AFRICA ELECTRONIC SPORT ASSOCIATION

Esports and Gaming in South Africa

February 2020

# TABLE OF CONTENTS

# TABLE OF FIGURES

# INTRODUCTION TO AESA

AESA is an international organization headquartered in South Africa. It was established to promote the development and adoption of Electronic Sports (Esports) in Africa.

# SOUTH AFRICAN EDUCATION CHALLENGES

At present, there is a massive disconnect between the current educational system components [early childhood development, primary, secondary and tertiary education], as well as between the education system as a whole and the labour market. This disconnect is primarily caused by:

1. Poor curricula implementation
2. Weak educator skills
3. Lack of school performance monitoring and accountability within DBE
4. Inadequate educational resourcing
    a. Infrastructure
    b. Educational equipment and learning materials
    c. Educator vacancies [35%] [1]

FIGURE 1:PROBLEMS EXPERIENCED IN SOUTH AFRICAN SCHOOLS [2]

[1] (Department of Basic Education, 2018)
[2] (South African Market Insights, 2019)

| Problems experienced in public school | Province (Per cent) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | WC | EC | NC | FS | KZN | NW | GP | MP | LP | SA |
| Lack of books | 3,2 | 1,8 | 2,1 | 3,0 | 3,7 | 2,3 | 2,9 | 4,1 | 1,4 | **2,8** |
| Classes too large | 6,7 | 1,2 | 1,2 | 1,8 | 3,1 | 5,6 | 3,6 | 4,3 | 2,2 | **3,3** |
| Fees too high | 5,5 | 2,2 | 1,2 | 1,9 | 1,7 | 2,4 | 4,5 | 2,4 | 0,5 | **2,6** |
| Facilities bad | 3,8 | 1,6 | 1,0 | 2,4 | 1,9 | 2,8 | 2,1 | 2,5 | 0,9 | **2,1** |
| Lack of teachers | 3,2 | 3,5 | 1,4 | 0,6 | 0,8 | 1,5 | 1,5 | 1,1 | 0,5 | **1,6** |
| Teachers absenteeism | 2,2 | 0,7 | 1,3 | 0,6 | 0,6 | 1,7 | 2,3 | 0,5 | 0,7 | **1,2** |
| Poor quality of teaching | 2,8 | 0,4 | 1,2 | 0,5 | 0,9 | 1,2 | 1,9 | 1,6 | 0,6 | **1,2** |
| Teachers striking | 1,9 | 0,1 | 0,5 | 0,3 | 0,5 | 0,9 | 1,2 | 0,5 | 0,4 | **0,7** |

The results are:

1. Early childhood development level children are inadequately prepared for Grade R
2. Primary school children are inadequately prepared for secondary school
3. Secondary school learners are inadequately prepared for tertiary education
4. School leavers are inadequately prepared to enter the labour market

With regards to the quality of education,

"In November [2016] the latest Trends in International Mathematics and Science Study (TIMSS), a quadrennial test sat by 580,000 pupils in 57 countries, had South Africa at or near the bottom of its various rankings …. 27 percent of pupils who have attended school for six years cannot read, compared with four percent in Tanzania, and 19 percent in Zimbabwe. After five years of school about half cannot work out that 24 divided by three is eight. Only 37 percent of children starting school go on to pass the matriculation exam; just four percent earn a degree." ( (World Education News and Reviews, 2017)

It is crucial that the education system is aligned with the needs of the labour market. This is currently not the case. South Africa is currently a labour force exporter, which is defined as:

"The most active part of the population is trying to compensate for historically underdeveloped public educational systems and the high cost of paid education through self-education and self-training. However, the inefficient labor market and disparities in

employment opportunities eventually force people to emigrate and look for work abroad." (Boston Consulting Group , 2019)

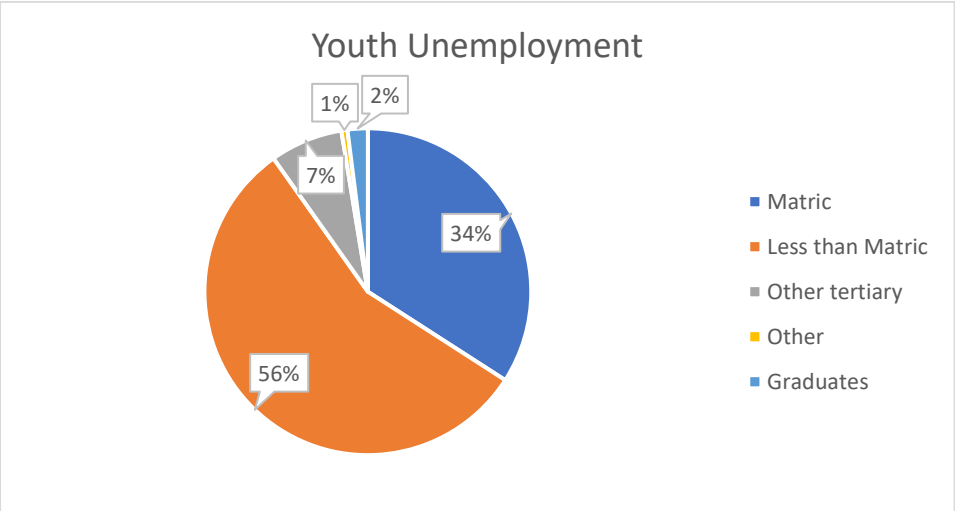
South Africa has an education skills and labour demand mismatch of over 50%, and very low levels of productivity. [3] In addition, the South African labour market is not growing at the required rate to create jobs for new entrants:

"...although employment increased by 70.2% between 1995 and 2017, employment would have had to grow by 124.6% to ensure that all new entrants into the labour market (by the broad definition) were able to find employment. Moreover, absorption rate indicates that by the broad definition, the economy was only able to generate 56 jobs for every 100 economically active individuals that entered the labour market between 1995 and 2017." (Department of Higher Education and Training, 2019)

Furthermore, the impact of the fourth industrial revolution will hit the South African economy very hard as low skilled jobs in manufacturing and mining become automated and more jobs require higher levels of technological and digital literacy. Historically, manufacturing and mining have been the sectors most likely to absorb low skilled workers. [4]

FIGURE 2:YOUTH UNEMPLOYMENT BY EDUCATION LEVEL[5]

[3] (Boston Consulting Group , 2019)
[4] (Harvey, 2017)
[5] (Statistics South Africa, 2019)




This paper explores the possibility of using gaming and esports to improve educational outcomes and access to the labour market for children and youth.

## WHAT IS ESPORTS

Esports gained significant momentum through the availability of broadband network connectivity, which allowed multiple players to join a game from different locations and gaming consoles. [6]

Computer games have evolved to the point of allowing large numbers of people from different locations to play a game together in online worlds. In addition, watching other people play games on YouTube or gaming streaming services has also developed into a popular active. An estimated 500 million people watched on online game in 2019. [7]

### Definition of Esports

[6] (Clarity Innovations, Inc., 2019)
[7] (Clarity Innovations, Inc., 2019)

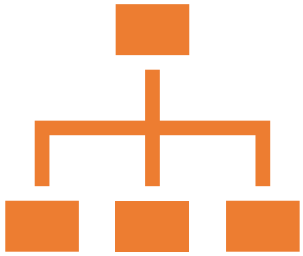
Esports refers to multiplayer teams playing against one another in an online competitive context. [8] Tournaments and online gaming competitions are often organised by the game developers. Recently, there has been an increase in formal esports organisations running their own tournaments and competitions. [9] Because of the increasing global interest in online gaming and esports, the esports sector is becoming more organised and structured

## The Esports Ecosystem

The esports ecosystem is becoming increasingly complex and layered. In addition to the players and game developers, there are also coaches, event managers, Information Technology (IT) support, content creators of fan art, merchandise, videos and other media, esports journalists, shoutcasters (person who narrates the action in the esport tournament for the audience), streaming service providers, game analysists and theorists.

[8] (Clarity Innovations, Inc., 2019)
[9] (Clarity Innovations, Inc., 2019)

FIGURE 3: ESPORTS AND GAMING ECOSYSTEM [10]

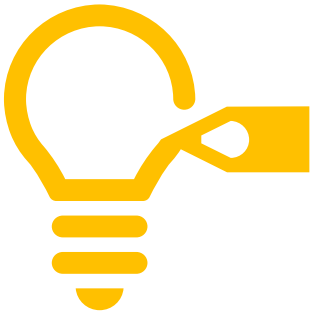


**Organisers**

- General managers
- Event organisers
- IT support

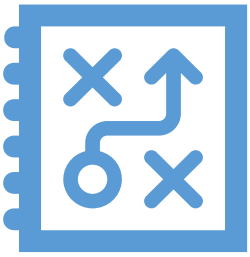
**Content Creators**

- Software developers
- Shoutcasters
- Fandom art and media
- Streamers
- Journalists



**Entrepreneurs**

- Web developers
- Business developers
- Marketing
- Corporate sponsorhsip



**Strategists**

- Coaches
- Theory crafters
- Analysts

## Gaming Platforms and Devices

The most common gaming devices are Personal Computer (PC), Nintendo and PlayStation.[11] Games can also be played on mobile devices, iPads and Android tablets. However, these

[10] (Clarity Innovations, Inc., 2019)
[11] (Clarity Innovations, Inc., 2019)

devices have limited capabilities when it comes to playing games requiring high-resolution graphics, complex action commands and playing online with multiple people. Esports are generally played on PC, and Nintendo and PlayStation consoles, which have higher gaming capabilities.

## Types of Games

There are five main categories of games.

FIGURE 4: FIVE MAIN CATEGORIES OF GAMES [12]


## Types of Players

There are two main categories of players: a professional esports player and a casual gamer or player. A professional esports player tends to be more serious about his / her game performance, and often considers it a job. S/he does not play for relaxation or enjoyment, but

[12] (Clarity Innovations, Inc., 2019)

in order to win tournament and competitions, usually for monetary gain. A casual gamer or player plays primarily for fun, entertainment and relaxation. [13]

It is important to note that the motivations of esports players and casual gamers differ. For the latter, gaming has become an occupation or career and a means of generating an income, rather than a hobby. [14]

## Motivations of Players

Different players have different motivations, or different combinations of motivations. Below is a list of the more common motivations for playing online games:

1. Arousal
2. Challenge
3. Competition
4. Distraction
5. Fantasy
6. Social interaction
7. Skills advancement
8. Escapism
9. Recreation. [15]

Esports audiences have different motivations. They are not individually involved in the game being viewed, but they derive specific benefits or rewards from viewing the game. These benefits or rewards include:

1. Opportunities to acquire new skills through observation

[13] Ma et al cited in (Bányai, Griffiths, Király, & Demetrovics, 2019)
[14] Griffiths cited in (Bányai, Griffiths, Király, & Demetrovics, 2019)
[15] (Bányai, Griffiths, Király, & Demetrovics, 2019)

2. Enjoyment of the game mechanics and aesthetics
3. Entertainment and satisfaction derived from supporting a specific team or playing
4. Entertainment derived from watching players' behaviour, typically regarding winning and loosing
5. Opportunities to socialise with other people who share similar interests
6. Escapism. [16]

## Genres of Games

The most popular games genre are as follows:

FIGURE 5: POPULAR GAME GENRES [17]

[16] (Bányai, Griffiths, Király, & Demetrovics, 2019)
[17] Adapted from (Besombes, 2019) and (Vince, 2018)


# EXTENT OF ESPORTS AND GAMING SECTOR WORLDWIDE

## Sector Information

In 2019, the esports industry generated $1.1 billion in 2019, which represented a year-on-year growth of +26.7%. [18] The highest grossing esports revenue stream for 2019 was sponsorship,

[18] (Pannekeet, 2019)

which generated $456.7 million. [19] The esports sector is estimated to reach an annual revenue of $1.8 billion by 2022.

The international audience of esports was forecasted to reach 453.8 million viewers worldwide in 2019, with at least 201.2 million viewers being regular audience participants. [20] North America is the largest Esports market, followed by China and Western Europe. [21]

## Extent of Esports and Gaming in South Africa

Just over half the South African population (54%) has access to the internet and 31.18 million are active internet users, with 65% using the internet daily. 24% have access to a laptop or computer, 60% have access to a smartphone and 12% to a tablet device. 22% of internet users play live streamed games, while 19% watch others play via live streaming services. 11% watch esports tournaments [22]

In the Global Kids Online study (2016), 70.4% of the children interviewed (913) used the internet. When disaggregated by age:

- 39.3% of children aged 9 to 11 years accessed the internet
- 76.1% of children 12 to 14 years access the internet
- 94.2% of children aged 15 to 17 years accessed the internet. [23]

Boys and girls have very similar levels of internet access:

- Boys 71.5%
- Girls 69.5% [24]

[19] (Pannekeet, 2019)
[20] (Pannekeet, 2019)
[21] (Pannekeet, 2019)
[22] (Kemp, 2019)
[23] (Phyfer, Burton, & Leoschut, 2016)
[24] (Phyfer, Burton, & Leoschut, 2016)

92.4% of children use prepaid data when accessing the internet. 25 49.9% of children stated they played online games alone, while 23.1% played online games with other people. 26 While there is a great deal of room for growth regarding access and penetration, these figures indicate that there is a solid foundation in place on which to build esports and gaming.

## BENEFITS OF GAMING FOR CHILD DEVELOPMENT

There are a range of benefits that emerge from gaming and esports. These include increased digital and technological skills, enhanced creativity, socialisations, improved cognitive functioning and inclusivity.

### Digital Literacy

Esports and gaming provide an appealing and interactive way to acquire fundamental digital literacy and technological skills. Gaming provides one with an opportunity to interact and learn about common digital devices, hardware and software. Of particular importance is dexterity in interacting with controls such as computer mice, control consoles, onscreen and external keyboards and interactive screens and screen navigation.

Gaming also requires one to be able to complete basic technological troubleshooting regarding internet and network connections, and software and hardware upgrades. Gaming also provides critical opportunities to engage in learner-directed discovery and inquiry regarding the games themselves, as well as with gaming peripherals and equipment. [27]

### Social and Emotional

The most obvious benefit from gaming and esports is entertainment. The value of entertainment should not be discounted as it is an important part of emotional and mental

[25] (Phyfer, Burton, & Leoschut, 2016)
[26] (Phyfer, Burton, & Leoschut, 2016)
[27] (Groff, 2013)

wellbeing. Engaging in fun and rewarding activities decreases stress and anxiety, reduces the risk of depression, and increases overall quality of life. [28] However, it is important to remember that there needs to be a heathy balance and that once time invested in entertainment reaches a certain tipping point, there are diminishing returns. [29]

Gaming provides valuable and accessible opportunities to socialise with likeminded people with ease. Interacting with people who share similar interests is beneficial to emotional and mental wellbeing. Esports and team-based gaming provide opportunities for meeting new people, working together towards a shared goal, collaborative problem-solving and goal attainment. [30]

> "In these virtual social communities, decisions need to be made on the fly about whom to trust, whom to reject, and how to most effectively lead a group. "[31]

Some research indicates that gamers have higher rates of social and civic engagement, including volunteering, donating and civic activities. However, further research is needed to unpack the correlations, as it is not clear if civically and socially-active people are more likely to be gamers, or if gamers are more likely to be civically and socially active. [32]

Gaming also enhances the development of adaptive regulation strategies, which involve acceptance, problem-solving and reappraisal. Research shows a strong link between adaptive regulation strategies and lower negative affect, increased social support, and lower levels of depressive symptoms. [33]

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[28] (Granic , Lobel, & Engels, 2014)
[29] (Innocenti, 2017)
[30] (Granic , Lobel, & Engels, 2014)
[31] (Granic , Lobel, & Engels, 2014)
[32] (Granic , Lobel, & Engels, 2014)
[33] (Granic , Lobel, & Engels, 2014)

## Inclusivity

Online gaming and esports has the potential to be far more inclusive than traditional sports. Categories such as male / female, able / disabled and grouping people by age, sex, height and weight are redundant in gaming. Any player can play against another player. Gaming devices and controls have been adapted to cater for people with physical limitations, putting the player on an equal level with an abled player.

The globally dispersed nature of esports allows people based in different countries to easily form a single team and work together towards achieving a goal in a way that is not easily replicated offline.

## Cognitive Development

Research suggest that playing digital games has a positive effect on the development of visual sensory processing, higher cognitive skills and selective visual attention. [34] Improved spatial skills have been noted amongst players of shooter-type games. Spatial skills are associated with higher achievement in science, technology, engineering and mathematics. [35] Playing digital games has also been found to be associated with improvements in neural processing and efficiency. [36]

These improvements in cognitive functioning are a result of the gaming environment where attention must be paid to constant unpredictable changes, and decision need to be made in

[34] Green et al cited in (Anderson, et al., 2017)
[35] (Granic , Lobel, & Engels, 2014)
[36] (Granic , Lobel, & Engels, 2014)

split seconds. [37] Playing digital games enhances the development of a "…a persistent, optimistic motivational style." [38]

It is important to note that not all digital games have the same cognitive effects on players. Puzzle games do not have the same effect on spatial skills as shooter games, and fighting games have shown little impact on cognitive development. However, available research indicates that playing any video game results in enhanced creativity. [39] Further research is required to unpack which games have what effect on which types of players.

## Education

Gaming and esports are associated with improved educational outcomes, depending on the nature of the game and the manner in which is it played. Not all games have the same educational benefits.

A study on using Minecraft to improve educational outcomes found that the study participants had:

1. Increased overall motivation toward school
2. Better communication and information technology skills
3. Increased creativity
4. Increased feelings of academic self-efficacy
5. Creation of a positive learning environment
6. Improved reading skills
7. Improved writing skills
8. Development of autonomy
9. Increased collaboration between students (many students chose to work in groups)

[37] (Granic , Lobel, & Engels, 2014)
[38] (Granic , Lobel, & Engels, 2014)
[39] (Granic , Lobel, & Engels, 2014)

10. Students developed a propensity to help each other troubleshoot gameplay issues.
11. Improved computer programming and computational logic skills
12. Improved problem-solving skills
13. Improved informational research competencies
14. Development of various math-related skills (perimeter, volume, calculation, required resources, counting)
15. Better understanding of scientific concepts (e.g., students had to identify certain elements in order to start a fire, or they had to understand basic agricultural concepts to accomplish certain tasks.)
16. Increased perseverance in the face of adversity (students met several challenges throughout gameplay, in addition to repeating certain tasks to improve their productions.)
17. Better understanding of history (especially when recreating historically accurate structures and sites)
18. Improved ability to follow directions
19. Greater self-esteem at school
20. Improved oral communication skills
21. Improved ability to generate high-quality products
22. Improved social skills
23. Improved organizational skills
24. Better inductive and deductive reasoning.[40]

Technology, and in particular, gaming, can play a crucial role in increasing learner engagement and facilitating a more adaptive and inclusive learning process for different types of learners. The manner in which learning takes place in digital games is also very important: "Instead of learning through explicit linear instruction (e.g., by reading a manual first), many children and

[40] (Karsenti, Bugmann, & Gros, 2017)

youth problem-solve through trial and error, recursively collecting evidence which they test through experimentation." [41]

School that are using game-based learning to enhance the curricula report:

1. Increased learner-driven learning and inquiry, which leads to longer-lasting learning and higher performance. Learner-driven inquiry is also the primary means of acquiring critical 21st Century skills such as collaborative engagement and critical problem-solving.
2. Increased learner engagement
3. Increased learner confidence
4. Increased learner motivation
5. Increased connections within the curricula (for example, between the maths, language and technology curricular)
6. Improved learner collaboration and interactivity
7. The personalisation of learning through highly adaptive systems and software
8. Decrease in school violence and disruptive behaviour
9. Improved learner writing, particularly amongst boys. [42]

According to Groff, "[w]hen properly integrated and strategically tied together, technology time and again shows to be a meaningful and powerful way to engage and motivate students in the learning process, as well as a means of catalysing strategic change in pedagogy and practice." [43]

## Esports and Skills Development

[41] (Granic , Lobel, & Engels, 2014)
[42] (Groff, 2013)
[43] (Groff, 2013). Insert author's own

Skill competencies in esports differs from the skills competencies required by traditional sports. There is a greater emphasis on mental and psychological preparedness and adaptability, as well as on soft skills, such as communication, leadership, conflict management, creativity and flexibility.

Esports have the potential to be an excellent platform to develop and enhance valuable skills required for the 21st century workplace. In particular, esports and gaming provide a unique way to combine the learning and development of cognitive, strategic and mimetic skills. [44]

These include:

1. The interactive nature of esports provides a structure for the development and maintained of social groups sharing a common set of objectives, either in the form of playing as a team, or in the form of belonging to the esports community and engaging in tasks together. [45]
2. Success in esports requires effective teamwork and group management, and working on group formation, management and growth. [46]
3. Esports provides a risk-free environment which facilitates exploration, experimentation, and mistake-based learning through curiosity, discovery learning and perseverance. The esports environment also provides instant feedback on the success of failure of actions and strategies, facilitating fast-paced learning. [47]
4. Esports also facilitates non-linear experiential learning through replay and replayability. A player can play a scene again using different strategies and assess the outcomes. Replay allows the player to view their actions and identify areas for correction and improvement. [48]

[44] (van Hilvoorde & Pot, 2016)
[45] (Lisk, Kaplancali, & Riggio, 2012)
[46] (Lisk, Kaplancali, & Riggio, 2012)
[47] Kirriemuir cited in (Lisk, Kaplancali, & Riggio, 2012)
[48] Benson cited in (Lisk, Kaplancali, & Riggio, 2012)

5. Games are extremely adaptive and suit any type of learning style. [49]

Below is list of the common esports and gaming skills competencies.

FIGURE 6: ESPORTS SKILLS COMPETENCIES [50]

| Activity | Description of Activity |
|---|---|
| PHYSICAL CONDITIONING | Rest, relaxation, and balanced state of mind. |
| TECHNICAL PREPARATION | Fast reaction time aids decision-making and deductive reasoning. |
| TACTICAL PREPARATION | Mastering nuances of the games for strategy purposes |
| GOALS | The players should be cognizant of the goals. |
| VALUES | The team establishes a set of values. |
| MOTIVATION | What drives the team? |
| SENSING/CONCENTRATION | The team is aware of what causes loss of concentration and intervenes where needed. |
| EMOTIONS | Improving on team member reactions to certain situations. |
| THOUGHTS | Maintain control of our thoughts and not allowing them to hinder our progress. |
| KNOWING THE SELF | Balancing the ego, allowing self-awareness. |
| COMMUNICATION | Students develop communication skills by participating in esports because of the dependent nature of team members to achieve certain tasks within the game |
| TEAMWORK | Esports games have goals and objectives which can only be achieved by the team. |
| PRESSURE PROBLEM-SOLVING | Because of the competitive nature of the game, team members must make quick decisions and plan strategies |

# RISKS OF GAMING

## The Link Between Violence and Violent Video Games

The relationship between violence and violent video games and other media has been the subject of much discussion, particularly as there has been contradictory evidence produced.

According to Anderson et al, (2017),"… the vast majority of media effects scholars, pediatricians, and all major scientific panel reports agree: evidence supporting theoretically

[49] (Lisk, Kaplancali, & Riggio, 2012)
[50] (Rothwell & Shaffer, 2019)

well-founded hypotheses linking violent media to aggressive and violent behavior is considerably more voluminous and convincing than the rare contradictory finding." [51]

The primary reasons why there has been contradictory research evidence has mostly attributed to differences in the definition of violence and aggression, studies focusing only on acts of violence and aggression and not including violent ideation and arousal, and the inclusion or exclusion of certain covariates in the data analysis.

However, there have been recent metadata analyses focusing on these points of difference, and the conclusion is that there is a link between violence and violent media, including video games. The relationship between media violence and increased aggressive behaviour has been studied and affirmed by the following organisations:

1. American Academy of Paediatrics
2. The American Academy of Child and Adolescent Psychiatry
3. The American Medical Association
4. The American Psychiatric Association
5. The American Psychological Association
6. The US Surgeon General
7. The Society for the Psychological Study of Social Issues
8. The International Society for Research on Aggression. [52]

According to Anderson et al, (2017):

"… comprehensive meta-analysis found that exposure to violent video games increases aggressive thoughts, angry feelings, physiologic arousal, hostile appraisals, and aggressive behavior and decreases prosocial behavior (e.g., helping others) and empathy. A recent meta-

[51] (Anderson, et al., 2017)
[52] (Anderson, et al., 2017) and (American Psychological Association, 2015)

analysis also revealed that exposure to violent media increases hostile appraisals (i.e., judgments of the hostile actions or intentions of others)." [53]

According to the recent paper by Prescott, Sargent, & Hull (2018) which focused specifically on the areas of discrepancy, they concluded that:

"… playing violent video games is associated with greater levels of overt physical aggression over time, after accounting for prior aggression. These findings support the general claim that violent video game play is associated with increases in physical aggression over time.

Furthermore, the results speak to three specific criticisms of this literature by demonstrating: (i) that violent video game play is associated with increases in measures of serious aggressive behavior (i.e., overt, physical aggression), (ii) that estimates of this effect are only slightly decreased by inclusion of statistical covariates, and (iii) by finding no evidence of publication bias. "[54]

According to Prescott et al, the results of their research presents a significant and serious challenge to the argument that there is no relationship between violence and violent video games.

"…the results of our metaanalysis pose serious challenges to several major criticisms of the literature linking VGV [video game violence] and physical aggression, and they offer a simple explanation for the inconsistent findings by researchers on opposing sides of the debate. We hope these findings will assist the field in moving past the question of whether violent video games increase aggressive behavior, and toward questions regarding why, when, and for whom they have such effects. " [55]

[53] (Anderson, et al., 2017)
[54] (Prescott, Sargent, & Hull, 2018)
[55] (Prescott, Sargent, & Hull, 2018). Insert author's own

However, the situation is far more complex than `video games cause violence`. There is no single risk factor that causes violence. Violence is the result of a cumulative effect of a variety of risk factors, counterbalanced by a variety of protective factors; the combination of which varies from individual to individual. [56]

FIGURE 7: PATHWAYS TO AGGRESSION [57]


Violence video games can increase aggressive behaviour by increasing aggressive thoughts and ideas, angry feelings and creating physiological arousal or stress. [58]

FIGURE 8: RISK FACTORS FOR VIOLENCE [59]

| | INDIVIDUAL | FAMILY | COMMUNITY & SOCIETY |
|---|---|---|---|
| RISK FACTORS | • Attention deficit, hyperactivity<br>• Conduct disorder<br>• Sex (being male)<br>• Genetic factors<br>• Low intelligence,<br>• Involvement in crime and violence<br>• Low academic performance | • Poor parental supervision<br>• Harsh and inconsistent parental discipline<br>• Divorce<br>• Teenage pregnancy<br>• Parental depression<br>• Family history of anti-social behaviour<br>• Unemployment | • Access to alcohol and illegal substances<br>• Access to weapons poverty<br>• Inequality<br>• Community disorganisation<br>• Pro-criminal values attitudes and beliefs |

[56] (Anderson, et al., 2017)
[57] (Anderson, et al., 2017)
[58] (Anderson, et al., 2017)
[59] (World Health Organization, 2015), (Brodowski, & Fischman, 2013), (Maree, 2008), (Domurad & Carey, 2010) and (National Crime Prevention Centre, 2008), and (David-Ferdon & Simon, 2014)

| | INDIVIDUAL | FAMILY | COMMUNITY & SOCIETY |
|---|---|---|---|
| | • Poor work performance<br>• Substance use and abuse<br>• Hazardous alcohol consumption<br>• Victim of child abuse or neglect<br>• Poor values, attitudes and beliefs<br>• Mental health, lack of employment stability<br>• Lack of pro-social leisure activities | • Use of alcohol during pregnancy by mother<br>• Gang membership<br>• Socio-economic status of family<br>• Absent parents<br>• Family violence<br>• Parental and sibling criminality<br>• Family mental health<br>• Unstable family income<br>• Substance abuse in the home | • Prevalence of community violence<br>• Dysfunctional schools<br>• School violence<br>• High crime rate in neighbourhood<br>• Delinquent or asocial peers |

As is evident from the above table, violence is caused by a complex combination of risk factors, which vary from individual to individual. Furthermore, the risk of violence can be mitigated by the presence of various protective factors.

FIGURE 9: PROTECTIVE FACTORS FOR VIOLENCE [60]

| | INDIVIDUAL | FAMILY | COMMUNITY & SOCIETY |
|---|---|---|---|
| PROTECTIVE FACTORS | • Strong problem-solving skills,<br>• Strong anger management skills,<br>• Good communication skills,<br>• Good risk management skills,<br>• High levels of contact with pro-social peers, | • Positive relationship between family members<br>• High levels of caregiver supervision and involvement<br>• Consistent fair and appropriate discipline methods<br>• Prosocial caregiver values attitudes and beliefs | • Families involved in community life strong bonds or relationships with neighbours<br>• Prosocial activities available in the community<br>• Participation in prosocial activities cultural factors such as loyalty |

[60] (World Health Organization, 2015), (Brodowski, & Fischman, 2013), (Maree, 2008), (Domurad & Carey, 2010) and (National Crime Prevention Centre, 2008), and (David-Ferdon & Simon, 2014)

| | INDIVIDUAL | FAMILY | COMMUNITY & SOCIETY |
|---|---|---|---|
| | • Good conflict management skills,<br>• Good academic and work performance,<br>• Increased vocational skills,<br>• Strong stress management and coping skills,<br>• Participation in prosocial activities,<br>• Temperament,<br>• Intelligence,<br>• Competence,<br>• Self-efficacy,<br>• Self-mastery, personal agency, and coping strategies,<br>• Development of a desirable personal identity,<br>• Experiences of power and control<br>• Experiences of social justice,<br>• Social cohesion with others,<br>• Adherence to cultural traditions | • High value placed on education in the family<br>• Financial stability<br>• Family dynamics stability<br>• Caregivers actively involved in schools participation in prosocial activities<br>• High levels of family cohesion loyalty communication<br>• Extended kin networks<br>• Mutual support access to food clothing and shelter<br>• Access to supportive relationships | • Importance of personal relationships<br>• Strong support networks<br>• Involvement in school church and community activities<br>• Elements of social capital<br>• Availability of financial educational medical and employment assistance and/or opportunities |

Research has shown that certain factors increase the likelihood of violence, and other factors reduce the likelihood of violence. Media violence has been identified as one of the common factors increasing the likelihood of violent behaviour in an individual. Other factors need to be present as well. Media violence is also one of the risk factors amenable to change, which makes it an important subject of discussion.

Gaming has the potential to be either a risk or a protective factor, depending on how it is experienced and the presence of other risk and protective factors in the individual's life. Furthermore, there is enormous potential for gaming and esports to be used as protective actors against violence through the provision of the following:

1. Developing problem-solving skills
2. Providing opportunities to strengthen anger management skills
3. Providing safe opportunities to develop good communication and conflict management skills
4. Develop stress management and coping skills
5. Provision of contact with pro-social peers
6. Developing risk management skills
7. Opportunities to engage in prosocial activities
8. Developing a sense of self-mastery and agency
9. Providing opportunities for social cohesion
10. Gaining access to a supportive network of peers
11. Developing technical skills related to employability
12. Involvement in community activities

All of the above opportunities provided by esports and gaming are cited in violence prevention literature as protective factors against violence.

## Violence and Misogyny in Gaming

Concerns around misogyny and violence in gaming are valid. A lot of games make use of gender stereotypes and the instrumental use of violence to achieve the game objectives. At the same time, there are numerous games that do not make use of violent and misogynistic images, narratives, plots and characters.

There is an increasing sensitivity to gender stereotypes of misogynistic depictions of females and male/female interactions in games. The reality is that these issues are reflections of

broader social challenges we face in our society. Gaming, like any other social activity, reflects these challenges to varying degrees.

By prompting a healthy, balanced and prosocial approach to gaming and esports, we can promote gaming and esports as a prosocial, inclusive and enjoyable activity for all.

## Toxic Game Culture

Due to the fact that gaming has historically been a white male activity, many women, girls and persons of colour find the gaming community to be toxic and hostile. [61] IN addition, However, there is a concentrated movement to improve the gaming community and culture through education and awareness, as well as encouraging more women, girls and persons of colour to become active gamers. As the gaming community becomes more inclusive and diverse over time, the toxic game culture will be reduced.

Through the increasing formalisation of the gaming and esports sector and through integration of gaming and esports into the formal school curriculum, formal attention can be spent on increased gender and race sensitivity, improved communication and negotiation skills, improved anger management skills and increased rates of holding players accountable for their online actions. This will, in turn, have a positive spill-over effect into the offline interactions of the players in their offline lives.

## Mental and Health Risks

The most common health and physical risks associated with gaming and esports are eye strain, head, back and neck injuries, and wrist and hand injuries. [62] Having a structured integration of gaming and esports into school curricula provides an invaluable opportunity to inform and educate around these health risks, and teach about healthy choices and decisions, limiting

[61] (Clarity Innovations, Inc., 2019)
[62] (Clarity Innovations, Inc., 2019)

screen time, getting sufficient physical exercise, the importance of good posture, and eating well. [63]

Excessive screen time has been identified in research also associate with reduced attention spans, which in turn, is associated with negative effects on educational and academic outcomes. [64]

The way in which people use the internet has an impact on the outcomes. People who have higher social media use, with high levels of night-time use and have high levels of emotional investment ion social media are more likely to experience poor sleep, and higher levels of anxiety and depression. However, it is not clear if people with higher levels of anxiety and depression are more likely to use social media in this way, or of using social media in this way increases anxiety and depression. [65]

However, there has been little evidence to support the notion that screen time in excess of the recommended two hours per day is associated with negative behavioural outcomes, such as increased depression, behavioural problems, and interpersonal problems. [66] The evidence does suggest that the positive effects of online activities produce diminishing returns once a threshold of time has been spent. In other words, once a certain threshold has been passed, the positive effects of online activities such as entertainment, social interaction and enjoyment do not increase as screen time increases. [67]

In the past, research indicated that spending more time online resulted in poor social and interpersonal outcomes. However, recent research indicates that this is no longer the case. The manner in which people interact online has become more sophisticated and nuanced,

[63] (Clarity Innovations, Inc., 2019)
[64] (Anderson, et al., 2017)
[65] Woods and Scott cited in (Organisation for Economic Co-operation and Development, 2018)
[66] (Innocenti, 2017)
[67] (Innocenti, 2017)

resulting in changing data on the effects of online activities for social and interpersonal outcomes. People may spend less physical time with one another, but evidence suggests the quality of offline interpersonal contact has not decreased. Contextual and individual factors are more likely to impact on the quality of on and offline interpersonal interaction than screen time. [68]

Moderate internet users, who spend between one to two hours online per day, report the highest life satisfaction when compared with low or very high users.[69] Taking a balanced approach to screen time will increase the possibility of positive outcomes whilst reducing the risk of negative outcomes. Achieving positive outcomes for children is more likely to be achieved through positive family functioning, socioeconomic conditions and positive social dynamics at school than limiting children's online activities. [70]

## Child Online Protection in South Africa

The child online protection domain in South Africa is comparatively under-developed compared with countries in Northern America and Europe. There is no South African legislation that speaks directly to the protection and safeguarding of children when engaging in online activities. There is no structured collaboration and common agenda regarding online child protection between the relevant department such as the South African Police Service, the Department of Social Development, The Department of Telecommunications and Postal Services, and the Department of Basic Education.

"…while there are a number of pieces of legislation and policy that speak directly or indirectly to child online protection, there is no common consensus on a comprehensive and integrated

[68] McKenna and Bargh, and Peter et al., cited in (Anderson, et al., 2017)

[69] (Organisation for Economic Co-operation and Development, 2018)
[70] Przybylski, Parkes et al., and Ferguson cited in (Anderson, et al., 2017)

child online protection strategy that builds upon existing legislations and ensures effective implementation of programmes of action across the public sector. There is also little guidance on managing the intersection between the public and private sector regarding child online protection.

There is also an inadequate focus on digital literacy and child online protection mediation on the part of caregivers and educators. A great deal more needs to be done to in include digital literacy for caregivers and educators into existing government programmes of action focusing on family strengthening, parenting skills development, family support, education and telecommunications.

Without improved child access to effective multi-level support for mediating online risks and opportunities, children will continue to be at risk of online harm." [71]

Currently, children are protected by different pieces of legislation referring to abuse in general. This fragmented approach is currently receiving attention by UNICEF South Africa and other private and public sector stakeholders.

[71] (Jules-Macquet, 2020)

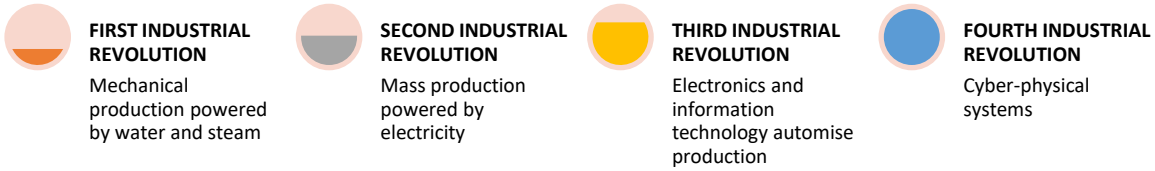
# RELEVANCE OF ESPORTS FOR THE FOURTH INDUSTRIAL REVOLUTION

## What is the Fourth Industrial Revolution?

The fourth industrial revolution (4IR) refers to the advent of people interacting with online digital systems via the Internet of Things (IoT), artificial intelligence (AI) and other forms of information technology in the following ways:

- Human – machine interaction (H-M)
- Machine - machine interaction (M-M)
- Machine – human interaction (M-H). [72]

FIGURE 10: THE FOURTH INDUSTRIAL REVOLUTION [73]




The 4IR means that many businesses and industries will move towards automation, no longer hire large numbers of people, and instead hire people with specific technological skills required to maintain the IT systems, equipment and networks. The 4IR also means that different skills sets will be required from employees that have a higher focus on areas where machines and IT cannot compete with a human. Machines will take over the tasks and functions that can be

[72] (Bloom, et al., 2014)
[73] (Bloom, et al., 2014)

automated and human employees will be retained in areas that require, amongst others, the following:

1. Communication skills
2. Collaboration skills
3. Creativity and innovation
4. Interpersonal skills

The workplace of the 4IR is referred to as the 21st Century workplace. It differs primarily from the 20th Century workplace due to extent of which the IoT, AI and machine / human interaction are used in the workplace.

## Skills and Competencies Required by the 21st Century Workplace

The table below illustrates the top ten skill competencies for 2018 versus 2022.

FIGURE 11: COMPARING SKILLS DEMAND, 2018 VS. 2022, TOP TEN [74]

| 2018 | TRENDING 2022 | DECLINING 2022 |
|---|---|---|
| • Analytical thinking and innovation<br>• Complex problem-solving<br>• Critical thinking and analysis<br>• Active learning and learning strategies<br>• Creativity, originality and initiative<br>• Attention to detail, trustworthiness<br>• Emotional intelligence | • Analytical thinking and innovation<br>• Active learning and learning strategies<br>• Creativity, originality and initiative<br>• Technology design and programming<br>• Critical thinking and analysis<br>• Complex problem-solving<br>• Leadership and social influence<br>• Emotional intelligence | • Manual dexterity, endurance and precision<br>• Memory, verbal, auditory and spatial abilities<br>• Management of financial, material resources<br>• Technology installation and maintenance<br>• Reading, writing, math and active listening<br>• Management of personnel |

[74] (World Economic Forum, 2018)

| 2018 | TRENDING 2022 | DECLINING 2022 |
|---|---|---|
| • Reasoning, problem-solving and ideation<br>• Leadership and social influence<br>• Coordination and time management | • Reasoning, problem-solving and ideation<br>• Systems analysis and evaluation | • Quality control and safety awareness<br>• Coordination and time management<br>• Visual, auditory and speech abilities<br>• Technology use, monitoring and control |

The following emerging skills have been identified as being required for the South African context:

1. Analytical thinking and innovation
2. Creativity, originality and initiative
3. Active learning and learning strategies
4. Technology design and programming
5. Complex problem-solving
6. Leadership and social influence
7. Reasoning, problem-solving and ideation
8. Critical thinking and analysis
9. Resilience, stress tolerance and flexibility
10. Emotional intelligence. [75]

## 21st Century Workplace Careers

In addition, new career opportunities will emerge that involve interaction, maintaining and repairing and developing software, machines and IT systems that enhance and maintain H-M, M-M and M-H interactions. Examples include:

[75] (World Economic Forum, 2018)

1. Product or service development
2. Cybersecurity
3. Software development and maintenance
4. Hardware development and maintenance
5. Networking and systems development and maintenance
6. Platform service providers. [76]

The 4IT will lead to occupational imbalances and skills shortages as the education system and labour market works to realign itself. This presents many opportunities for growth as well as challenges for the education and employability of young people in particular.

As companies adopt more sophisticated hardware and software, they create job opportunities in new areas.

The table below maps out the projected stable, new and redundant roles in the future.

FIGURE 12: EXAMPLES OF STABLE, NEW AND REDUNDANT ROLES, ALL INDUSTRIES [77]

| STABLE ROLES | NEW ROLES | REDUNDANT ROLES |
|---|---|---|
| • Managing Directors and Chief Executives<br>• General and Operations Managers*<br>• Software and Applications Developers and Analysts<br>• Data Analysts and Scientists<br>• Sales and Marketing Professionals | • Data Analysts and Scientists<br>• AI and Machine Learning Specialists<br>• General and Operations Managers<br>• Big Data Specialists<br>• Digital Transformation Specialists<br>• Sales and Marketing Professionals<br>• New Technology Specialists | • Data Entry Clerks<br>• Accounting, Bookkeeping and Payroll Clerks<br>• Administrative and Executive Secretaries<br>• Assembly and Factory Workers<br>• Client Information and Customer Service Workers<br>• Business Services and Administration Managers |

[76] (Bloom, et al., 2014)
[77] (World Economic Forum, 2018). Roles appearing in more than one column reflect the fact that they might be seeing stable or declining demand across one industry but be in demand in another.

| STABLE ROLES | NEW ROLES | REDUNDANT ROLES |
|---|---|---|
| • Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products<br>• Human Resources Specialists<br>• Financial and Investment Advisers<br>• Database and Network Professionals<br>• Supply Chain and Logistics Specialists<br>• Risk Management Specialists<br>• Information Security Analysts<br>• Management and Organization Analysts<br>• Electrotechnology Engineers<br>• Organizational Development Specialists<br>• Chemical Processing Plant Operators<br>• University and Higher Education Teachers<br>• Compliance Officers<br>• Energy and Petroleum Engineers<br>• Robotics Specialists and Engineers<br>• Petroleum and Natural Gas Refining Plant Operators | • Organizational Development Specialists<br>• Software and Applications Developers and Analysts<br>• Information Technology Services<br>• Process Automation Specialists<br>• Innovation Professionals<br>• Information Security Analysts*<br>• Ecommerce and Social Media Specialists<br>• User Experience and Human-Machine<br>• Interaction Designers<br>• Training and Development Specialists<br>• Robotics Specialists and Engineers<br>• People and Culture Specialists<br>• Client Information and Customer Service Workers<br>• Service and Solutions Designers<br>• Digital Marketing and Strategy Specialists | • Accountants and Auditors<br>• Material-Recording and Stock-Keeping Clerks<br>• General and Operations Managers<br>• Postal Service Clerks<br>• Financial Analysts<br>• Cashiers and Ticket Clerks<br>• Mechanics and Machinery Repairers<br>• Telemarketers<br>• Electronics and Telecommunications Installers and Repairers<br>• Bank Tellers and Related Clerks<br>• Car, Van and Motorcycle Drivers<br>• Sales and Purchasing Agents and Brokers<br>• Door-To-Door Sales Workers, News and Street Vendors, and Related Workers<br>• Statistical, Finance and Insurance Clerks<br>• Lawyers |

## South Africa and the Fourth Industrial Revolution

In South Africa, 83% of surveyed companies are looking to automate their workforce, and 56% are anticipating strategic redundancies of staff who lack the skills to use new technologies. At the same time, 88% are looking to employ new permanent staff with the required skills and expertise. [78]

The list below indicates the percentage of surveyed South African companies that are planning the adopt the following technologies in the near future:

FIGURE 13: PERCENTAGE OF SOUTH AFRICAN COMPANIES PLANNING TO ADOPT TECHNOLOGY BY PERCENTAGE [79]

| | | |
|---|---|---|
| 1. | User and entity big data analytics | 96% |
| 1. | Machine learning | 90% |
| 2. | App- and web-enabled markets | 88% |
| 3. | Cloud computing | 81% |
| 4. | Internet of things | 78% |
| 5. | Augmented and virtual reality | 76% |
| 6. | Digital trade | 68% |
| 7. | Encryption | 64% |
| 8. | New materials | 61% |
| 9. | Wearable electronics | 60% |
| 10. | 3D printing | 57% |
| 11. | Stationary robots | 54% |
| 12. | Distributed ledger (blockchain) | 54% |
| 13. | Autonomous transport | 54% |
| 14. | Quantum computing | 51% |
| 15. | Non-humanoid land robots | 49% |
| 16. | Biotechnology | 38% |

[78] (World Economic Forum, 2018)
[79] (World Economic Forum, 2018)

17. Humanoid robots 32%

18. Aerial and underwater robots 24%

The table below provides an overview of the skills shortages and surplus in South Africa.

FIGURE 14: SOUTH AFRICAN SKILLS SURPLUS AND SHORTAGE [80]

| KNOWLEDGE | ABILITIES | SKILLS |
|---|---|---|
| **SKILLS SURPLUS** | | |
| • Economics and accounting<br>• Administration and management<br>• Education and training<br>• Psychology<br>• Sociology and anthropology | • Written expression<br>• Written comprehension<br>• Deductive reasoning<br>• Inductive reasoning<br>• Oral expression | • Learning strategies<br>• Instructing<br>• Management of personnel resources<br>• Reading comprehension<br>• Monitoring |
| **SKILLS SHORTAGE** | | |
| • Building and construction<br>• Mechanical<br>• Design<br>• Transportation<br>• Sales and marketing | • Static strength<br>• Multi-limb co—ordination<br>• Control precision<br>• Reaction time<br>• Manual dexterity | • Operating and control<br>• Repairing<br>• Equipment maintenance<br>• Troubleshooting<br>• Operation monitoring |

## Esports and the 21st Century Workplace Skills

Esports and gaming have the potential to provide an accessible, inclusive and appealing way to acquire digital skills and soft skills required by the 21st workplace. According to Groff (2013),

[80] (Organisation for Economic Co-operation and Development , 2017)

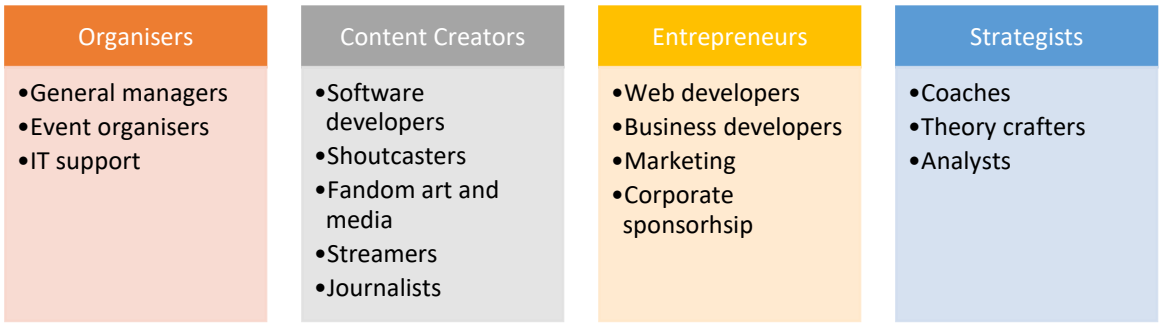
"The skills for an adult life include technological literacy, and people who do not acquire and master these competencies may suffer from a new form of the digital divide, which will impact their capacity to effectively operate and thrive in the new knowledge economy. Technology is an integral part to accessing the higher-order competencies often referred to as 21st Century Skills, which are also necessary to be productive in today's society. " [81]

Esports and gaming have a vital role to play in the 4IR, both in terms of the digital and soft skills acquired through gaming, but also though the emerging careers and income-generating opportunities provided in the esports and gaming sector.

## Careers in Esports

There are a variety of ways a person could generate an income through esports. The sector makes use as a wide range of expertise through general gaming as well as through competitive esports tournaments. Service or product consumers include esports players, sponsors and the esports audience. [82]

FIGURE 15: ESPORTS AND CAREERS [83]




[81] (Groff, 2013)
[82] (Anderson, et al., 2018)
[83] (Clarity Innovations, Inc., 2019)

## SUSTAINABLE DEVELOPMENT GOALS

The Sustainable Development Goals (SDG) were developed in September 2015 by the United Nations to replace the Millennium Development Goals. The 17 SGDs are collective goals to be attained by the year 2030. [84]

FIGURE 16: THE 17 SUSTAINABLE DEVELOPMENT GOALS

- Goal 1. End poverty in all its forms everywhere
- Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3. Ensure healthy lives and promote well-being for all at all ages
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- Goal 5. Achieve gender equality and empower all women and girls
- Goal 6. Ensure availability and sustainable management of water and sanitation for all
- Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all
- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Goal 10. Reduce inequality within and among countries
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 12. Ensure sustainable consumption and production patterns
- Goal 13. Take urgent action to combat climate change and its impacts*
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

[84] (United Nations, 2015)

- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
- Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Based on the available research, esports and gaming serving as vehicles for education and skills development, have the potential to support the achievement of the following SDGS:

FIGURE 17: ESPORTS AND THE SDGS


## STRATEGY FOR USING ICT IN EDUCATION

The Department of Basic Education has developed a policy that guides educators on using ICT for educational purposes. The guidelines list the following as key areas where educators can use ICT to support educational outcomes:

1. Learners are increasingly using their cell-phones to the concept of the 21st century learner, especially to ensure that their teaching strategy is in line with the devices their learners use.
2. Teaching and learning can be greatly enhanced with increased access to communication and information and this potential needs to be maximised by teachers.
3. Integrating technology appropriately into teaching practice is important; a 'just-in-time' approach within a contextualised learning environment versus "just-in-case" i.e. learning computer skills in case they may be needed in the future. [85]

Using gaming and esport as a in-curricular and extra-curricular activities can assist educators in improving the technological and digital literacy and skills of learners.

## CHILDREN AND ICT STRATEGY

Esports can also support the Department of Telecommunications and Postal Services' Children and ICTs Strategy, which seeks to provide a coherent approach to the empowerment of children in the ICTs sector for the Department itself and its subsidiaries. This strategy takes a rights-based approach to children's internet use and promotes internet access by vulnerable groups such as disabled children, children living in rural areas and girl children.

The key foci areas of the strategy include:

1. Policy and Regulation Impact
2. Access to Financial Service by Children
3. Child Online Protection and Victim Support
4. Cyber Bullying and Sexting
5. Promotion of Digital Citizenship
6. e-Education

[85] (Department of Basic Education, 2010)

7. Managing the Unintended Consequences of ICTs on Children
8. Digital Awareness. [86]

Gaming and esports can be a powerful tool for government and other industry stakeholders in using ICT to empower children and youth through digital and technological skills development.

## IN-CURRICULAR ACTIVITIES

One way of increasing technological and digital skills through gaming and esports is to integrate gaming into the national curriculum. While this would be a time and resource-intensive exercise, it would ensure that gaming and esports-based digital skills development was formally part of the South Africa secondary and primary curriculum.

In the current Curriculum and Assessment Policy Statement produced by the Department of Basic Education (DBE), there is no specific time allocated to computers or digital learning in any subject for grades one – nine.

From Grades 10 to 12, the following subjects are available:

1. Computer Applications Technology
2. Information Technology

However, many schools in historically disadvantaged areas will not have the educator expertise nor the equipment to offer these subjects.

[86] (Gender, Disability, Youth and Children Chief Directorate: Children Empowerment Directorate, 2014)

What is interesting is that the DBE lists 10 subjects which are regarded as gateway subjects – subjects essential for the socio-economic growth of South Africa. This list does not include any computer-related subjects.

FIGURE 18: LIST OF DEPARTMENT OF BASIC EDUCATION GATEWAY SUBJECTS

1. Accounting
2. Agricultural Science
3. Business Studies
4. Economics
5. Geography
6. History
7. Life Sciences
8. Mathematical Literacy
9. Mathematics
10. Physical Science

Because Computer Applications Technology and ICT are not considered gateway subjects, the DBE does not provide any data on the enrolment or pass rate information on these subjects in its annual Diagnostic and Subject Reports. [87]

## EXTRA-CURRICULAR ACTIVITIES

Given the challenges in integrating games and esports into the formal curricula, a better option is to offer these activities as extra-curricular activities at schools. There is a lot of evidence showing the value in accessing extra-curricular activities for educational outcomes. Participating in extra-curricular activities is associated with:

1. Improved learner motivation

[87] (Department of Basic Education, 2019)

2. Improved grades
3. Improved academic participation and performance
4. Improved self-esteem. [88]

The primary challenge would be the provision of computers and internet connectivity to schools across the country.

[88] (Rothwell & Shaffer, 2019)

## CURRICULUM OUTLINE

We suggest the following as an outline for an extra-curricular programme for primary and high school leaners, as well as for out-of-school youth.

1. Basic Digital Literacy
2. Terms And Definitions
3. Introduction To Gaming
    a. Gaming Platforms
    b. Gaming Devices
    c. Game Genres
    d. Esports, Leagues And Tournaments
    e. Benefits Of Gaming
    f. Risks Of Gaming
4. Basic Troubleshooting
    a. Cleaning
    b. Common Problems And Solutions
5. Gaming And Behaviour
    a. On And Offline Personas
    b. Decision-Making
    c. Goal Setting
    d. Anger Management
    e. Healthy Choices
    f. Bullying
    g. Leadership
    h. Teamwork
    i. Gender
    j. Toxic Play
6. Child Online Protection
    a. Safety

   b. Reporting
   c. Information And Resources
7. Health And Wellbeing:
   a. Healthy Balance
   b. Sleep
   c. Nutrition
   d. Emotional And Mental Wellness
   e. Physical Injuries
      i. Prevention / Ergonomics
      ii. Exercises
   f. Information And Resources
8. Entrepreneurship
   a. What is an entrepreneur?
   b. Entrepreneurial opportunities in gaming and exports
9. Game design
   a. The fundamentals of basic game design and strategy
10. Careers
   a. Career Overviews
   b. Guest Speaker
   c. Site Visit
   d. Job Shadow
11. Gaming (practical)
   a. Creativity games
   b. Team games
   c. Leagues
   d. Tournaments

## CONCLUSIONS

Esports and gaming have massive potential to play an innovative role in digital and technical skills development for South African learner and youth. By doing so, esports can contribute towards South Africa's achievement of the SDGs and National Development Plan in a way that is engaging, appealing to youth and creative. At the same time, additional benefits will be obtained through the social, emotional and cognitive skills enhancements that gaming ahs to offer players.

## BIBLIOGRAPHY

Adendorff, C., Lutshaba, U., & Shelver, A. (2019). *Policy Implications of the 4th Industrial Revolution for the Cultural and Creative Economy*. Port Elizabeth: South African Cultural Observatory.

American Psychological Association. (2015). *Resolution on Violent Video Games*. Retrieved February 2 2020, from https://www.apa.org: http://www.apa.org/about/policy/violent-video-games.aspx

Anderson, C., Bushman, B., Bartholow, B., Christakis, D., Coyne, S., Donnerstein, E., . . . Ybarra, M. (2017). Screen Violence and Youth Behavior. *Pediatrics, 140*(Supplement 2), S142–S147.

Anderson, C., Tsaasan, A., Reitman, J., Lee, J., Wu, M., Steel, H., . . . Steinkuehler, C. (2018). Understanding Esports as a STEM Career Ready Curriculum in the Wild. *10th International Conference on Virtual Worlds and Games for Serious Applications (VS-Games)*.

Bányai, F., Griffiths, M., Király, O., & Demetrovics, Z. (2019). The Psychology of Esports: A Systematic Literature Review. *Journal of Gambling Studies, 35*(2), 351–365.

Besombes, N. (2019, June 26). Esports & Competitive Games by Genre. *Medium.Com*. Retrieved February 1, 2020, from https://medium.com/@nicolas.besombes/esports-competitive-games-by-genre-61fcaf9c6a8f

Bloom, J., Van Doorn, M., Duivestein, S., Excoffier, D., Maas, R., & van Ommeren, E. (2014). *The Fourth Industrial Revolution: Things to Tighten the Link Between IT and OT*. Vint Sogeti.

Boston Consulting Group . (2019). *Mass Uniqueness: A global challenge for one billion workers*. Singapore: Boston Consluting Group.

Brodowski,, M., & Fischman, L. (2013). *Protective Factors for Populations Served by the Administration on Children, Youth, and Families: A Literature Review and Theoretical Framework*. Development Services Group, Inc.

Clarity Innovations, Inc. (2019). *Leagues of Learning: The Rising Tide of Esports in Education*. Portland: Intel.

Craft, S. (2012). The Impact of Extracurricular Activities on Student Achievement at the High School Level. *Dissertations, Spring* .

David-Ferdon, C., & Simon, T. (2014). *Preventing Youth Violence: Opportunities for Action*. Atlanta.

Deloitte Insights. (n.d.). *The Fourth Industrial Revolution Is Here—Are You Ready?* Deloitte Insights.

Department of Basic Education. (2010). *Guidelines On E-Safety In Schools: Educating Towards Responsible, Accountable And Ethical Use Of ICT In Education*.

Department of Basic Education. (2011). *National Curriculum Statement (NCS): Social Sciences Senior Phase Grades 7-9*. Pretoria: Department of Basic Education.

Department of Basic Education. (2018). *2018 Diagnostic Report*. Pretoria: Department of Basic Education.

Department of Basic Education. (2018). *Annual Report 2018 -2019*. Pretoria: Department of Basic Education.

Department of Basic Education. (2018). *Report on the 2019 National Senior Certificate Examination*. Pretoria: Department of Basic Education.

Department of Basic Education. (2019). *School Subject Report*. Pretoria: Department of Basic Education.

Department of Higher Education and Training. (2019). *Skills supply and demand in South Africa*. Pretoria: Department of Higher Education and Training.

Domurad, F., & Carey, M. (2010). *Implementing Evidence-Based Practices*. United States Department of Justice,. Maryland: Center for Effective Public Policy. Retrieved March 11, 2013

Gender, Disability, Youth and Children Chief Directorate: Children Empowerment Directorate. (2014). *Children's Empowerment & Information Communication Technology (ICT) Strategy*. Pretoria: Gender, Disability, Youth and Children Chief Directorate: Children Empowerment Directorate.

Granic , I., Lobel, A., & Engels, R. (2014). The Benefits Of Playing Video Games. *American Psychologist, 69*(1), 66–78.

Groff, J. (2013). *Technology-Rich Innovative Learning Environments*. Geneva: Organisation for Economic Co-operation and Development.

Harvey, R. (2017). *The 'fourth industrial revolution': potential and risks for Africa*. Pretoria: National Science Technology and Innovation Information Portal.

Innocenti. (2017). *How Does the Time Children Spend Using Digital Technology Impact their Mental Well-being, Social Relationships and Physical Activity?: An Evidence-Focused Literature Review* . Florence: Innocenti .

Jules-Macquet, R. (2020). *Literature Review on Best Practices for Campaign and Educational Messaging On Child Online Safety in South Africa. [Internal project document]*. Cape Town: UNICEF South Africa.

Karsenti, P., Bugmann, J., & Gros, P. (2017). *Transforming Education with Minecraft*. Montréal: CRIFPE.

Kemp, S. (2019). *Digital South Africa 2019:All The Data And Trends You Need To Understand Internet, Social Media, Mobile, And E-Commerce Behaviours In 2019* . New York: Hootsuite| We Are Social.

Lisk, T., Kaplancali, U., & Riggio, R. (2012). Leadership in Multiplayer Online Gaming Environment. *Simulation & Gaming, 43*(1), 133–149.

Maree, A. (2008). Criminogenic Risk Factors for Youth Offenders. In C. Bezuidenhout, & S. Joubert, *Child and Youth Misbehaviour in South Africa*. Van Schaik.

Merino-Campos, C., & Del Castillo Fernández, H. (2016). The Benefits of Active Video Games for Educational and Physical Activity Approaches: A Systematic Review. *Journal of New Approaches in Educational Research, 5*, 115–122.

National Crime Prevention Centre. (2008). *Family-Based Risk and Protective Factors and their Effects on Juvenile Delinquency: What We Know?* National Crime Prevention Centre. Retrieved Sept 10, 2013

Organisation for Economic Co-operation and Development . (2017). *Getting Skills Right: South Africa*. Geneva: Organisation for Economic Co-operation and Development .

Organisation for Economic Co-operation and Development. (2018). *Children & Young People's Mental Health in the Digital Age: Shaping the Future*. Paris: OECD.

Pannekeet, J. (2019, February 12). Global Esports Economy Will Top $1 Billion for the First Time in 2019. *Newzoo*. Amsterdam. Retrieved February 1, 2020, from https://newzoo.com/insights/articles/newzoo-global-esports-economy-will-top-1-billion-for-the-first-time-in-2019/

Phyfer, J., Burton, P., & Leoschut, L. (2016). *South African Kids Online: Barriers, Opportunities and Risks: A Glimpse into South African Chidlren's Internet Use and Online Activities*. Centre for Justice and Crime Prevention.

Prescott, A., Sargent, J., & Hull, J. (2018). Metaanalysis Of The Relationship Between Violent Video Game Play And Physical Aggression Over Time. *Proceedings of the National Academy of Sciences, 115*(40), 9882–9888.

Rothwell, G., & Shaffer, M. (2019). ESports in K-12 and Post-Secondary Schools. *Education Sciences, 9*(2).

South African Market Insights. (2019, Nov 12). *South Africa's Education statistics*. (South African Market Insights) Retrieved Jan 7, 2020, from https://www.southafricanmi.com/education-statistics.html

Statistics South Africa. (2019). *Quarterly Labour Force Survey Quarter 3: 2019*. Pretoria.

Statistics South Africa. (2019). *Work and Labour Force*. Johannesburg: StatsSA.

United Nations. (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. Geneva: United National .

United Nations. (2019). *Sustainable Development Goals*. Retrieved November 22, 2019, from https://sustainabledevelopment.un.org/sdgs

van Hilvoorde, I., & Pot, N. (2016). Embodiment And Fundamental Motor Skills In Esports. *Sport, Ethics and Philosophy, 10*(1), 14-27.

Vince. (2018, April 12). The Many Different Types of Video Games & Their Subgenres. *iD Tech*. Retrieved February 1, 2020, from https://www.idtech.com/blog/different-types-of-video-game-genres

World Economic Forum. (2018). *The Future of Jobs Report 2018*. Geneva: World Economic Forum.

World Economic Forum. (2019). *Towards a Reskilling Revolution: Industry-Led Action for the Future of Work*. Geneva: World Economic Forum.

World Education News and Reviews. (2017, May). *Education in South Africa*. Retrieved Jan 7, 2020, from World Education News and Reviews: https://wenr.wes.org/2017/05/education-south-africa

World Health Organisation. (2015). *Global Status Report on Violence Prevention 2014*. Geneva.

World Health Organization. (2015). *Preventing Youth Violence: An Overview Of The Evidence*. Geneva: World Health Organization.