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Dedication

It is our pleasure and great privilege to present the forty-third issue of the Academic Journal of Research and Scientific Publishing to all researchers and doctors who published their research in the issue, and we thank and appreciate to all contributors and supporters of the academic journal and those involved in the production of this scientific knowledge edifice.

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Parental Involvement in United States of America's Schools from the Perspective of Parents from Saudi Arabia

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Abstract

The more a teacher knows about the students in his or her classroom, the more likely he or she will be able to relate to the student and facilitate a positive learning experience. When teachers have students from foreign countries, it becomes even more important for teachers to know something about the country of the student's origin, composition of the family, the values of the family, and other relevant components of the student's culture. The purpose of the present study is to learn how parents from Saudi who have children attending schools in the United States of America perceive the school experiences of their children, and to learn how they might become involved to support the teacher and help them better understand Saudi culture. a focus group was conducted to learn more about how much involvement the parents have and what kind of barriers they face to get involved in U.S. schools. The main purpose for this study was to answer the question "What are the parental involvement strategies that can be used by Saudi parents to introduce Saudi culture into the US elementary schools?". The main goal was to know how Saudi students get more involved in American schools. A focus group was conducted with Saudi students' is weak, and they don't prefer to impose it. Also due to the religion factor associated to Saudi culture it is hard for them get involved in American school's culture. mothers who live in the US to answer this question from their perspective. Mothers agreed that the involvement of Saudi culture in American school

Keywords: Parental Involvement, Saudi Families, Saudi Students in US

1. Introduction

As migration and immigration escalates (Wong-Lo & Moreno, 2014), schools invariably represent the diversity of the people who live in a particular country. Teachers often have one or more students in their classrooms who are new to the country in which they reside. Students from families who have cultural values and traditions different from the norm including language, religious practices, food choices and other defining cultural distinctions. It is common that teachers do not have sufficient information about the various cultures (e.g., Bullock et al., 2014; Elhoweris, Whitaker, & Salend, 2007; Obiakor, Algozzine, & Bakken, 2007).

Working with families and parental involvement is an extremely important element in the academic life of a student. In reviewing the literature, the role of parents was often highlighted, which is stimulating to try, and find how Saudi parents can become involved in their children's academic life in the USA. The purpose of the present study is to learn how parents from Saudi who have children attending schools in the United States of America perceive the school experiences of their children, and to learn how they might become involved to support the teacher and help them better understand Saudi culture.

According to Reuda, Limn, and Velasco (2007), it is not uncommon that teachers make judgments regarding their international students based on surface characteristics of the culture (e.g., dress, greeting style, accent, facial and body expressions) without having sufficient information about the students' culture and considering group differences and family traditions. Understanding a student's culture may help teachers understand different behaviors that students from culturally and linguistically diverse (CLD) backgrounds may exhibit in the classroom. For example, according to Ash, Rice, and Radmond (2014), a student may exhibit unsociable behavior during interactions with native speakers' peers, compared with the non-native speakers or peers from the same language. Furthermore, this understanding may help minimize differences between the culture at home and the culture at school.

According to Crozier & Davis (2007), when parents were asked about school expectations regarding their participation in the academic life of their children, the parents indicated there were none, other than bringing them to school every day and making sure they did their homework. Although it is important for schools to be clear as possible for their expectations about all parental involvement, it is especially important to international parents because they may be unfamiliar with local school customs.

Teacher Preparation

Teachers need to be prepared to teach in classrooms that have students from different cultures (Bullock et al, 2014; Bullock & Gable, 2014). For example, one teacher recently reported that out of the 25 students in her class, only 12 were from the USA, and 6 other different countries were represented. Robinson and Clardy (2011) suggested the need to have teachers and professors from diverse backgrounds. Having field experiences in schools that are highly culturally diverse was suggested.

If teachers understand more about cultural diversity, it may help reduce the number of referrals for English Language Learners (ELL) to special education programs. It may also help in the screening and evaluation process for the placement in special education programs (Hardin, Mereoiu, Hung, & Roach-Scott, 2009), because according to IDEA, we need to provide appropriate education for all students. (Uhara, 2005).

Behaviors have an effect on social relationship, because the way a person behaves affects the relationship with the family at home, friends and teachers at schools, and colleagues at work. People from a specific culture may behave differently from individuals from other cultures in different social situations. There is insufficient research relative to behavioral intervention in specific cultures (Kauffman , Conroy, Gardner, & Oswald, 2008). Recently, everyone is calling for equality in both society and in schools; therefore, teachers need to instill confidence by acknowledging and respecting each student's culture in the best way possible (Taras & Rowney, 2007).

Parents and Schools

One of the roles of schools is to ensure that students receive appropriate instruction in academic and social skills to help them to be successful. As teachers and administrators, we need to be more knowledgeable about the barriers that prevent parents from becoming involved in their children's education, and address them in a meaningful manner. As schools become more diverse, it becomes more difficult for schools to provide and manage appropriate services (Lacroque, 2011; Ramirez & Soto-Hinman, 2009; Singh, Curtis, Wechsler, Ellis, & Cohen, 1997).

Parental involvement is one of the most effective elements to ensure academic achievement (Walker, Ramsey, & Gresham, 2004; Trainor 2010).

Schools cannot work in isolation; there must be a strong collaborative connection and understanding between the school and the parents (Robinson, 2004). It should be kept in mind that various cultures view education in different ways- some highly respect and value teachers and schools, while others place little emphasis on education. For example, the Chinese consider academic achievement as successful proof of their parenting style; therefore, they prefer home-based involvement rather than school-based involvement due to their high appreciation and trust of their teacher's decision and they do not want to interfere with the teacher's teaching style (Wong & Bai, 2013).

Educators and administrators should think about parents as a main resource for collecting data as well as for planning services. They should also consider parents as partners in the educational process. One well documented way to include parents is by creating a parent-community advisory group representative of all the families from different backgrounds to work together in planning and establishing a community-based school services (Cheney & Osher, 1997; Klopvic, Vasu, & Yearwood, 2003). The advisory group ensures that parents have a role in the decision-making relative to school matters.

After an extensive search, there is insufficient literature pertaining to the Arabic culture in American schools and specifically, the Saudi culture and how Saudi students adapt to the American culture in U.S. schools. For this reason, we conducted a focus group to learn more about how parents from Saudi who have children attending schools in the USA perceive the school experiences of their children and to learn how they might become involved to support the teacher and help them better understand Saudi culture.

1.1. Statement of the Problem and Research Question

Elementary and Secondary Schools in the USA have numerous students from Saudi, which grow with each passing year. Many Saudi Arabian parents are unfamiliar with the education system of the USA and, therefore, feel they are not fully involved in their child's education. Therefore, a focus group was conducted to learn more about how much involvement the parents have and what kind of barriers they face to get involved in U.S. schools. The main purpose for this study was to answer the question "What are the parental involvement strategies that can be used by Saudi parents to introduce Saudi culture into the US elementary schools?"

This focus group may help teachers understand Saudi culture and how they can support the teacher and the school program.

2. Method

2.1. Participants

Selection of participants depended on specific criteria: (a) be a mother of an elementary level child or children, (b) have English language proficiency, (c) be enrolled or graduated from a U.S. institution (i.e., Undergraduate, Masters, Doctoral), and (d) have spent more than one year in the USA. The rationale for selecting these specific criteria depended on the aim of the study, which was to learn how to enhance parental involvement of Saudis in elementary schools in the U.S.. We wanted mothers only, because as a Saudi cultural factor, mothers are more involved in their children's academic life than the fathers. As for the language proficiency, the aim was to make certain the mothers are able to communicate with the teachers and schools in English. As for time, we wanted to make certain those mothers were familiar with the U.S. school system and American culture, as well as to be able to think how they could integrate their Saudi culture into the American school system.

Recruitment for participants was through contact with the Saudi Students' organization at a local university located in the southwest USA. After identification of participants, invitations were sent by text messaging and emails. A total of 7 participants agreed to join the focus group.

2.2. Assistant Selection

The assistant was a Saudi doctoral student who attended the College of Education at a local university. She was chosen specifically because of her familiarity with education in USA and fluency in English. She would be able to help to facilitate the discussion and take notes.

2.3. Logistical Procedures

Location. The meeting was held at the home of the researcher, in order to respect Saudi culture privacy issues. The direction for the house was clearly provided to the participants.

Time. The length of the meeting was planned to be one hour and a half to two hours. The first 20 minutes was spent welcoming the participants, getting them comfortable, and waiting for others to arrive.

Identification of group member. Members were identified by their first name during the meeting and by numbers for recording purposes.

Recording. Two recorders were used to record the meeting. Notes during the meeting were taken by the researcher and the assistant to be compared later.

2.4. Questioning Route

At the beginning, each participant was given a short questionnaire. The questionnaire asked for information about the participant, including first name, number assigned, age, education level, number of children, age of children, years lived in USA, and if the child attends English as a Second Language (ELS) program.

The questioning route began with the parents' experiences with American schools and their familiarity with school regulations. Then, they discussed their child's contradicting cultural values and how they adapted. Finally, they were encouraged to create parental involvement strategies that integrate Saudi culture in American schools.

(See Table 1 for the Questioning Route).

Table 1

Questioning Route

Questions
1. Can each person share their first impression of American schools and how they saw them as being different from the schools in Saudi Arabia?
2. How did the procedure of the registration go for your child's enrollment in the school? And was anyone able to explain it to you, as well as explain the school regulations? Were you able to communicate in English or were there translating services?
3. What kind of experiences have you had with schools regarding school services, curriculum, teachers, and administrators?
4. In what way were your children adapting to the American culture, and how do the children deal with cultural contradiction?

5. What are the largest barriers you find when you try to get involved in your child's education?
6. What are the solutions from your point of view to break these barriers?
7. What are the Saudi cultural principles that you would like to be integrated in American schools?
8. Can you think of some strategies that can be used by schools and teachers that make the Saudi parents more involved using their cultural factor?

Information gleaned from the meeting was transcribed from the recorder. First, it was transcribed in Arabic (the language of the participants) and then translated to English by the researcher. Once the information was transcribed, it was sorted in patterns and themes. The analysis depended on the question provided and the topics that emerged during the discussion.

3. Result

The participants began by sharing their experiences when they first came to the USA and how they saw the difference between schools in Saudi Arabia and the schools in the USA. There was greater satisfaction with the schools and the services provided in the USA than in Saudi Arabia.

“Well, my daughter was in second grade in Saudi Arabia and came to second grade in the USA so I think I could give a good comparison.”

“But the public schools in the USA and Saudi Arabia is not even comparable.”

“The public schools in USA are much more advanced than Saudi schools.”

The participants, when examining American schools and Saudi schools, made comparisons from different aspects (e.g., teachers' enthusiasm, teachers' passion to teach). These aspects were higher in America than in Saudi.

“I also noticed difference in teachers' passion.; Sometimes you feel that teachers are forced to work as teachers “because it is the most popular job that suits Saudi women

because of the cultural issues” , but in the USA teachers love teaching, they love what they do.”

“The teacher basically was very supportive; Well, I think the main difference is the teacher.”

“Here teachers believe that their responsibility is not only to be a teacher, but also to be an educator.”

“Teachers here love what they do.”

Some of the participants shared their own elementary education experiences from when they were children in Saudi Arabia. There are two reasons for comparing their own experiences. First, they might see there is a slight improvement in the education in Saudi Arabia; secondly, their children did not enter elementary school in Saudi Arabia. The age for the students in this study was elementary school ,so they were in preschool before they moved to USA. They could not compare the education for their children because all the children’s ages were between 5 and 9 when they started their elementary schools in the USA.

“Well, I can’t compare, because my son was born here and he never attended school in Saudi Arabia. I can compare with my own experience at Saudi elementary schools. I noticed the difference in children’s passion. When he gets out of school, how he loves school; not having the negative attitude in school (School is bad or school is painful); not it is fun.”

“When I was in the intermediate school I can still remember how bad principal we had she was so scary.”

“Me too. I can remember one of the principals we had would shout at the teacher in front of the students”

Participants related to their own experiences and the experiences they have had with school principals in the USA, Most participants agreed that the principals in the USA are more involved in the school activities. Involvement was viewed as a demonstration of positive leadership.

“I have a lot of experience with the principal because I am involved in ELS program as a volunteer.”

“Yes, she seemed that she really cares because this year they do not send the flyer electronically only but she sometimes send some educational and parenting article that she feels it is going to benefit the parents.”

“The pervious school the principal was involved with my daughter when my husband came to visit.”

“I had a good experience with the principal in school one, because they helped me. I had some issues with the children.”

When the participants were asked if any were explanations provided during the registration process, there was total agreement that no help was provided except for a flyer, which was in English. Participants thought it be would a good idea if they had provided important information in multiple languages. The participants argued that the school should provide translation services. Some of the participants thought that it is the schools' responsibility, and others thought if the school did not provide translation services, it is the parents who should bring someone to help and translate for them “if they cared about their children.”

“By a chance last year, the time I was entering the school and because I was wearing my hijab a father noticed me while he was exiting the school and he came back and talked to one of the staff. The staff came to me and asked if I can help with translating some stuff for him. The ESL were explaining to him the ESL program that his son will be enrolled in and he did not understood what they were trying to say. I translated everything and he understood the program but it was difficult for him to understand without an interpreter and they did not have one in Arabic language.”

“But when the schools do not provide and the parent really care they can find a way to have a translator.”

“Yes, I agree if the school couldn't find one the parent should bring someone who can translate if they care about their child.”

When the participants were asked if they felt they were involved or if the schools invited them to be involved, most of the participants responded negatively. Some parents volunteered for schools trips or simple activities, but as for collaboration between the parents and the teacher regarding the academic aspects, parents felt they were not welcomed. Most of them agreed that they needed to offer their help to the school, unless the schools don't allow them to become involved.

"There is no good communication between the school and me but in my opinion it is the school fault. My son has been in this school for 3 years now they have not contacted me except for the first parent conference. After that they have not call me at all unless something bad happen to my child."

"The school called me once last year when my son had an accident at school."

"For volunteering, I posed my question and offered them to volunteer but they don't ask. For knowing what's going on it depends on the teacher and how she deliver the information."

"One of my problems with my son's teacher was when I asked the teacher for the material they used in the class but she did not let me know or show me what kind of the material she used."

"My son is doing great at school now, but I think if he had some academic problem they will notify me. But I am the one who is going ~~you~~ to spend more effort that the school to get more information about what he is exactly doing and how we can improve his skills and how I can help him at home. All these stuff I think I will be doing it and I'll not get help from school."

Participants were asked about what could be a barrier inhibiting Saudi parents' involvement. Most of them suggested the educational level of the parent could highly affect their involvement in their child's education. The higher level of education the parent has, the greater the involvement. Besides the language and academic level of the parents, some participants suggested that the culture of the parent might play role.

Saudi has different geographic areas and each area has a subculture that is different from others, thus, some involvement in their students' education is not a priority. Some Saudis think that American schools are doing a great job and they don't need to get involved.

"In the preschool, one of the teachers was complaining about ~~the~~ some Saudi parents who don't understand English. And their kids were at risk. She could not communicate with them and they seemed they don't care."

"It is going to be difficult if the parent came from a culture that they are not used to being involved in their child's education and they don't care what's going on in the school."

"I think Saudi parents' educational level effects their involvement in the schools. There is a difference when the parents are educated."

The surprising thing about this focus group was that no one felt they needed to enter the Saudi culture into the school. They felt that by insuring that they foster their own culture at home it would be sufficient for the children to maintain their identity. They did not want their children to be recognized and classified regarding their nationality. As having a large support group of friends, they believe the child will feel more accepted in this way than by integrating the Saudi Culture in the school, where it might make them feel segregated.

"I don't know if bringing the Saudi culture to the school and having the kids identified, as a Saudi will benefit them. This will segregate them and add stereotyping to their identity and we don't need that."

"I am trying to make sure that they have their Saudi identity at home and they realize that they are Saudis and they are proud of themselves because they talk two languages. As long as we make sure that we are holding our believes at home the kids are going to be fine."

4. Discussion

A focus group was conducted to gain knowledge on the perceptions of Saudi parents on parental involvement in the USA schools. Selected criteria consisted of Saudi parents, specifically moms, who have children enrolled at the elementary school level in the USA. Participants were Saudi graduate and undergraduate students in USA institutions.

Five participants were enrolled in PhD programs; one participant had already graduated from a master's degree program; one was enrolled in a master's program, and one was an undergraduate student. Most of them had 2-3 children. They had been living in the USA for an average of three years, and their ages were between 25 and 32.

The focus group was led by the researcher as the moderator with the help of an assistant moderator. A recorder and an iPhone were used to record the meeting. The discussion lasted for an hour and focused on comparing experiences between Saudi schools and American schools, and the parental involvement of Saudi Arabian parents in schools in the USA. At the beginning of the meeting each participant was given a small sheet of paper where they filled out basic information about themselves: name, age, number of children, years spent in USA, and their educational level. The questionnaire helped the moderator to recall the information about each participant.

The discussion began by posing the first question about how they perceive the differences between schools in Saudi Arabia and schools in the USA. The majority of the participants agreed that USA public schools are much better than the ones in Saudi Arabia regarding curriculum, teachers, staff, administration, and facilities. They all agreed the only schools considered to be good in Saudi Arabia are private schools, but they are costly. They all had negative experiences related to their education in Saudi Arabia. They compared the Saudi schools and the curriculum, the teacher preparation, and homework loads. Homework loads are among the main differences, where in Saudi Arabia the students are required to complete more homework.

When the participants were asked to share their personal experiences with the schools in the USA, they shared different experiences related to dealing with school administration and teachers. Most of them were impressed with how some schools take care of small details regarding the child's life. Overall, they agreed that schools in the USA do not promote parent involvement. They think that if the parent did not offer to volunteer and impose themselves, the school would not encourage them to get involved. Most of them had volunteered in different activities and all the volunteering experiences were not by invitation from schools.

According to the participants, they received no help when they registered their children for school. There was agreement that there was no help, except the flyers that explained the procedure of registration in the English language only.

They thought it would be more helpful to make parents who do not have proficiency of the English language understand the registration procedure in American schools.

Regarding the barriers, there were different points-of-view regarding the barriers that prevent Saudi parents from getting involved. Some mothers related the main barrier was the language when the family first arrived in the USA. They agreed that having a translator provided through the schools would be beneficial.

Others related to barriers of the academic level of the parent. With some low educated parents, especially when it is the mother with no higher education, parental involvement will be lower. If the mother is the one who came to the U.S. to study, parental involvement will be higher because she socializes more than mothers who come as independents with their husbands and do not study. They are usually stay-at-home mothers and do not go out a lot; their English Language proficiency is low so they cannot communicate efficiently with school personal.

Finally, when the participants were asked about their children's adaptation to the American culture, and if there were any contradictions, most of them said the children are adapting to American culture very well and very quickly, so they are making certain that they hold onto Saudi cultural beliefs at home and make certain they speak their mother tongue at home. Surprisingly, when asked if they want to integrate Saudi culture into American schools, all of them refused to bring the Saudi cultural to the school. Their answer came from not believing in segregating by their culture. All the mothers assured that their children are adapting very well and they have no problems regarding the contradiction between two cultures.

Conducting this focus group brought up different interesting issues related to Saudi parents and their children's education in the USA. One of the important things obtained from this focus group was the refusal of involving Saudi culture in American schools. According to the parent responses, they believed in fostering the Saudi culture at home and among close friends. They did not feel like bringing the Saudi culture to the school, for fear of portraying stereotypes.

The other issue is that Saudi culture is complicated due to the large role that religion plays. It is difficult to separate the traditions and culture from the religion. The participants were knowledgeable about the effect of the integration of Saudi culture in the American schools. Thus, they refused to introduce the Saudi Culture to the American schools.

At the same time, it gave evidence that Saudi parents may not realize the positive effect of integrating Saudi Culture in American school, which will make the teacher understand the Saudi culture and design their instructions based on the student culture especially for the students who are at risk.

It was helpful to see the comparison between American schools and Saudis schools which will allow us to find the weaknesses of the Saudi education system and help to develop improvement plans for public schools in Saudi Arabia. It also helped to see what kind of services needed to be implement in Saudi, how much which professional development is needed, and how administrators should be dealing with students.

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A Review on Water Desalination Technology and Economics

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Abstract

Water is essential for life on earth. There were civilizations everywhere there was water. The issue of severe freshwater shortage on Earth results from the planet's limited freshwater resources, quickly growing human population, and improving living standards (mainly due to industrial and agricultural advancement). Numerous studies and research programs have focused on the future of the water situation and the quest for non-traditional water sources, such as desalination. Desalination has been regularly employed since the 1960s. Major technologies have improved efficiency, dependability, and cost since then. MSF served as the standard thermal technique for many years. The most advanced thermal process is MEE. However, it is not commonly employed. Since reverse osmosis (RO) has surpassed MSF as the most popular desalination method, it needs to be used as a standard. Desalination technology costs have significantly decreased over the past 30 years due to research and development that has reduced energy usage and improved design. Table 1 lists desalination methods according to their anticipated prices. Most of the costs associated with desalination are related to capital expenditure and energy prices, whereas expenses like operation and maintenance are almost constant.

Keywords: Desalinating, Multi-stage flash, Multi effect desalination, Vapor compression.

1. Introduction

Desalinating water involves taking the dissolved salts out of salt water. Thermal and membrane desalination are the two main desalination methods used today.

Desalination methods may be used in municipal, industrial, or commercial settings. As technology progresses, desalination technologies are becoming economically competitive with other ways of providing potable water to meet our growing needs. While the latter technique boils or evaporates saltwater to create water vapor condensed to make salt-free liquid water, the former employs a specialized membrane filter to produce desalinated water.

Desalination technology was considered necessary during World War II to transform salt water into usable water in locations with few water supplies (Needham et al., 1980), (Hinkebein, 2021). Desalination methods have become more widely utilized in recent years to cleanse industrial and municipal wastewater before it is discharged or reused, as well as to create drinking water from groundwater and seawater.

In the 1950s, there were about 225 ground desalination units per day, producing 27 million gallons (mgd). There are currently approximately 3,500 units with a 3,000 mgd capacity globally. Desalination technology will be used more frequently as freshwater demand grows and the quality of the available supply deteriorates (Andelin, 1988).

Desalination has spread swiftly throughout the Middle East, Arabian Gulf, North Africa, and smaller islands. It is also being studied in other countries. FIGURE 1: Global desalination capacity.

Due to the limited available fresh water resources and the prohibitive cost of delivering fresh water from distant sources to water demand regions, there is a growing concern about water scarcity around the world.

Because of this circumstance, efforts to explore seawater and brackish water as potential sources of drinking water have been refocused. Studying the technology used in desalinating salt water and the factors affecting each method to choose the most appropriate method and Choice criteria for desalination technology and cost are the main objectives of this study.

2. The Process of Desalination

Distillation and membrane desalting are the principal methods. Distillation mimics nature by evaporating and condensing water. Multi-Stage Flash (MSF), Multi-Effect Distillation (MED), and Vapor Compression (VC) facilities desalinate salt water in stages. To lower energy use, membranes must create water without evaporation. To function, membranes need either electrical power or shaft power. Reverse osmosis for brackish and seawater and electrodialysis for brackish water exclusively are the two methods that have come into use. Figure 1 illustrates the principles of desalination and membranes.

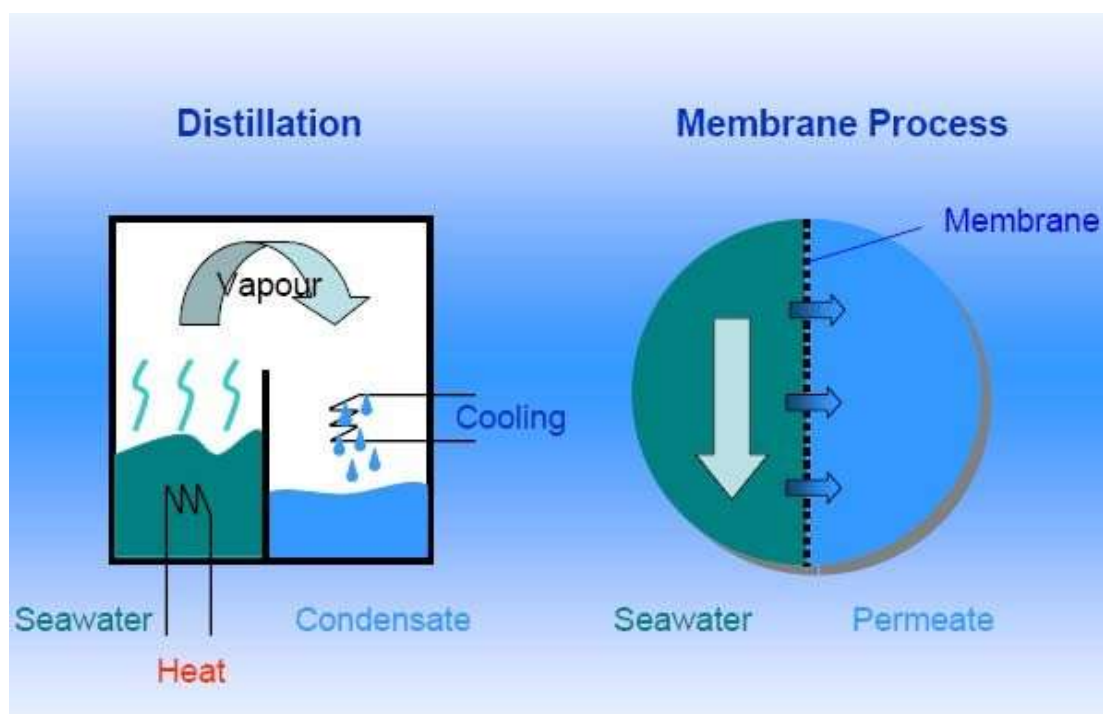


Fig 1 The Principles of desalination and membranes process.

2.1. Multistage flash distillation (MSF)

Msf is a thermal procedure that allows for the desalination of enormous volumes of seawater. This is accomplished in a sequence of closed tanks (stages), where the pressure is gradually reduced from one stage to the next. Water boils less when air pressure drops. In the initial desalination step, warmed seawater flash-boils condensed on heat-exchange tubes.

As demonstrated in Fig. 2, residual salt water is flashed, and freshwater is collected. Al-Jubayl, Saudi Arabia, is the world's largest desalination facility, producing 200 million gallons daily. MSF desalinates 85% of global water (Shoaiba, 2011).

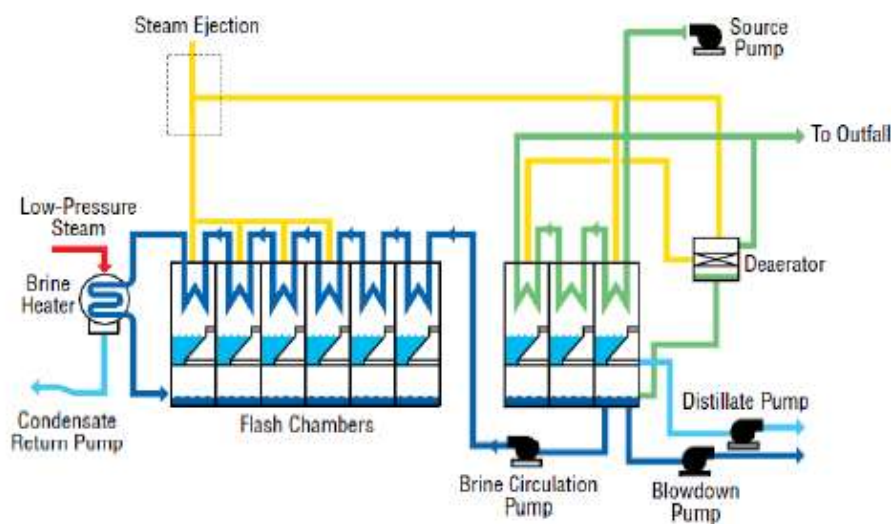


Fig 2: Multi-stage flash process (flowserve.com, 2013)

2.2 Multiple Effect Distillation

There are typically 5-10 phases in a MED desalination facility. The MED impact is seen in Fig. 3. From above the tangle, cold brine begins to rain down on the tubes. The condensation enthalpy of the vapor is sucked up by the brine coating on the pipe surface and evaporated. The demister removes undesired effects by filtering film evaporation vapor. Any leftover demister droplets and brine are gathered in the brine pool and carried out of the impact. In the event of flash evaporation, the pressure differential between the effect pressure and the brine pressure will cause more vapor to be generated. To achieve various effects, a condensate flash box of the same pressure as the effect can be mounted at the outlet of the bundle tubes. Evaporation of some of the condensate combines with the effect's vapor to boost thermal efficiency.

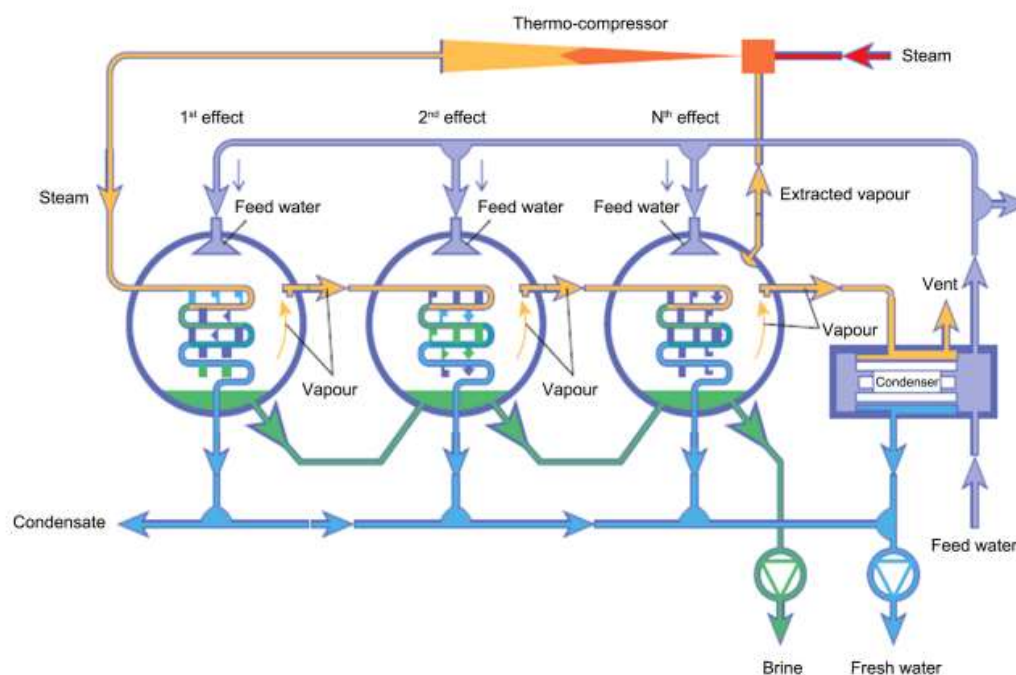


Fig. 3 Multiple Effect Distillation (MED) desalination (World Bank, 2019).

2.3 “Vapor Compression Distillation”

Sea or brackish water is evaporated using compressed vapor. Centrifugal compressors compress vapor. Under sub-atmospheric pressure, seawater is evaporated and condensed into fresh water. As a blowdown, the leftover concentrated salt water is removed at the double the initial concentration. As an electrical process, it's clean. Due to its high efficiency, it's ideal for single-purpose, small-capacity installations. The system includes a proven, optimized compressor with a high-efficiency centrifugal blower and a low compression ratio. Because the evaporator/condenser thermal differential is below 50 C, less compression work is necessary, reducing energy consumption. Figure 4 shows two forms of vapor compression desalination. First, a solar-powered mechanical compressor compresses vapor (MVC). The second kind uses thermal vapor compression (TVC) to extract water vapor and provide low evaporator pressure using high-velocity motive steam in the nozzle (Andelin, 1988).

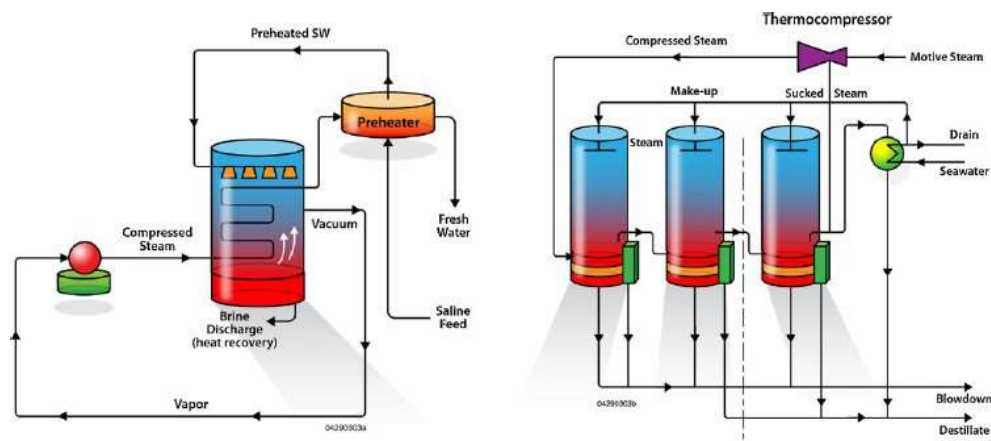


Fig 4 Vapor compression desalination (a) mechanical (b) thermal (Al-Karaghoul, 2009).

2.4 - Reverse osmosis

By forcing water through a semipermeable membrane, reverse osmosis (RO) may remove contaminants from water. There is no natural filtration happening with this membrane technology. By applying an external force, reverse osmosis may counteract the osmotic pressure exerted by the chemical potential, a thermodynamic parameter. Reverse osmosis, which employs a semi-permeable membrane, can be used to remove molecules and ions from a solvent. This technique is used in commercial and residential applications, creating clean water for human use (Fig. 5).

Ranging the salt side pressure and pushing water through the semi-permeable RO membrane, reverse osmosis discards almost all dissolved salts. Pressure is determined by feed water salt content—more osmotic pressure from feed water concentration. Desalinated, demineralized water permeates. The reject stream contains pollutants that didn't cross the RO membrane.

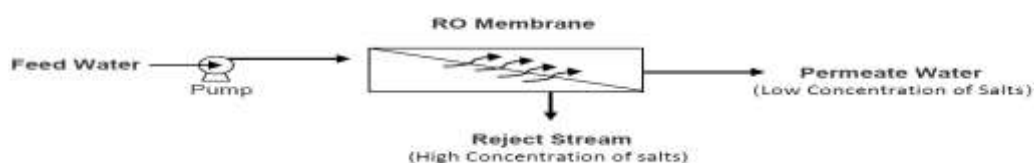


Fig 5. Vapor compression desalination is (a) mechanical and (b) thermal (Al-Karaghoul, 2009).

2.4.1 “Types of RO Membranes”

Commercial RO membranes are mostly cellulose acetate and aromatic polyamide. TFCM refers to aromatic polyamide membranes.

A membrane made from a paper byproduct and a synthetic layer is called a CTA membrane or a Cellulose Triacetate membrane. It is necessary to have a trace level of chlorine in the water supply to avoid bacterial growth on the membrane.

Chlorine is detrimental to the components of thin film membranes and must be removed before the water can pass through a thin film composite (TFC) membrane. Compared to cellulose acetate, which has a maximum operating temperature of 35 degrees Celsius, these membranes may be employed at 45 degrees Celsius.

2.5 Comparison of thermal and Membrane processes

To purify very salty fluids (most often saltwater) and produce vast volumes of product water, thermal methods are frequently employed (mostly seawater). Whenever there is an abundance of waste heat sources or a location with a cheap cost of energy,

When energy costs or flow rates are high, membrane technologies are better for treating brackish waters or salty wastes.

2.6 Choice criteria for desalination systems

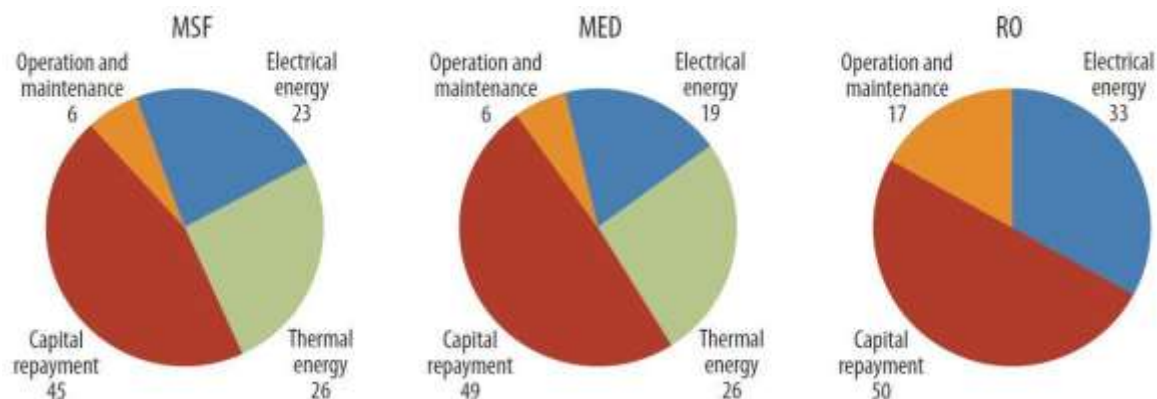
- Problems with one's finances.
- Consumption of energy.
- Characteristics of the water that is used as a source.
- Constraints imposed by geography and location
- A product's water consumption.
- Concerns about pollution and waste disposal methods.
- Maintenance and operational issues
- Rates of use.

2.7 Costs of desalination

Desalination technology expenses have been drastically cut over the past 30 years due to efficiency and design advancements. Table 1 displays the expected prices of various desalination systems. Fees like operation and maintenance are relatively constant, but the primary expenses of desalination are the initial capital expenditure and the cost of electricity. Other factors that impact desalination prices include the salinity of the water supply, the accessibility of energy sources, the plant's scale, the land's cost, and the presence or absence of government subsidies. The entire yearly cost of each component using the most popular desalination technologies is shown in Fig. 6. The high expense of harvesting renewable energy sources and the need for advanced equipment and infrastructure make desalination systems that employ them less efficient than those that use fossil fuels. More research and development might lower renewable energy prices. In 20 years, renewable energy is expected to cost 0.05 USD/kWh, making it competitive with conventional power. Table 2 displays recent high pricing for REDS (Alkaisi, 2016).

	"MSF "	"MED "	"RO"
"Investment"	"1,700	1,700	1,300
"expenses"	— "2,900"	— "2,700 "	— 2,500
Spending on daily "operations."	0.65— 1.25	0.67— 0.96	0.58— 0.88
Annualized price tag	0.84- 1.6	1.21- 1.59	1.06— 1.36

"Table 1 shows the average cost of desalinating seawater using traditional methods (in US Dollars per cubic meter per day" (Alkaisi, 2016).



Below is a table showing the average price of desalination systems that use renewable energy.

“Methods of Desalination”	“MED”	“HDH”	“SD”	“ED”	“RO”	“MVC”	“RO”	RO
“Capacity (m ³ /d)”	>5000	>100	>1	>100	>100	>100	>50	>1000
“Cost (USD/m ³)”	“2.5-3”	“2.8-7”	“1.4-12”	“11.2-12.6”	12.5-16.8	“5.6-8.4”	7-9.8	2.1-5.6

2.8 Desalination is growing around the World

Water supply is likely to become increasingly dependent on desalination in the years to come because of its rapid growth around the world. Desalination is becoming increasingly popular, especially in dry regions of the world. It appears that the annual desalination capacity is increasing rapidly over time. More desalination plants are being developed to meet demand. From 326 m³/d in 1945 to 5,000,000 m³/d in 1980 and 35,000,000 m³/d in 2004, this has expanded dramatically. In 2008, 14,000 plants produced 52,333,950 m³/d (Al-Karaghoul, 2009). 16,000 plants produced 67,000,000 m³/d in 2011, with 2012 predictions topping 79,000,000 m³/d.

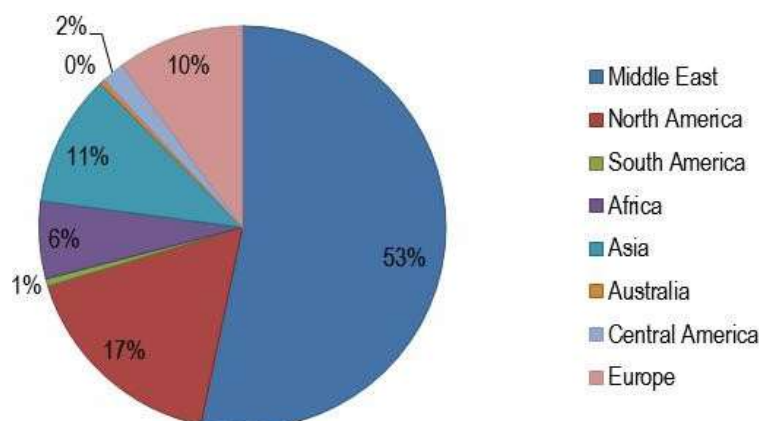
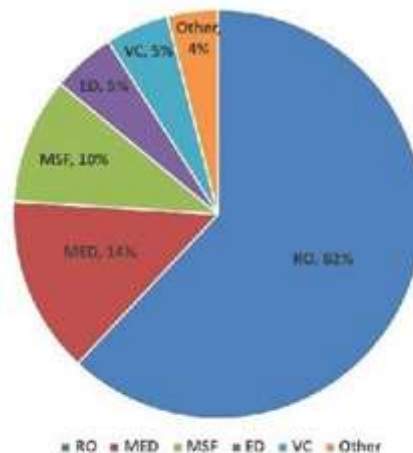


Fig. 7 Distribution of desalination facilities across the world (percent). (Zotalis et al., 2014).

The Middle East has most of the world's largest saltwater desalination plants. Ras Al-Khair, also called Ras Al-Zour or Ras Azzour SA, has generated over 1,000,000 m³/d since 2013. Incorporates membrane and thermal technology. Ras Al-Khair supplies Maaden's manufacturing plants with 1,350 MW of electricity and 25,000 m³ of desalinated water each day. Additionally, it allows water to Riyadh, the country's capital, and a few other central cities that require a combined 900,000 m³/d (constructionweekonline.com, 2013), (desalination.biz, 2013). Water for Jeddah, Makkah, and Taif is produced by the MSF Shuaiba 3 desalination facility on the east coast of SA, which has a capacity of 880,000 m³/d. South Africa is also home to the Ras Al-Zour plant, producing 800,000 m³ of water daily (Henthorne, 2009).

2.9 Distribution of installed plant capacity

Reverse osmosis (RO) systems are more popular than multi-stage flashing MSF and multi-effects distillation MED. Figure 8 shows each desalination method's worldwide contributions (Alkaisi, 2016).



Water output worldwide as a function of various desalination techniques is shown in Fig. 8 (Alkaisi, 2016).

3. Results

- 1- Water supply is likely to become increasingly dependent on desalination in the years to come because of its rapid growth around the world. Desalination is becoming increasingly popular, especially in dry regions of the world.
2. The Middle East has most of the world's largest saltwater desalination plants.
3. RO systems are more popular than MSF MED.

4. Conclusions

Desalination is becoming increasingly popular, especially in dry regions of the world. It appears that the annual desalination capacity is increasing rapidly over time.

It is crucial to continue funding research into brine disposal since desalination can provide a sustainable water supply at a low cost.

5. Recommendations

1. The variety of technologies available on the market ensure products of different quality and distinguish themselves by efficiency.

2. Based on the earlier figures and the lower cost of water production, the RO unit is the best desalination technology now available. Additionally, by using commercially available technologies like solar panels and wind turbines, the prospect of using electrical energy as an input would make the coupling with renewable energy sources simpler.
3. Install tiny desalination units on uninhabited islands, powered ideally by renewable energy sources, to meet freshwater demand in a sustainable manner.

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Biology Gifted Students' Perception towards Learning Strategies, Learning Preferences, and Information Stabilization

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Abstract

Biology is a natural science concerned with the study of life and living organisms. Biology makes a big contribution to our understanding of nature. Science, especially biology, has been reported to be one of the main interest areas for many gifted and talented students.

Considering the increased interest and attention in the gifted and talented students, a discussion group was held with 25 Biology Gifted Students (BGS) with the aim of examining Perception towards learning strategies, learning styles, and information stabilities. The students pointed out 10 different learning strategies, which varied in importance. The top three strategies were the experiential learning strategy, open discussion strategy and thirdly self-learning strategy. Whereas flipped learning strategy, role-playing strategy, and brainstorming strategy ranked the least important respectively.

The BGS's answers regarding learning styles varied but they asserted the importance of group learning style, competitive learning style and one-to-one learning style. The best ways to install and retain information were also discussed with Biology Gifted Student. The BGS stated that the best ways to retain and stabilize the information were, paraphrasing the information, writing, repetition, drawing and explaining to others. From these results, the researcher presented a set of recommendations and proposals including encouraging teachers of gifted students to benefit from the results of this study.

Keywords: Talented, Gifted, Students, Biology, Learning strategies

1. Introduction

Biology is an essential science for the advancement of humanity. Having well-educated biologists with the essential information, motivation, and abilities is crucial for scientific investigations and advancements. Directing the talented and gifted students to be future biology scientists will enrich the biology community and its achievements.

The phenomena of gifted students is thoroughly explored in modern education. However studies of gifted students' achievements in different disciplines are limited resulting in suboptimal teacher's utilization of the gifted students abilities in specific subjects. Many of these pupils' unique skills may be lost due to a lack of instructional approaches to unlocking their potential. (Kairullayevna, Rakhmatullayeva, 2021).

Talented and gifted students are highly motivated to complete numerous biology assignments and have an endless learning drive, passion, and inventiveness (Murat & Gulcan, 2018). This will facilitate the development of learning strategies, learning styles and more enjoyable solutions. The more fun, stimulating and engaging the subject becomes, the more motivated the students are (Sadi & Uyar, 2013). Another point is that the inspiration of skilled and talented students is enhanced when they experience topics appropriate to their level (Özarslan, & Çetin, 2018).

Also the effective use of modern teaching techniques in biology can increase the interest of students in mastering the basics of science (Kairullayevna, Rakhmatullayeva, 2021).

So teachers of gifted students should be concerned in the development of higher order thinking skills and should focus on suitable teaching approaches that promote divergent, convergent and creative thinking.

Al-Hadabi (2010), stated that teachers are critical teaching and learning components in gifted programs. They can create an environment that encourages the development of thinking skills and creativity of their gifted students.

Therefor teachers of the gifted students should strive to improve learning strategies, learning styles, materials, differentiated curriculum, high quality learning process, and information stability .(Syafril,.et al., .2020)

Al-Hadabi (2010), also stated that teachers should double their efforts to discover the mental, emotional, and affective aspects that are characteristic of gifted children, allowing them to identify and utilize teaching strategies that meet the needs of gifted students.

But the studies on the scientific attitudes of gifted students, factors affecting their attitudes and how to improve their attitudes are quite limited in the literature (Özarslan, 2018)

Hence the main aim is to study BGS's cognition related to learning strategies, learning styles, and information stability.

1.1. Research questions

- What are the views of Biology Gifted Students' towards the best learning strategies?
- What are the Biology Gifted Students' Perceptions towards the best learning styles?
- What are the views of Biology Gifted Students' towards information stabilization?

2. Research Methods

2.1. Participants

The research is concerned with Biology Gifted Students' Perception towards learning strategies, Learning Preferences, and information stabilization. A total 25 Biology Gifted Students were asked about their perceptions towards learning strategies, learning styles, and information stabilities.

2.2. Data Collection Tool

The most suitable way to explore Perception towards learning strategies, learning styles, and information stabilities is to utilize data collection tools usually associated with qualitative approaches such as discussion groups or focus groups (Hoseth & McLure, 2007).

2.3. Collection of Data

The students were chosen based on their wish to participate in this new educational experience. We held a discussion group with 25 Biology Gifted Students to ask them about their perceptions towards learning strategies, learning styles, and information stabilities.

The discussion was organized and managed by the researcher and lasted for an hour divided equally between the main topics mentioned earlier. Notes were also taken in preparation for the analysis stage of this study.

2.4. Data Collection Tools

We held a discussion group with 25 Biology Gifted Students (BGS) to ask them about their educational experience as gifted biology students

The discussion group focused on BGS's Perceptions towards Learning Strategies, Learning Preferences, and Information Stabilization. The discussion was organized and managed by the researcher and lasted for an hour divided equally between the main topics mentioned earlier. Notes were also taken in preparation for the analysis stage of this study.

2.5. Validity and Credibility

The research validity was ascertained by involving two professional individuals as moderators and evaluators. These two individuals were responsible for evaluating and assessing the overall procedure. The consistency of inter-raters was 83.3% assuring the credibility of research study and results.

3. Results and Findings

- 1- The discussed views of BGS toward Learning Strategies revealed 10 different Strategies, which varied in significance. The top three Learning Strategies were the experiential learning strategy (24/25), followed by the open discussion strategy (23/25) then self-learning strategy (21/25). Whereas, flipped learning strategy (2/25), role-playing strategy (3/25), and brainstorming strategy (5/25) ranked the least important as presented in table 1:

Table 1: Frequencies of Learning Strategies

Frequencies of Learning Strategies out of total 25	
<i>Top 3 Strategies</i>	
24	Experiential learning strategy
23	Open discussion strategy
21	Self-learning strategy

<i>Least 3 Strategies</i>	
2	Flipped learning strategy
3	Role-playing strategy
5	Brainstorming strategy

2-The discussion with BGS about learning preferences showed the Group Learning style (24/25), Competitive Learning style (20/25) and One-to-one learning style (12/25) were the highest preferred learning styles as in Table 2.

Table 2: Frequencies of preferred learning styles

Frequencies Of learning styles out of 25	
24	Group learning style
20	Competitive learning style
12	One-to-one learning style

3-Ways to install and retain information (Information Stabilization) are presented in Table 3

Table 3: Top Frequencies of ways to install and retain information

Frequencies Of the ways to retain information out of 25	
24	Paraphrasing the information
23	Writing
23	Repetition
20	Drawing
20	Explaining to others

4. Discussion and Conclusion

The education policy in the Kingdom of Saudi Arabia emphasizes the discovery of talented students and the provision of appropriate educational care for them. (<https://moe.gov.sa/en/pages/default.aspx> website of the Ministry of Education in the Kingdom of Saudi Arabia)

Previous studies emphasized the importance of the role of the teacher and what is introduced in the classroom in developing the skills and abilities of the gifted.(Rita & Martin-Dunlop, 2011, Al-Hadabi, 2010)

However, Hughes & Murawski (2001) confirmed discrimination in teaching gifted students does not usually occur within the general classroom, so collaboration between general education teachers and the gifted is critical to ensure appropriate services for high-ability students.

In this study, we documented students' experience in gifted classes, and students expressed their views on learning strategies, learning styles, and the stability of information.

Summarizing all the above discussion, it has been observed that there are different learning strategies, favoured by gifted students such as experiential learning strategy, open discussion strategy, self-learning strategy and different styles of teaching. Additionally, if students struggle with memorizing and using biological information, they can also adopt a range of strategies such as paraphrasing, writing, repetition, drawing, etc.

We hope that the research results will be useful for general education teachers and talented people

5. Suggestions and Recommendations:

- The study recommends utilizing the top learning strategies, learning preferences and information stabilization found in this study in teaching the Biology Gifted Students.
- Conducting the same study on gifted students in other subjects.

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