concepts or principles that will be processed through a scientific attitude. Scientific attitude according to Ulfa (2018), is an attitude that must be possessed so that students are able to face the problems they want to solve. The scientific attitude consists of curiosity, critical attitude, open attitude, objective attitude, respect for the work of others, courage to defend the truth, attitude to reach the future, work hard, be thorough, and never give up.

One way to instill a scientific attitude in learning according to Hodson (1996) is to carry out practical activities and discussion activities, because in practicum activities and discussion activities there are patterns of interpersonal relationships that are useful for training leadership, communication, conflict resolution, building trust, mutual cooperation and provide power and control. Regarding the need for a scientific attitude, there are two skills in the 21st Century skills that are able to improve scientific attitudes in students, namely connectivity and citizenship.

The ability of connectivity in biology learning can be seen from the forms of cooperation, solidarity, discipline, responsibility, and tolerance among students. In this study, connectivity ability was measured by identifying attitudes of care for body health, religious, independent, tolerant, friendly/communicative, social care, responsibility, and care for the environment. Citizenship skills in biology learning can be seen from how students love and care for their nation, Indonesia because it is a country that has a diversity of flora, fauna, ecosystems and existing microorganisms. So that students must have an attitude of nationalism as a form of loving and protecting their country from outside threats. The attitude of nationalism in this study was measured by identifying the attitude of love for the motherland, the attitude of appreciating the services of the heroes, being willing to sacrifice, prioritizing unity and oneness, not giving up, and having an attitude of tolerance between fellow beings.

METHODS

This research is a type of descriptive research with a quantitative approach. The research was conducted at SMA Negeri 12 Padang, the population in this study were students in class XI-IPA for the 2023/2024 academic year consisting of 5 classes with 36 students in each class, so the total population in this study was 180 participants. This study drew samples using the total sampling technique, in which all members of the population were sampled in this technique, because the researcher wanted to minimize errors in determining the attitude of each student.

There are 2 variables in this study, namely the ability of connectivity and citizenship abilities of students. The data in this study is primary data because the data is directly taken from respondents using a questionnaire. The instrument in this study was a questionnaire or questionnaire with a closed questionnaire, where the statements that had been prepared by the researchers were structured and the respondents only had to choose the answers from these statements. The questionnaire was used to get an overview of the indicators of connectivity and citizenship abilities in biology students.

In determining the score of the questionnaire answer choices, the researcher used a Likert scale because this scale can be used to measure a person's attitudes, opinions, and perceptions. In the questionnaire there are four alternative answers to the statement, namely SS (strongly agree), S (agree), TS (disagree) and STS (strongly disagree). Each alternative

answer sequentially has a weight of 4, 3, 2, 1 for positive statements and 1, 2, 3, 4 for negative statements.

Data analysis techniques in this study can be described as follows.

- a. Counting the number of scores that have been obtained by students, each total ideal score (criterion) for all items for each question or statement will be multiplied by the number of respondents.
- b. Convert raw scores obtained by students into scores in the form of percentages. The formula used is as follows.

$$NP = \frac{R}{SM} \times 100\%$$

(Sudjana, 2016)

Information:

NP = The percentage value sought or expected

R = Raw score obtained from students

SM = The ideal maximum score of the test in question

100% = Fixed number

- c. Calculate the average value using the following formula.

$$X = \frac{\sum x_i}{N}$$

(Sudjana, 2016)

Information:

X = Calculated average

$\sum X_i$ = Number of data values

N = Lots of data

- d. Determine the category description of the percentage obtained, then a category table is created which is compiled with the following calculations:
 - a. Maximum percentage $= \frac{4}{4} \times 100\% = 100\%$
 - b. Minimum percentage $= \frac{1}{4} \times 100\% = 25\%$

- c. Percentage range = $100\% - 25\% = 75\%$
- d. Percentage class interval = $\frac{75\%}{4} = 18,75\%$

Table 1 . Category Test Result Criteria

Intervals	Criteria
75.02% - > 93.77%	Very high
56.27% - 75.01%	Tall
37.52% - 56.26%	Currently
18.76% - 37.51%	Low
0% – 18,75%	Very low

RESULTS

1. Connectivity Capability Data

connectivity ability in biology students as part of 21st Century skills at SMAN 12 Padang consists of 39 items. The statement with the highest score obtained is 150 with a percentage of 96.15%, the maximum possible score is 156 (4 x 39 = 156). The lowest score obtained is 105 with a percentage of 67.31%, the minimum possible score is 39 (1 x 39 = 39). To find out how the connectivity capability of each indicator is described, it can be seen from the results of the frequency distribution in Table 2.

Table 2. Description of Student Connectivity Capabilities for Each Indicator

Indicator	Percentage (%)	Criteria
Health Care	83.19%	Very high
Religious	84.58%	Very high
Tolerance	84.47%	Very high
Independent	79.31%	Very high
Friendly/communicative	80.21%	Very high
Social care	77.82%	Very high
Responsibility	81.32%	Very high
Environmental care	79.30%	Very high
Average indicator score	81.62%	Very high

In this study consisting of 180 students, through data processing the number of student frequencies was produced which can be seen in Table 3.

Table 3 . Total Frequency of Students' Connectivity Ability

intervals	Criteria	Frequency	Percentage (%)
75.02% - > 93.77%	Very high	149	82.77%
56.27% - 75.01%	Tall	31	17.22%
37.52% - 56.26%	Currently	-	-
18.76% - 37.51%	Low	-	-
0% – 18,75%	Very low	-	-

2. Citizenship Ability Data

citizenship abilities in biology students as part of the 21st Century skills at SMAN 12 Padang consists of 22 items. The statement with the highest score obtained is 85 with the maximum possible score being 88 ($4 \times 22 = 88$). The lowest score obtained is 54 with the minimum possible score being 22 ($1 \times 22 = 22$). To find out how the citizenship ability of each indicator is described, it can be seen from the results of the frequency distribution in Table 4.

Table 4. Description of Student Citizenship Ability for Each Indicator

Indicator	Percentage (%)	Criteria
Love the Motherland	79.83%	Very high
Appreciate Hero Services	79.49%	Very high
Willing to sacrifice	82.43%	Very high
Prioritize Unity	82.85%	Very high
Reformer Spirit	71.39%	Tall
Attitude of Tolerance	75.60%	Very high
Average indicator score	79.70%	Very high

In this study, it consisted of 180 students, through data processing the number of student frequencies was produced which can be seen in Table 5.

Table 5. Number of Frequency of Students Citizenship Ability

intervals	Criteria	Frequency	Percentage
75.02% - > 93.77%	Very high	126	70%
56.27% - 75.01%	Tall	54	30%

37.52% - 56.26%	Currently	-	-
18.76% - 37.51%	Low	-	-
0% – 18,75%	Very low	-	-

DISCUSSION

It is important to teach 21st Century skills to students, because currently students are in the era of revolution 4.0 which will continue to develop following technological and scientific developments. Given that at this time, the current job market is always a competitive job market. This is reinforced by McGraw-Hill & Ennis (2018), that the job market in the 21st Century requires not only preparation to get things done properly and precisely but also requires sufficient skills to be able to adapt to changes in the needs of the job. it is necessary to learn or instill 21st Century skills to be ready to face the developments of the world in the future.

The development of today's world has made the focus on job intelligence which used to focus on hard skills now focuses on soft skills . Soft skills are interpersonal skills in which these skills shape the ability to interact with other people and the environment around them. Currently soft skills can also affect job readiness. This is reinforced by Yulianti & Khafid (2015), which states that the higher the soft skills possessed by an individual, the higher the level of readiness for work and the lower the soft skills possessed by an individual, the lower the level of readiness. it works.

One of the skills of the 21st Century that can make humans become more qualified human resources and be able to develop soft skills and keep up with the times, namely 6C, which consists of critical thinking, creativity, collaboration, communication, connectivity/character education and citizenship . In this 6C skill, there are two important interpersonal skills to instill in students, namely connectivity and citizenship which can help students develop their soft skills or interpersonal skills.

The importance of these two interpersonal skills for students in the future, makes parents, teachers and Indonesian educational institutions more aware of what students will face in the future, therefore researchers identify connectivity abilities and citizenship abilities in students in order to provide an overview of how the ability of connectivity and citizenship of students at the time this research was conducted.

Based on the results of distributing the questionnaire on connectivity ability and citizenship ability on students of Padang 12 Public High School, it shows that connectivity ability on students is included in the "Very High" criterion with the percentage figure obtained, namely 81.62% and citizenship ability in students is included in the criterion "Very High" with the percentage obtained, namely 79.70%. This shows that the connectivity ability and citizenship ability in class XI-IPA students at Padang 12 Public High School in biology learning are good because students have interpreted the indicators on connectivity ability and citizenship ability .

1. connectivity

Connectivity is a skill for students to be able to relate to friends and other people around them and to build a better world and to become responsible, caring and contributing citizens and to have character that shows individual qualities in order to become good citizens. In biology learning the ability of connectivity can be shown by the existence of practicum activities and discussion activities. As the opinion of Montessori et al. (2023), which states that the ability of connectivity can be shown in cooperation, solidarity, discipline, responsibility, and tolerance.

The ability of connectivity in this study is seen from how the character of students towards themselves and to others. Described in several indicators, namely, having an attitude that cares about the health of oneself and others, being religious to God and His teachings, tolerance for differences, being independent in doing things, being able to make friends or communicate well with others, caring for other people and communities in need , have an attitude of responsibility to oneself, the environment and to God, and care for the environment around them.

Based on the results of distributing research questionnaires that have been conducted, it was found that students in class XI-IPA at SMA Negeri 12 Padang have a very high connectivity capability with a percentage of 81.62% for each given indicator. In the indicator "Health Care" which is an attitude or behavior with an effort to apply good habits to create a healthy life and stay away from bad habits that can interfere with health. In this indicator the results obtained by students were 83.19% in the "Very High" category.

These results indicate that students are able to maintain and care for the health of the organs in their bodies by not forgetting to clean their genitals after urinating. Students are able to choose healthy food types and maintain food hygiene, such as drinking at least 2

liters of mineral water per day. Students are able to maintain the cleanliness of their bodies by bathing 2 times a day using clean water. Students are able to prevent illness and disease by preventing transmission to people by wearing masks if they have the flu. Students are able to carry out treatment and find the nearest health service worker. Students are able to stay away from habits that damage health, such as, immediately stay away from people who are smoking so that we are not exposed to cigarette smoke and become passive smokers.

On the indicator "Religious" which is the attitude and behavior of obedience in carrying out the teachings of the religion adhered to, as well as being tolerant of other religions and getting along well with adherents of other religions. In this indicator the results obtained for students are 84.58% in the "Very High" category. These results show that students are always grateful for human superiority over other God's creatures, by always praying and worshipping God according to their teachings. Students are grateful for being created as Indonesian citizens who have the beauty and diversity of nature and culture. Students also feel the greatness of God given to them by always eating the food given to them.

On the indicator "Tolerance" which is the attitude and action of respecting differences in religion, ethnicity, ethnicity, opinions, attitudes, and actions of other people who are different from themselves. In this indicator the results obtained for students are 84.47% in the "Very High" category. These results indicate that students always provide opportunities for friends to provide criticism and suggestions. Students remain friends and friends with other friends regardless of religion, ethnicity and ethnicity by remaining friends with people who have different religions, different skin colors, habits or cultures that are different from their own. Students want to accept different opinions from friends, such as when making a presentation in front of the class, students want to accept opinions from other groups.

On the indicator "Independence" which is the attitude and behavior to not easily depend on others in completing tasks. In this indicator the results obtained by students are 79.31% which are included in the "Very High" category. These results indicate that students are able to do their own assignments without depending on other people, such as doing homework (PR) at home and not copying friends' work. Students are also able to find the information needed independently, such as when in learning the teacher asks students,

students immediately look for answers to teacher questions from learning sources which can be in the form of books, the internet and others.

On the indicator "Friendly/communicative" which is an action that shows a sense of pleasure in talking, socializing, and working with other people. In this indicator the results obtained by students are 80.21% which are included in the "Very High" category. These results indicate that students in group activities and practicum activities are able to give their opinions with other group friends and students are able to listen to opinions from group mates and other groups. Students are also active in social activities within the scope of the class such as visiting friends who are sick. Apart from being active in social and cultural activities, students also play an active role in organizational activities at school, such as participating in extracurriculars of interest. Students also play an active role in social and cultural activities within the scope of the school, such as wanting to participate in mutual cooperation activities carried out at school to maintain the cleanliness and beauty of the surrounding environment. Students are good at establishing communication with teachers, principals and all education staff at schools including school cleaning staff and school guards. If students find difficulties in learning, students are not reluctant to convey these difficulties to the teacher concerned.

On the indicator "Social Care" which is an attitude and action that always wants to provide assistance to other people and communities in need. In this indicator the results obtained by students are 77.82% which are included in the "Very High" category. These results indicate that students are willing to design and carry out various social activities, such as helping people affected by disasters and helping to collect appropriate donations for disaster victims. Students also want to help friends who need help such as helping explain subject matter that friends don't understand. Students also want to donate blood if they are of sufficient age and physically fit.

In the indicator "Responsibility" which is a person's attitude and behavior to carry out duties and obligations that should be carried out towards oneself, society, the environment in the form of natural, social and cultural, to the state and to God Almighty. In this indicator the results obtained by students are 81.32% which are included in the "Very High" category. These results indicate that students are able to maintain and return items that have been used, such as returning school equipment (laboratory equipment) that is lent in good condition. Students carry out academic assignments in accordance with the

provisions, such as submitting homework (PR) on time according to the deadline given by the teacher. Students are brave in expressing ideas or opinions if it is needed. Students have the courage to admit their mistakes without any element of coercion, such as breaking/breaking other people's things, students are willing to replace them without any element of coercion.

On the indicator "Care for the Environment" which is an attitude and action that is always trying to prevent damage to the surrounding natural environment and develop efforts to repair the natural damage that has occurred. In this indicator the results obtained by students are 79.30% which are included in the "Very High" category. These results indicate that students are able to maintain the cleanliness and sustainability of the school environment, such as disposing of trash in its place and reprimanding friends for littering. Students are already able to maintain the classroom environment such as not throwing used food waste in desk drawers. Students are able to separate the types of inorganic and organic waste, the waste is put in the trash that has been provided. Students want to form a clean love for the environment program such as inviting class mates to do mutual cooperation or carry out picket duties to clean class yards according to a predetermined schedule. Apart from cleaning the school area, students will also take part in activities to clean up the beach area from plastic waste.

Based on the results obtained from these indicators, it shows that the connectivity ability of biology students at SMA Negeri 12 Padang is in a very high category. This indicates that the interaction of students with other people around them can be said to be good, and indicates that the interpersonal skills or soft skills possessed by students are said to be good and very high. So that students are considered capable of competing with other Human Resources (HR) and are able to face challenges in the times and be able to compete in the job market in the future. Students are also able to be able to connect with anyone related to the problems being faced by students, and are always connected to the world around them with qualified personal.

2. Citizenship

Citizenship is a skill that refers to the ability of students to relate to everything that surrounds them, to know and appreciate their homeland, the values held by the community, and their history as a society. We can see citizenship abilities in students from the way students love and care for the country and the environment where they were born. In the

opinion of Anugerahwati (2019), that citizenship abilities can be seen from the way they love and appreciate everything that is around them, the values of society, culture and the natural environment.

Currently we live in Indonesia which is a country rich in diversity of endemic flora, fauna and their ecosystems. As stated by Kusmana & Hikmat (2015), that Indonesia is known as a mega-biodiversity country because it has a very large wealth of flora, fauna, ecosystems and microorganisms because Indonesia is a tropical country. The wealth that exists in Indonesia certainly makes it easier for us to get threats from other countries that want to take advantage of Indonesia's natural wealth, therefore as citizens who love and respect our country of birth it is fitting to protect and maintain the wealth that exists in Indonesia by having an attitude nationalism. As according to Subkhi et al. (2021) to maintain the diversity that exists in Indonesia, students must be equipped with an attitude of nationalism.

The ability of citizenship in this study can be seen from the attitude of nationalism of students to love and protect their country of birth and protect their country from threats from other countries. Poured out in several indicators of nationalism, namely, love for the Indonesian homeland, appreciating the services of heroes who saved Indonesia from colonialism, willing to sacrifice for the sake of protecting and protecting Indonesia, always prioritizing the unity of the Indonesian nation, having a reforming spirit and having an unyielding attitude, having attitude of tolerance between people.

Based on the results of distributing research questionnaires that have been conducted, it was found that students in class XI-IPA at SMA Negeri 12 Padang have a very high citizenship ability with a percentage of 79.70% on each indicator given. On the indicator "Love the Motherland" which is a way of thinking, behaving, acting that shows loyalty, caring, and high appreciation for the nation's language, environment, social, culture, economy and politics. In this indicator the results obtained by students were 79.83% in the "Very High" category.

These results show that students love their homeland by proudly using domestic products such as eating local agricultural and livestock products and using industrial products made in Indonesia. Students are also proud to use good Indonesian by speaking Indonesian to other people and rarely using slang to other people and speaking kindly and politely with older people.

On the indicator "Appreciating the Services of Heroes" which is the attitude of emulating heroes such as being willing to sacrifice and willing to apologize and forgive. In this indicator the results obtained by students were 79.49% in the "Very High" category. These results show that the form of students appreciating the services of heroes is by studying hard as the day before the lesson begins, students read and make a summary of the subject matter that will be taught by the teacher. In addition, students also maintain and care for the results of the development that is around them, both public facilities and private facilities such as never damaging the facilities provided by the school on purpose, and never destroying public facilities that have been provided by the government and are detrimental to others. .

On the indicator "Willing to Sacrifice" which is a way to maintain, maintain and develop the progress and glory of the nation. In this indicator the results obtained by students were 82.43% in the "Very High" category. These results show that the form of students is willing to sacrifice, namely by participating in state activities such as carrying out a flag ceremony to commemorate Indonesian independence on August 17 which is held on school holidays and students celebrate Indonesian independence free from colonialism . Students also do mutual cooperation to clean up the surrounding environment on Sundays. In addition, students also have a passion for defending the country, such as feeling angry and annoyed when other countries claim that the food, objects and dances that are characteristic of Indonesia are their culture. Students also choose to use products from Indonesia rather than using products from other countries. As well as students feel proud when the Indonesian independence anthem is sung during the flag ceremony which is held every Monday and at certain moments, one of which is if Indonesia wins an international event.

On the indicator "Prioritizing Unity" which is a way to establish close cooperation with ethnic groups in working together and togetherness. In this indicator the results obtained by students were 82.85% in the "Very High" category. These results show that students are able to respect differences of opinion such as when someone is giving their opinion we do not denounce the opinion and when carrying out discussion activities in groups students are able to respect the opinions of other friends even though these opinions are different. Students are also able to foster a sense of tolerance between tribes, religions and ethnicities by not discriminating against friends of different religions, skin colors and cultures.

In the indicator "Renewal Spirit and Never Give Up" which is awareness in the state which is determined by the mental quality of human resources. In this indicator the results obtained by students are 71.39% in the "High" category. These results show that students have been able to preserve natural ecosystems such as participating in the action of a thousand trees to reforest an already deforested forest and have been able to preserve the nation's culture not to litter.

On the indicator "Having an Attitude of Consideration" which is a way of appreciating and respecting the feelings of other people so you don't feel offended. In this indicator the results obtained by students are 75.60% in the "Very High" category. These results indicate that students are able to respect the rights of others, such as not disturbing friends when they are focused on learning. As well as the willingness of students to help friends who experience misfortune by donating as much as they can to friends affected by the disaster and visiting friends who are sick.

Based on the results obtained from these indicators, it shows that citizenship skills in biology students at SMA Negeri 12 Padang are in a very high category. This indicates that students are able to love and appreciate everything around them, including humans and also the environment (natural, social and cultural), especially in the place where they were born and raised. With this ability, students are expected to have interpersonal skills or soft skills that will support the needs of the job market and help students to be able to face challenges in the future.

CONCLUSION

Based on the research that has been done, it can be concluded that the ability of connectivity and citizenship in biology students at SMA Negeri 12 Padang with the percentage of students' answers related to the variable ability of connectivity is 81.62% which is included in the very high category. As well as the percentage of student answers related to the citizenship ability variable is 79.70% which is included in the very high category. From the results of this study it can be seen that students are able to compete and face the demands of work in the future and are able to keep abreast of world developments.

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