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A comparative study of motor skill performance levels of students with hearing-impairment and students without hearing-impairment in the Hohoe municipality

Donkor Kormla Simon and Ahorlu Michael Koku

Abstract
The purpose of the study was to compare motor skill-related physical fitness (speed, balance and coordination) levels of the hearing-impaired and non-hearing-impaired students of Volta School for the Deaf and St. Francis Junior High School in the Hohoe municipality. A cross-sectional design was used in conducting this study. The target population for the study was the students of Volta School for the Deaf and all basic school students in the Hohoe municipality. One hundred participants were used for the study; fifty with hearing-impairment and the other fifty without hearing-impairment. Volta School for the Deaf was selected purposively for the study because it was the only school for the deaf in the region and located in Hohoe municipality. A simple random sampling technique was used to select St. Francis Junior Secondary School from among mixed schools in the municipality without hearing-impairment. The University of Illinois Test Instruments designed by American Alliance of Health, Physical Education, Recreation and Dance (AAHPERD) in 1986 was used to collect data. The t-test and descriptive statistics on Statistical Package for Social Sciences (SPSS) software were used to analyse the results of the assessment conducted on the participants. An alpha level of 0.05 for two-tail was used. The result showed that there were no significant differences between the two groups in the use of speed but there were differences in coordination and balance.

Keywords: Speed, balance, coordination

Introduction
Physical education is an all-encompassing term, including fitness, skills, movement, dance, recreation, health, games and sport plus the appropriate values and knowledge of each. The skills developed through a good physical education programme are critical in ensuring that students have success in many of the sports and leisure activities common to the community. This view is affirmed in the report, Sport Education (Victorian Ministry of Education, 1987) [28] where physical education was characterized as the "foundation stone" on which an effective sport education programme can be built. It is therefore the responsibility of every physical education teacher to ensure that students in their formative years develop basic physical education skills. This includes the development of the essential fundamental motor skills.
Inclusion practice in General Physical Education (GPE) means educating students with disabilities (mild to severe) using special resources as needed, in safe, successful, and satisfying learning experiences with classmates without disabilities (Block & Vogler, 1994). Scholars have claimed that there are attitudinal, social, and educational benefits to be derived from inclusion practices in GPE for students with and without disabilities (Block, 1998; Sherrill, 1998; Sherrill, Heikinaro-Johansson, & Slininger, 1994) [23]. It is often assumed that social interactions between students with and without disabilities in GPE classes are positive and contribute to feelings of acceptance and camaraderie. To date, however, limited research exists that supports this assumption. Increasingly, scholars have studied the social experiences of students with disabilities in GPE classes. Blinde and McCallister (1998) [6], after interviewing elementary, junior high, and senior high school students with disabilities, reported that some of these students had limited opportunities to participate fully in their GPE classes. Exclusion from class activities led some students to feel like outsiders in their classes and unwelcome by classmates without disabilities.

Goodwin and Watkinson (2000) [15] also studied the experiences of elementary school-age students with physical disabilities in GPE and reported finding a dichotomy in terms of students experiencing good days and bad days. To paraphrase, good days were described as students with physical disabilities having experiences that were positive (i.e., supportive interactions with classmates and teachers) and meaningful (i.e., those experiences that promoted a sense of belonging, opportunity to share in the benefits of the GPE programme, and the opportunity to engage skilfully with classmates). In contrast, students with physical disabilities described their bad days experiences as unhappy when they encountered social isolation (i.e., rejected, neglected, or seen as objects of curiosity by their classmates), were perceived as different due to their disability, or had their participation inhibited (i.e., lack of support from teachers, a scarcity of engagement from classmates, constraints imposed by the instructional space, or all three) (Goodwin & Watkinson, 2000, pp. 151-154) [15]. Contact theory posits that favourable conditions or good days such as those reported by Goodwin and Watkinson would create favourable attitude shifts, while unfavourable conditions (i.e., bad days) would create unfavourable attitude shifts.

Goodwin (2001) [14] further studied the meaning of help in GPE as perceived by elementary school-aged students with physical disabilities and reported that peer interactions were perceived as self-supporting or self-threatening. More specifically, for students with disabilities assistance from their classmates without disabilities was perceived as either self-supporting (i.e., helpful in terms of assistance with equipment, mobility, and active participation in activities) or self-threatening resulting in a loss of independence, concerns for self-esteem, or restricted participation. Although not conceptually examined in Goodwin's (2001) [14] study, contact theory considers establishing equal-status relationships as important (Slininger, Sherrill, & Jankowski, 2000) [26]. Equal-status implies that both students with and without disabilities engage in helping behaviours with one another, rather than only those students without disabilities unilaterally providing help to their classmates with disabilities (Sherrill *et al*., 1994; Slininger *et al*., 2000) [23].

Place and Hodge (2001) [22] examined the behaviours of three eighth-grade girls with physical disabilities and their classmates without disabilities in a GPE programme at an urban middle school relative to social inclusion. Their findings indicated that students with and without disabilities infrequently engaged in social interactions. Two themes emerged from interviews with the three girls with physical disabilities: (a) segregated inclusion (i.e., referred to times when students with disabilities were separated from classmates without disabilities in terms of proximity) and (b) social isolation (i.e., referred to group separateness between students with and without disabilities). These girls interacted with each other to a greater degree than with classmates without disabilities (Hodge, Ammah, Casebolt, LaMaster, & O'Sullivan, 2000) [17].

Basic education according to the 1992 Constitution of Ghana, is the birth right of every child irrespective of ethnicity, religion, gender, disability and geographical location. The curriculum of basic education in Ghana, like all other curricula incorporates physical education as a requirement based on UNESCO Charter Article 1:1. The physical education syllabus has various physical activities to be taught to enhance the physical fitness of the individual child. According to a definition by the World Health Organisation (WHO), physical activity is any bodily movement produced by the skeletal muscles that require energy expenditure.

Despite the numerous benefits that one derives from physical education, individuals with disabilities are not getting the same amount of opportunity as their counterparts the hearing individuals. This is because the subject has been neglected entirely with the excuse that children with special needs do not deserve any proper physical education classes and that people with hearing-impairment cannot perform physical activities as well as their counterparts without hearing-impairment. But the performances of these children during inter-school sport meetings however, revealed that given the same opportunity; students of Volta School for the Deaf could equally participate in sport related activities. The hypothetical nature of this assumption has prompted the investigation of this problem to find out whether there would be any significant difference between the hearing-impaired and non-hearing-impaired students regarding motor-skill performance levels. Therefore, the need to compare the motor skill performance levels of the hearing-impaired and non-hearing-impaired students of Volta school for the Deaf and St. Francis Junior Secondary School all in Hohoe municipality. This was to enable me find out if any significant differences existed between the two groups.

Research Hypotheses

The following research hypotheses were tested;

1. There would be significant difference between the students with hearing-impairment and non hearing-impairment in Speed Test.
2. There would be significant difference between the students with hearing-impairment and non hearing-impairment in Balance Test.
3. There would be significant difference between the students with hearing-impairment and non hearing-impairment on Coordination Test.

Motor-Skill Related Physical Fitness Components

The motor skill-related components include; ability, balance, coordination, power, speed and reaction time. According to Colfer (2004) [8], while physical fitness and a healthy lifestyle are desirable, many people also participate in a variety of competitive sports or mission-related competition. Success in games and contests require more than just being fit. It demands motor skill-related physical fitness components to enable one to move and perform more efficiently, whether it is in work-related activities, daily movement functions, or in sports performance. Further, health-related physical fitness may also benefit from skill-related physical fitness, since persons who possess skill-related fitness are more likely to be active throughout life.

Motor skill-related physical fitness is compatible with health-related physical fitness. Many activities promote both types. Individuals, who possess both, will find participation in either type of activities more enjoyable and beneficial to their health and physical well-being. A person who is physically active cannot help but improve some aspects of skill-related physical fitness.

Speed

Speed is defined as the production of repeated maximal muscular contractions over a short distance within minimal period of time (Beashel & Taylor, 1996). According to Prentice (1994) [22] speed is the ability to perform a particular movement very rapidly. It is a function of distance and time.

It is an important component for successful performance in many competitive athletic situations. Speed can also be defined as the ability to perform a movement in a short period of time (Corbin, *et al*, 2000) [9]. Speed can be improved by practice. According to Dick (1992) [13], speed in training theory is defined as the capacity of moving a limb or part of the body's lever system or whole body with the greatest possible velocity.

Speed is measured in metres per second, for example, in quantifying the value for speed of moving one part of the body's lever system relative to another, the forward speed of the body in sprinting or a point of take-off in jumping, and the velocity of implements and balls at release or being struck. The time taken to achieve a certain task may also be considered a measure of the athlete's speed. The number of repetitions of a task within a short period of time might be considered an index of speed (Dick, 1992) [13].

Balance

The complex quality called balance involves reflexes, the inner ear, the cerebellum, and the skeletal-muscular system which forms a specific kind of coordination. Balance is defined to be the ability to maintain some degree of equilibrium while moving or standing still (Prentice, 1994) [22]. According to Auxter, Pyfer, & Huettig, (1997) [4] balance is the ability to maintain equilibrium in a held position (static) or in moving position (dynamic). The ability to maintain the equilibrium of the body manifests itself in two types, static balance, and dynamic balance. Static balance involves the maintenance of equilibrium in a fixed position such as while standing on one foot on a narrow stick for a period of time. Dynamic balance on the other hand is when the equilibrium must be maintained while moving. Walking on a balanced beam is an example of dynamic balance. According to Sherrill (1993) [25], balance is a more global term, referring to the control processes that maintain body parts in the specific alignments necessary to achieve different kinds of mobility and stability. Most sensory systems (vestibular, kinaesthetic, tactile, and visual), interact with environmental variables to bring about balance. According to Auxter, Pyfer, & Huettig, (1997) [4] until balance becomes an automatic, involuntary act, the central nervous system must focus on maintaining balance to the detriment of all other motor and cognitive functions. Balance development is dependent on vestibular, visual reflex, and kinaesthetic development. When these systems are fully functioning, high levels of balance development are possible. The basic factors which influence balance are the height of the centre of gravity, the size of the base of support and the line of gravity.

But the principles which aid balance include

1. The lower the base, the greater the balance and stability
2. The larger the base of support, the greater the balance and stability
3. The more nearly centred the line of gravity is to the centre of the base of support, the greater the stability.

Activities that can be used to promote static balance include

1. Freeze tag - the children play tag, the child who is caught is "frozen" until a classmate "unfreezes" the child by tagging him or her. "It tries to freeze everyone".
2. Statue' - the child spins around and then tries to make himself/herself into a "statue" without falling.
3. Tripod - the child balances by placing forehead and both hands on the floor, kneels and balances on elbows to form tripod balance.

Activities that can be used to promote dynamic balance include

1. Hopscotch
2. Various types of locomotors movements following patterns on the floor
3. Races using different types of locomotors movement
4. Walk forward heel to toe between double lines, on single line, and then on balance beam, make this more demanding by having child balance a bean bag on different body parts (e.g. head, shoulder, wrist, etc) while walking on the balance beam.

Cues to poor balance developments include

1. Inability to maintain held balance position, e.g. standing on one foot, stand heel to toe with eyes open
2. Inability to walk heel to toe on a line or on a balance beam
3. Tipping or falling easily.
4. Wide gait while walking or running (Auxter, Pyfer, & Huettig, 1997) [4].

According to Sherrill (1993) [25], input from both semicircular canals and the sacs are needed in all kinds of balance. This is because the head moves in many ways during both static and dynamic balances. The principle of specificity tells us that there are many kinds of static and dynamic balances, and a test of balance in one position will not yield data that are generalized to other positions. The maintenance of balance involves both sensory input and motor output. Many motor impulses are generated to control balance. Some go directly to muscles that activate reflexes and or reactions, some go to the cerebellum, and some go to midbrain nuclei of cranial nerves that innervate the eye muscles.

Balance in young children is heavily influenced by vision, whereas adults rely more on tactile and kinaesthetic input (Sherrill, 1993) [25]. This explains why children and persons with developmental delays are encouraged to focus their eyes on a designated point during balance activities. It also explains why blindfolds are often used in testing and remediation of balance.

The vestibular system is well developed at birth, as is evidenced by the calming effect of cradling or rocking the infant in the arms, crib, or rocking chair. Swings, seesaws, merry-go-rounds, and other playground apparatus owe their popularity to children's natural craving for vestibular stimulation. The use of balance boards, various kinds of balance beams, swinging bridges and trampolines in early childhood physical education is based largely on the theory that postulates that the vestibular system is a coordinating mechanism for all sensory function that leads to balance (Sherrill, 1993) [25].

Coordination

This can simply be defined as the ability to use the senses with the body parts to perform tasks smoothly and accurately (Corbin, *et al*, 2000) [9]. It can also be defined in other words as the ability to integrate the senses, visual, auditory and proprioceptive, with motor functions to produce smooth, accurate and skilled movement (Prentice, 1999) [21]. Most bodily motions, even simply holding out a hand involve the precise, accurate movements of dozens of muscles. In order for the body to move uninhibited, there must be a smooth synchronization of muscles. According to Auxter, Pyfer, & Huettig (1997) [4] differential relaxation or controlled tension attributable to the reciprocal action of agonist and antagonist muscles provides for coordination movement without undue fatigue. The nerve signals are processed by the small, rear, wrinkled part of the brain, called the cerebellum, before they pass out to the muscles.

A well-developed sense of motion is important to good coordination. This sense, in cooperation with vision and sound, allows the athlete to get information from the muscles, as well as the body's spatial position and dynamics of movement (e.g. speed). Athletes with a well-developed sense of motion can make corrections during the execution of movements and are able to imagine and visualize each element of very complex activities. Coordination is influenced by the genetic makeup of the individual, as well as the individual's imagination, acquired skills and experience. During human development, coordination improves along with the state of nervous system.

Methodology

The aim of this study was to compare the motor skill performance levels of students with hearing-impairment and students without hearing-impairment in the Hohoe municipality.

A cross-sectional design was used in conducting this study. Cross-sectional research is a research method often used in developmental psychology, but also utilized in many other areas including social science and education. This type of study utilizes different groups of people who differ in the variable of interest, but share other characteristics such as socio-economic status, educational background, and ethnicity. For example, researchers studying developmental psychology might select groups of people who are remarkably similar in most areas, but differ only in age. By doing this, any differences between groups can presumably be attributed to age differences rather than to other variables.

A cross-sectional design can also be defined as a quasi-experimental design between subjects which the people involved are observed at different ages and, or at different periods of time in a time-based sequence (Heiman, 2002) [17]. Cross-sectional study is observational in nature and is known as descriptive research, not causal or relational. Researchers record the information that is present in a population, but they do not manipulate variables. This type of research can be used to describe characteristics that exist in a population, but not to determine cause-and-effect relationships between different variables. This method is often used to make inference about possible relationships or to gather preliminary data to support further research and experimentation.

Cross-sectional design is a descriptive study (neither longitudinal nor experimental). Data were collected to determine the current motor skill-related physical fitness levels of the two groups of students to find out if any significant difference existed between them.

A great advantage of cross-sectional designs is that the study can be conducted and finished easily and fairly quickly. However, a disadvantage of these types of designs is that the conditions might become different in terms of how many confounding variables there are (Heiman, 2002) [17].

Population

The target population was the students of Volta School for the Deaf and all basic school students in the Hohoe Municipality. Students of Volta School for the Deaf were with hearing-impairment, while their counterparts from the other basic schools were students without hearing-impairment.

Sample and Sampling Technique

Volta School for the Deaf was selected purposely for the study because it was the only school for the deaf in the region and for that matter in the Hohoe Municipality. A simple random sampling technique was used to select St. Francis Junior Secondary School from among mixed schools in the municipality that had students without hearing- impairment. The population of Volta School for the Deaf was 250, made up of 159 boys and 91 girls. St. Francis Junior Secondary School on the other hand, had a student population of 348, constituting 228 boys and 120 girls. Volta School for the Deaf had two categories of students. The students who have hard of hearing problems were 10 and those with total deafness number 240. However, in the absence of reliable gadgets to certify the level of deafness in the students, the researcher relied on the statistics provided by the school and random sampling was used to select only those with total deafness.

As a result of the breakdown of the target population into boys and girls, it was clear that there were more boys in both schools than girls. A sample frame of all students from each class was obtained from the two schools and a table of random numbers was used to select the samples from each school. A stratified random sampling technique was used to select 30 boys and 20 girls from each school for the study. This made the total sample from the two schools to be 60 boys and 40 girls.

Instrumentation

The University of Illinois Test Instruments designed by American Alliance of Health, Physical Education, Recreation and Dance (AAHPERD) in 1986 was used to collect data. The test items included:

- 30m dash for running speed.
- Stork stand test for static balance.
- Bass test for dynamic balance.
- Alternate hand-wall toss test for eye-hand coordination.
- Kicking a moving ball with the foot test for eye-foot coordination.

Validity and Reliability of Test Instrument

According to Amin (2005) [3], validity is the extent to which the instruments used during the study measure the issues they are intended to measure. As a standardized instrument it has been validated and is widely used in the United States of America, Europe and other parts of the world for all categories of people. Test reliability refers to the degree to which a test is consistent and stable in measuring what it is intended to measure. Reliability will depend upon how strict the test is conducted and the individual's level of motivation to perform the test (David 2000, David, 2008) [11]. Also reliability is the extent to which the measuring instrument will produce consistent scores when the same groups of individuals are repeatedly measured under the same conditions (Amin, 2005) [3]. As a validated instrument its reliability is assured.

Data Collection Procedure and Data Analysis

The data on each subject's performance on the tests and the measurements of motor skill-related physical fitness components were collected with the help of five (5) research assistants who were physical education teachers and have knowledge of test and measurement. The research assistants were trained on the mode of the assessment.

Written permission was sought from the two schools four weeks before the day for the testing. Four separate days were used to collect the data for the two groups. On the first two days, at the St. Francis College of Education field, all the subjects from St. Francis Junior Secondary School were tested using the six test items. The participants were briefed a day earlier and were given details of what was entailed in the test and measurement. Just after morning assembly, the students in the company of three of their teachers arrived on the field for the testing. After taking the students round the 6 test venues on the field, the research assistants took them through warm-up and stretching for about twenty minutes before the testing began. Likewise, on the third and fourth days at Hohoe Evangelical Presbyterian Secondary School (HEPSS) field, the subjects from Volta School for the Deaf were conveyed to the field on board the school bus in the company of three of their teachers for the test. The accompanying teachers from Volta School for the Deaf played the role of sign language interpreters. The HEPSS field has the same facilities just like the St. Francis College of Education Park. The two are the same in size as well. The students arrived at about 8:00am and were quickly shown round the testing areas. They were also taken through vigorous warm-up and stretching by the research assistants before the testing began.

The testing started at 8.45am on each day and ended at 12.45pm.The research assistants were given special assignments which they carried out throughout the testing for the two days. The research assistants were responsible for recording on the cards.

The description of the test items and how they were conducted were as follows:-

30m Dash for Running Speed

Purpose: To measure running speed.

Apparatus: Running track, pencil, paper and a stop watch.

Activity: From a marked starting position or point, the participant ran to a finish line as fast as possible starting from a crouch position. (One attempt only but in case of a false start another chance was given)

Score: The seconds (time) made was recorded as the score obtained, to the nearest whole number.

Stork Balance Stand

Purpose: To measure the static balance of the performer.

Apparatus: Flat, non-slip surface, pencil, paper and stop watch.

Activity: From a comfortable standing position, the participant placed the hands on the hips and then lifted one leg and placed the toes against the knee of the other leg. On command, the participant raised the heel of the standing leg and stood on the ball of the foot for as long as possible.

Score: The seconds (time) the participant was able to balance on the ball of the foot was recorded as the score to the nearest whole number.

The Bass Test

Purpose: To measure the ability to maintain balance while in motion (dynamic balance).

Apparatus: Eleven circles of 24cm diameter, measuring tape and stopwatch.

Activity: Standing on the dominant foot in the first circle, the participant leap forward from one circle to the next, alternating the legs. Only the ball of the foot was to touch the ground, and the participant stood in each circle for five seconds before leaping into the next circle, (one assistant was assigned to time- 5sec).

Score: The participant who finished successfully scored the full mark of 50. A successful leap in each circle was 5 marks. A failure at any point was minus 3 points (one attempt only).

The Alternative Hand-Wall Toss Test

Purpose: To measure eye-hand coordination.

Apparatus: Tennis ball, a stop watch and a smooth wall.

Activity: Standing two metres away from a smooth wall and at a signal, participant threw a tennis ball with the right hand against the wall and caught it with the left hand. He/she then threw it with his/her left hand and caught it with the right hand. The participant was not allowed to move from where he/she stood (one attempt only).

Score: The number of successful throws against the wall and catching in 30 seconds was recorded as the score.

Kicking a Moving Ball with the Foot

Purpose: To measure eye-leg coordination;

Apparatus: A football and a playing field.

Activity: From a starting line, the football was thrown into the path of the performer. The performer sprinted within 6 metres to meet the ball as he/she was moving and kicked it.

Score: Any successful contact of the ball scored 50 points.

The data were analyzed using the Statistical Package for Social Sciences (SPSS) windows 15.0. The data collected were entered onto the SPSS programme and analyzed using the Mean, Standard Deviation, Standard Error of Mean and Independent sample t- test. The independent sample t-test used to test for the significant differences was chosen because there were only two different groups for comparison. The independent sample t- test was used to find out whether any differences existed among the students with hearing-impairment and the students without hearing-impairment concerning their motor skill-related physical fitness level. It tested the statistical hypotheses that; there were no significant difference in motor skill-related physical fitness between students without hearing-impairment and those with hearing-impairment. An alpha level of 0.05 (2 tailed) was used in analysing data.

Results, Findings and Discussions

The purpose of the study was to compare the motor skill performance levels of students with hearing-impairment and students without hearing-impairment and to find out if any differences existed between them.

Data were organised to identify the existence of observed pattern and, or differences across the target groups. Key statistics were mean, standard deviation and standard error of mean of motor skill-performance levels for comparison between the target groups. In testing the significance of the observed differences or pattern, the t-test statistical technique was used where the mean, standard deviation and standard error of mean of the test scores on motor skill-performance levels for the groups were compared.

Hypothesis 1

There would be significant difference between the students with hearing-impairment and non-hearing-impairment in Speed Test

Table 1: Independent samples t-test of the two groups in running speed (30m dash)

Group	M	SD	SEM	N	Df	T	Sig
Normal	5.680	0.794	0.112	50	98	6.093	.000(s)
Deaf	4.680	0.794	0.112	50			

[*P*<.05, S = significant.

Table 1 illustrated the test values obtained by both the students with hearing- impairment and students without hearing-impairment. The independent samples t-test analysis showed that there was significant difference between the students with hearing- impairment and the students without hearing-impairment with [t (98) = 6.093, *P*<.05], While the students without hearing-impairment obtained a mean (M) of 5.680, the students with hearing-impairment obtained a mean (M) of 4.680. The two groups obtained the same standard deviation (S) of 0.794 and a standard error of mean (SEM) of 0.112. The hypothesis which stated that there would be significant difference between the two groups regarding running speed (30m dash) could not, therefore, be rejected.

Table 2: Independent samples t-test of the two groups in running speed (50m sprint)

Group	M	SD	SEM	N	df	T	Sig
Normal	4,980	0.869	0.123	50	98	0.230	.819(ns)
Deaf	4.940	0.818	0.116	50			

P>.05, NS = not significant.

From table 2, the students without hearing-impairment obtained a slightly higher mean (M) than their counterparts with hearing-impairment. The students without hearing-impairment obtained a standard deviation (S) of 0.869, whilst their counterparts with hearing-impairment obtained 0.818. The standard error of mean (SEM) of the students without hearing-impairment was also slightly higher than that of the students with hearing-impairment. The independent samples t-test analysis showed that there was no significant difference between students with hearing-impairment and those without hearing-impairment at [t (98) = 0.230, *P*>.05], Consequently, the hypothesis which stated that there would be a significant difference regarding running speed (50m sprint) was rejected.

Hypothesis 2

There would be significant difference between the students with hearing-impairment and non hearing-impairment in Balance Test.

Table 3: Independent samples t-test analysis of the two groups in static balance

Group	M	SD	SEM	N	df	T	Sig
Normal	63.440	19.130	- 2.705	50	98	3.945	.000(s)
Deaf	43.540	26.539	3.753	50			

P<.05, S= significant.

Table 3 showed the test values obtained by both students with hearing-impairment and those without hearing-impairment on static balance. A comparison of the means (M) indicated that while students with hearing-impairment obtained 43.540 as mean value, students without hearing-impairment obtained 63.440 as their mean value. This showed that the students without hearing-impairment were better in terms of static balance.

The independent samples t-test showed that there was significant difference between the students with hearing-impairment and those without hearing-impairment at [t (98) = 3.945, *P*<.05], This depicted that the hypothesis which stated that there would be significant difference between the students with hearing-impairment and those without hearing-impairment regarding balance (static balance) could not be rejected.

Table 4: Independent samples t-test analysis of the two groups in dynamic balance

Group	M	SD	SEM	N	df	T	Sig
Normal	46.060	8.860	1.253	50	98	3.025	.004(s)
Deaf	41.200	6.354	0.899	50			

P<.05, S = significant.

Table 4 outlined the test values obtained by both the hearing-impaired and non-hearing-impaired students on the Bass Test for dynamic balance. Whereas the students without hearing-impairment had a mean of 46.060, the students with hearing-impairment had 41.200 as the mean value. This showed that the students without hearing-impairment performed better in the dynamic balance test than their counterparts without hearing- impairment.

The independent sample t-test showed that there was significant difference between students with hearing-impairment and those without hearing-impairment at [t (98) = 3.025, *P*<.05]. This also indicated that the hypothesis, which stated that there would be significant difference regarding balance (dynamic balance), could not be rejected.

Hypothesis 3

There would be significant difference between the students with hearing-impairment and non-hearing-impairment in eye-hand Coordination Test.

Table 5: Independent samples t-test analysis of the two groups in eye-hand coordination

Group	M	SD	SEM	N	df	T	Sig
Normal	10.780	8.551	1.209	50	98	3.269	,028(s)
Deaf	6:820	8.012	1.133	50			

P<.05, S= Significant.

Table 5 illustrated the test values obtained by both students with hearing- impairment and those without hearing-impairment in the alternate hand wall ball juggle test for eye-hand coordination. While the students with hearing-impairment obtained a mean value of 6.820, a standard deviation of 8.012 and a standard error of mean of 1.133, their counterparts without hearing-impairment obtained a mean value of 10.780, a standard deviation of 8.551 and a standard error of mean of 1.209. The independent samples t-test indicated that there was significant difference between the students with hearing-impairment and the students without hearing-impairment at [t (98) = 2.269, *P*<.05]. However, the difference between the two groups indicated that the students without hearing-impairment were more coordinated in terms of their eye-hand coordination. Consequently, hypothesis which stated that there would be significant difference between the student's with hearing-impairment and those without hearing- impairment regarding their eye-hand coordination could not be rejected.

Table 6: Independent samples t-test analysis of the two groups in eye-foot coordination

Group	M	SD	SEM	N	df	T	Sig
Normal	10.300	8.416	1.190	50	49	1.097	.278(ns)
Deaf	8.600	7.426	1.050	50			

P>.05, NS = Not significant.

Table 6 showed the test values obtained by both students with hearing-impairment and those without hearing impairment in the eye-foot coordination test of kicking a moving ball. While the students with hearing-impairment obtained 8.600 as mean, the students with normal hearing obtained 10.300.

The independent samples t-test showed that there was significant difference between the students with hearing-impairment and the students without hearing- impairment at [t (98) = 1.097, *P*<.05]. Thus, the hypothesis, which stated that there would be significant difference between the hearing-impaired and students without hearing-impairment regarding eye-foot coordination, could not be rejected.

Discussion of Findings on Hypothesis 1

The finding on independent samples t-test of the two groups in running speed (30m dash) in Table 1 was not surprising because the students without hearing- impairment were expected to hear the command as well as see the signal. According to Winnick (1995) [30], lighting systems placed 50 meters in front of the starting blocks and the side of the track was used to signal the start of a race. Unfortunately, the lighting systems were not put in place thus leading to the low performance of the students with hearing- impairment. Also, according to Groves (1989) [16], in individual sports and athletic events, physically able deaf children can, of course, excel. She added that just a few adaptations were necessary, thus, starting signals should be visible as well as audible. This was put in a different form by Sherrill (1993) [25] that deaf students may demonstrate delays or perform below average simply because they do not understand test instructions or test instructions were not well explained.

According to Auxter *et al*.., (1997) [4], one characteristic that may be negatively affected by hearing-impairment was motor speed. They further explained that it would take a longer period for the child to process information and complete a motor act. Because of the late processing of information, Silvia Kauahuma who won two bronze medals at the 1997 Deaflympics Games for South Africa could not compete in the Olympic Games (Lieberman, 1999) [19]. It could also be added that due to continuous involvement in physical activities and the range of people to play with, the fitness levels of the pupils without hearing impairment seem better than the pupils with hearing- impairment. According to Siedentop (2001) [26], one can improve his or her speed but to do so, there must be the use of training activities designed to be specific to the outcomes intended.

The findings on independent samples t-test of the two groups in running speed (50m sprint) in Table 2 revealed that the students with hearing-impairment performed better than the students without hearing-impairment. The students with hearing- impairment obtained a mean (M) value of 4.940 while students without hearing- impairment obtained 4.980 as mean (M) value. Comparing the speed levels of the students with hearing-impairment on the 30m dash to the 50m sprints from a flying start, the findings revealed that, they performed better on the 50m sprints. In the 50m sprints, there was a 20m flying start, and they sprinted for the remaining 30m for time. It meant that the 30m with straight command was not favourable to the students with hearing- impairment but a flying start was better for them. Auxter *et al*.., (1997) [4], commented that one characteristic that may be negatively affected by hearing-impairment was motor speed. That is, the time it takes a child to process information and complete a motor act would be very long; it means that the 20m flying start is enough time for the deaf athlete to process the information.

The results showed that physically able students with hearing-impairment can perform well in some physical activities. According to Groves (1989) [16], physically able deaf children can, of course, excel. This was emphasized by Beashel and Taylor (1996) [5] that speed can be improved by practice (as well as increase in speed) if one runs in a proper manner. They explained further that it was obvious that movement time would decrease if one stood too straight or too far forward when running for speed.

Discussion of Findings on Hypothesis 2

The findings on independent samples t-test analysis of the two groups in static balance in Table 3, revealed the significant difference in performances between the students with hearing-impairment and those without hearing-impairment in the Stork Stance Test item. Statistical test values indicated that while the hearing-impaired obtained a mean (M) test value of 43.540, their counterparts without hearing-impairment obtained 63.440 as mean test value. The independent samples t-test value indicated that the students without hearing-impairment were better in activities requiring static balance. This result tied up with similar results by Auxter, Pyfer, & Huettig (1997) [4], that impairment of the semi-circular canals, vestibule of the inner ear and or vestibular portion of the eighth cranial nerves has negative effect on balance. This was supported by Sherrill (1993) [25], in her book "Adapted Physical Activity, Recreation and Sport: cross disciplinary and lifespan", that performance in motor skills and patterns is the same as for hearing persons except when inner ear balance deficits exist.

This finding, notwithstanding, indicates that static balance was better in students without hearing-impairment than in students with hearing-impairment. According to Winnick (1995) [30], one possible explanation is that if the semi-circular canals of the inner ear are damaged, balance problems are likely to occur. He explained further that these balance problems may, in turn, cause developmental delays.

The findings on independent samples t-test analysis of the two groups in dynamic balance in Table 4 revealed that the students with hearing-impairment cannot perform to standard in activities that required dynamic balancing. This was confirmed in Table 4 that the students without hearing-impairment were better in terms of dynamic balance. While the students with hearing-impairment obtained a mean value of 41.200, those without hearing-impairment obtained 46.060 as their mean test value. The independent samples t- test indicated that students without hearing-impairment were better on activities involving dynamic balance. This was supported by Akuffo (1998) [1], that dynamic balancing is a problem to the students with hearing-impairment and that focus should be on activities that are challenging, like walking on a balance beam and so on. Also, according to Auxter, Pyfer, & Huettig (1997) [4], impairment of the semi-circular canals, vestibule of the inner ear and or vestibular portion of the eighth cranial nerves has a negative effect on balance. Winnick, in his book “Adapted Physical Education and Sports”, supported the fact that if the semicircular canals of the inner ear are damaged, balance problems are likely (Winnick, 1995) [30]. It was also reported that there is significantly depressed balance performance by children with sensory neural hearing-loss of below 65 decibels (Auxter, Pyfer, & Huettig, 1997) [4].

According to Sherrill (1993) [25], the inner ear governs both hearing and balance and that if the vestibular apparatus is damaged, static and dynamic balances are impaired. She also stated that dynamic balance has very low correlation with static balance and should be assessed and remediated separately. Balance is extremely task specific, so success on one balancing task cannot be generalized to other task, even those of the same type (Sherrill 1993) [25].

Discussion of Findings on Hypothesis 3

The findings on independent samples t-test analysis of the two groups in eye-hand coordination in Table 5 produced a significant difference between the two groups. The independent samples t-test of the groups indicated that the students without hearing- impairment looked much more coordinated in terms of eye-hand coordination than their counterparts with hearing-impairment. It was also deduced that the size of the tennis ball used may also be a factor. Balancing and coordination are problems to the students with hearing-impairment and that focus should be on activities that are challenging, like walking on a balance beam and so on (Akuffo, 1998) [1]. Also, according to Auxter, Pyfer, & Huettig, (1997) [4], impairment of the semi-circular canals, vestibule of the inner ear and or vestibular portion of the eighth cranial nerve has a negative effect on balance and coordination. In addition to that, Auxter, Pyfer, & Huettig (1997) [4], state that analysis of perceptual attributes important to skilled motor performance indicates that extercoptors like eyes and ears as well as proprioceptors like vestibular and kinaesthetic receptors are important avenues for receiving information from the environment. Deficits in information from these senses may result in deficits in performance of physical activities that increases coordination and balance. They went further to state that impaired balance interferes with postural and locomotors efficiency as well as eye-foot and eye-hand coordination (Auxter, Pyfer, & Huettig, 1997) [4]. According to Lieberman’s (1999) [19] publication, “Sport is Life” on the Internet http://www.clercenter.gallaudet.edu.), coordination is influenced by the genetic make-up of the individual, as well as the individual’s imagination, acquired skills and experience. As a result of the above statement, it means that, the hearing-impaired did not develop their eye-hand coordination during the school period.

According to Crowe, Auxter,& Pyfer, (1981) [10], play in preschool years is important in learning social skills and in the development of motor skills. They further stated that the role of play, which is so important to social, psychological and motor aspects of development in typical children, is usually limited in deaf children (Crowe, Auxter, & Pyfer, 1981) [10]. Akuffo (1998) [1] stated categorically that the pupils with hearing-impairment with vestibular dysfunction are uncoordinated and lack control of motor responses.

The findings on independent samples t-test analysis of the two groups in eye-foot coordination in Table 8 produced no significant differences in performance between the two groups. It revealed that the students with hearing-impairment were more coordinated in the eye-foot coordination. This is contrary to what Akuffo (1998) [1] said, that the students with hearing-impairment are uncoordinated and lack control of motor responses.

Curtis Pride, a deaf soccer star played for the USA in the FIFA under 17 World Championship in China (Jamie, March, 2005). Though Curtis was deaf, he was coordinated and played with his colleagues efficiently. Fencer Frank Bartolillo represented Australia in the Athens Olympic Games in 2004 (Jamie, March, 2005). Fencing is a skill, where body movement is paramount, but Bartolillo was successful. This indicates that he was well coordinated. According to Pinchas (2004) [20], Terence Parkin of South Africa took silver in the 200m-breast stroke at the Sydney Olympic Games in 2000. Though he was deaf, he was able to swim past able-bodied competitors to come second.

Summary

The purpose of the study was to compare the motor skill performance levels of students of hearing-impairment and those without hearing-impairment in the Hohoe Municipality and to find out if any differences existed.

The major research problem of the study focused on the three motor-skills performance (speed, balance and coordination) levels between the students with hearing-impairment and those without hearing-impairment using test items selected from the University of Illinois test instruments designed by AAHPERD, 1986 and the SEMU test instruments. The study involved a randomized population of 100 pupils aged between 12 and 18 years, from St. Francis Junior Secondary School and Volta School for the Deaf, both in the Hohoe Municipality in the Volta Region of Ghana. The data for the study were collected on four separate days. Day 1 and 2 were at St. Francis College of Education Park for the students without hearing-impairment and Day 3 and 4 were at the Hohoe Evangelical Presbyterian Secondary School Park for the students with hearing-impairment. Data obtained from the test of both groups were analyzed using the independent sample t-test to determine whether any significant differences existed.

The summary of findings of the study is presented in six main sections according to the six sub-hypotheses. The results revealed that:

1. The hearing-impaired could only compete favourably with the students without hearing- impairment in terms of speed, if flying start for the sprints is adopted. This would enable the hearing-impaired child to process the information fast enough for him or her to react.
2. The findings on balance showed that there was significant difference between the students with hearing-impairment and the students without hearing-impairment. It also showed that the hearing-impaired could not perform balance activities correctly.
3. The students with hearing-impairment were not coordinated considering eye-hand coordination but were a little better regarding eye-foot coordination. It may be attributed to the size of the ball. There was no significant difference with one test item and a significant difference with the other.

Conclusion

Based on the findings of the study and the conclusions drawn, the following recommendations were made:-

1. Flying start should be adopted for short distance (sprint) events.
2. More activities which will help to develop balance should be taught in the schools, for example, walking on a balance beam and standing on one leg.
3. The development of motor skills and knowledge of it must begin in the earliest years of primary school in the special schools.

It was clear that the hearing-impaired cannot perform better than those without hearing-impairment with regards to running speed except when the flying start is used before hitting the starting point. It was also clear that the hearing-impaired hardly succeeded in balance activities. From the findings, both static and dynamic balance exhibited by the hearing-impaired could be described as very poor. This showed that the damage of the semicircular canals of the inner-ear in most hearing-impaired which creates balance problems may be affecting most of them.

It was clear that since their inability to compete in speed, balance oriented events, they resorted to stationary activities that mainly help to develop power. It was clear from the findings that the hearing-impaired is poor in eye-hand coordination but quiet good in eye-foot coordination. Again, activities that dealt with eye- hand coordination were minimal among the hearing-impaired but the ability to use the foot seemed more pronounced especially where boys regularly play football. This was reflected in the t-test values obtained which was interpreted to mean that most sporting activities introduced in the schools were more of eye-foot coordination and most of the children participated in them.

With the above presentation, it can be said emphatically that, there was significant difference between the hearing-impaired and those without hearing-impairment regarding their motor skill performance levels.

Implications

The findings of this study have a series of implications for the Ministry of Education, Ghana Education Service and other stakeholders concerned with the total development of the child with hearing-impairment and the disable child as a whole. The Ministries of Education and Youth and Sports in close collaboration with the Ghana Education Service should embark upon a vigorous educational campaign for the teaching of Physical Education in hearing-impairment (Deaf) institutions in Ghana.

Almost, all schools for the Deaf in Ghana lack physical education teachers, sports facilities and equipment which could help to promote physical education among these groups of people. Consequently, if Government, District Assemblies, Non-Governmental Organization and other stakeholders could support the schools for the Deaf by donating money, facilities and equipment, it would go a long way to help develop physical education in their schools and continuous participation will help the hearing-impaired improve upon the problems of balance and coordination and processing of information.

In the same vein, more physical education teachers should be trained in adapted physical education programmes and curriculum in the colleges of education should be restructured so that the general education could handle the hearing-impaired in a physical education class.

Recommendations

From the findings of the study, it is recommended that additional research is conducted on the topic using a larger population involving another age group for example those who have just finished school. It is also recommended that similar research should be conducted on the following areas:-

i. Students of the school for the Deaf and private schools for the hearing.
ii. Only female students of non-hearing-impairment schools and Deaf schools.

References

1. Akuffo PB. Issues in Adapted Physical Education for children with special needs and specific learning disabilities. Unpublished teaching pamphlet, University of Education, Winneba. 1998.
2. America Alliance of Health, Physical Education, Recreation and Dance Test Batteries; Reston, USA. 1986.
3. Amin ME. Social Science Research: Conception, Methodology and Analysis. Kampala, Uganda, 2005.
4. Auxter D, Pyfer J, Huettig C. Principles and Methods of Adapted Physical Education and Recreation. Dubuque: McGraw Hill Companies, 1997.
5. Beashel P, Taylor J. (Eds) Advanced studies in Physical Education and sports survey: Thomas Nelson and Sons Ltd. CMD Statistics. Archived from the original. 1996. http://www.cmdeaf.org/stats/stats.asp. Retrieved 2007-12-28.
6. Blinde ME, McCallister GS. Listning to the voices of students with physical disabilities. Journal of Physical Education, Recreation, and Dance, 1998.
7. Block ME, Vogler EW. Inclusion in regular physical education: The research base. Journal of Physical Education, Recreation, and Dance, 1994; 65(1):40-44.
8. Colfer G. The Hauchuca Scout. Newsletter on internet 2004. @http://www.Huachucascout.com. (Retrieved on May 30, 2005).
9. Corbin CB, Lindsey R, Welk, G. Concept of Physical Fitness active lifestyle for wellness. Dubuque: McGraw-Hill Companies, 2000.
10. Crowe WC, Auxter D, Pyfer J. Principles and Methods of Adapted Physical Education and Recreation. London: C.V. Mosby Company, 1981.
11. David LH. Critical Disability Theory; A paper presented at the 4th Biennial Disability Studies Conference at Lancaster University, UK, Sept. 2008, 2-4.
12. Devlin R. Jurisprudence for judges: Why legal theory matters for social context education. Queen’s Law Journal. 2000; 27:161-205.
13. Dick FW. Sports training principles, London, A&C Black. Donaldson, J. Changing attitudes towards handicapped persons: A review of research. Exceptional Children, 1992; 46:504-514.
14. Goodwin DL. The meaning of help in PE: Perceptions of students with physical disabilities. Adapted Physical Activity Quarterly, 2001; 18:289-303.
15. Goodwin DL, Watkinson EJ. Inclusive physical education from the perspective of students with physical disabilities. Adapted Physical Activity, 2000; 17:144-160.
16. Groves L. Physical Education for handicapped children. London: Cambridge University Press, 1989.
17. Heiman GW, Research Methods in Psychology (3rd ed.). Boston & New York. Houghton Mifflin Company, 2002.
18. Hodge SR, Ammah JOA, Casebolt K, La Master K, O’Sullivan M. Analysis of inclusion practice in physical education. Unpublished observational behavioural instrument. The Ohio State University, Columbus, OH, 2000.

19. Lieberman LJ, Sports is life. Newsletter on the internet @http://.www.clercenter.gallaudet.edu., 1999.
20. Pinchas PR, CISS eNews @http:www.deaflympics.co, 2004.
21. Prentice WE. Fitness and wellness for life. Dubuque, Iowa: McGraw-Hill Companies Inc., 1999.
22. Prentice W. Fitness for college and life. St. Louis: Mosby, 1994.
23. Place K, Hodge SR. Social inclusion of students with physical disabilities in general physical education: A behavioural analysis. Adapted Physical Activity Quarterly, 2001; 18:389-404.
24. Sherrill C, Heikinaro-Johansson PM, Slininger D. Equal-status relationships in the gym. Journal of Physical Education, Recreation and Dance. 1994; 65(1):27-31, 56.
25. Sherrill C. Adapted physical activity, recreation and sport-cross disciplinary and lifespan. Dubuque, Iowa: Brown Benchmark, 1993.
26. Siedentop D. Introduction to Physical Education, fitness and sport California: Mayfield Publishing Company. Statistics of Christian Ministry for the Deaf, 2001.
27. Slininger D, Sherrill C, Jankowski CM. Children’s attitudes toward classmates with severe disabilities: Revisiting contact theory. Adapted Physical Activity Quarterly, 2000; 17:176-196.
28. UNESCO Charter of Physical Education and Sport (Paris: UNESCO, 1978) http://www.unesco.org/education/nfsunesco/pdf/SPORTE.PDF. (Retrieved November 22, 2011)
29. Victorian Ministry of Education Implementing Ministerial Paper No. 6, Ministry of Education, Melbourne, 1987.
30. Winnick JP. Adapted Physical Education and Sport. Brockport: Edward Brother’s Inc, 1995.