Volume 6, No. 1; February 2018

Advances in Image And Video Processing

ISSN: 2054-7412

Society for Science and Education - United Kingdom

TABLE OF CONTENTS

EDITORIAL ADVISORY BOARD

DISCLAIMER

All the contributions are published in good faith and intentions to promote and encourage research activities around the globe. The contributions are property of their respective authors/owners and the journal is not responsible for any content that hurts someone's views or feelings etc.

AIVP ADVANCES IN IMAGE AND VIDEO PROCESSING
SOCIETY FOR SCIENCE AND EDUCATION UNITED KINGDOM
VOLUME 6, ISSUE 1
ISSN 2054-7412

MR Image Segmentation Based on Contrast Enhancement with Collaborative Learning

[1]Yuchou Chang
[1]Computer Science and Engineering Technology Department, University of Houston - Downtown, Houston, United States
changy@uhd.edu

ABSTRACT

Magnetic resonance imaging (MRI) has been widely used on clinical applications. Due to different weighting strategies MRI, different weighting images have different contrast even for the same anatomy structure of the same subject. Since some MR brain images have low contrast, different types of tissues such as white matter, grey matter, and cerebrospinal fluid (CSF) are difficult to be divided and segmented. Image contrast needs to be enhanced for better post-processing and image analysis. In this paper, a two-step MR brain image segmentation technique is proposed to solve low contrast MR image segmentation problem. A collaborative learning based image enhancement is firstly applied on low contrast MR brain image. Then, spectral clustering algorithm is used for segmenting enhanced image. Experimental results illustrate that the proposed 2-step segmentation method is able to identify boundaries between tissues well, so that MR image segmentation accuracy is improved in compared to image segmentation without contrast enhancement and exact histogram equalization enhanced image segmentation.

Keywords: MR Image Segmentation, Image Enhancement, Spectral Clustering, Histogram Equalization, and Collaborative Learning.

1 Introduction

Magnetic Resonance Imaging (MRI) [1] has become an important aided tool in the clinical medical analysis of brain tissue structure to analyze the visualized three-dimensional reconstruction of disease diagnosis and surgical treatment, because of its advantages of non-invasion, high resolution, and good imaging quality. Compared with other medical imaging methods, MR imaging has higher soft tissue resolution and approximate anatomical imaging display, which can reflect the biochemical characteristics of organs or tissues and is very suitable for human brain imaging. Image segmentation [2] is an important image analysis technology, which determines the final analysis quality. It is the technical process of dividing the image into regions with different features and extracting the target of interest. With the wide application of medical images in clinical diagnosis, image segmentation has played an increasingly important role in medical image analysis. It is also the prerequisite and key technology of medical image visualization, image fusion, pattern recognition and image guided surgery. It is also the basis of practical application of medical image processing system in clinic. Due to the complexity and diversity of medical images, no segmentation algorithm is suitable for all images. Brain magnetic resonance (MR) image segmentation, as the basis of brain image analysis, plays a guiding role in the research of brain tissue brain diseases. It is also difficult in the field of image

DOI: 10.14738/aivp.61.4089
Publication Date: 03rd Feb, 2018
URL: http://dx.doi.org/10.14738/aivp.61.4089

processing. Segmentation is to divide brain images into several regions with different tissues like white matter, grey matter, and cerebrospinal fluid (CSF). The process of obtaining the regions of interest mainly includes brain normal tissue segmentation and abnormal lesion segmentation.

Image contrast [3-5] refers to the measurement of different levels of brightness between the brightest white and the darkest black in the light and dark regions of an image. The bigger the difference is, the higher the contrast is. The signal intensity of the magnetic resonance image is the result of a combination of T1, T2, proton density, flow, diffusion, perfusion, and other factors affecting signal emission in the voxel or the pixel. Compared with other medical imaging modalities, MRI has more parameters and more complicated design, which provide technology to improve the contrast between different tissues. For example, the human brain MRI is to detect the hydrogen signal of the tissue. Different tissues have different hydrogen contents, and can display high or low signal in different parameter choices, which gives a lot of choices on clinical applications. Therefore, MR image can provide richer information. However, since different contrast images can be produced for the same brain region, image segmentation is different on those different contrast images, even if the same segmentation method and parameters are used. High contrast MR brain image can increase segmentation accuracy in compared to segmentation on low contrast images. For this reason, image enhancement is necessary to be implemented before segmentation for obtaining accurate segmentation.

Spectral clustering [6] extracts the eigenvectors by eigenvalue decomposition of the data matrix to realize spectral mapping from high-dimensional complex structures to low-dimensional simple structures, and obtains a low-dimensional embedding of the original data in the new space. Low-dimensional embedding in the structure is more simple and obvious distribution. Compared with the traditional clustering algorithm, spectral clustering algorithm has obvious advantages. The algorithm can converge to the global optimum. In order to apply spectral clustering to the field of image segmentation, reduce the computational complexity and reduce the memory consumption of the algorithm, some methods have been studied and improved the spectral clustering algorithm. In the reference [7], mean shift algorithm [8] is combined with normalized cut algorithm [6] to classify the images by mean shift algorithm, resulting in a relatively large number of pure subclasses. Then by normalized cut algorithm is used for re-clustering these sub-class combination. The reference [9] proposed pixel sampling of the image by the Nyström method by sampling sampling pixel set and unsampled pixel set between weights matrix to obtain the original image weight matrix for generating approximation matrix, and the approximate weight matrix W to approximately replace the eigenvectors of the original weight matrix. Keuchel et al [10] proposed the pixel based matrix weights vector sampling. The matrix of the singular value decomposition is used to approximate the original weight matrix, and then the eigenvectors of the original weight matrix are used to approximate the eigenvectors of the original weight matrix.

A novel MR brain image segmentation method is proposed in the paper. Low contrast MR brain image is enhanced with collaborative learning based image enhancement technique [11] at first. This image enhancement technique outperforms traditional image enhancement technique to make brain tissues contrast obviously. Then, a spectral clustering algorithm is implemented on the enhanced MR brain image for obtaining the segmentation results. The paper is organized as follows. The introduction and background of techniques are presented in the first two sections. The proposed method is given in the third section. Experimental result and conclusion are presented in the last two sections.

2 Background

Image enhancement highlights useful information in an image according to a specific requirement. The purpose of image enhancement is to make the processed image more suitable for the visual characteristics of the human eye or for easy machine recognition. In medical imaging, remote sensing imaging, photography and other fields, image enhancement technology has a wide range of applications. At the same time, image enhancement can be used as a preprocessing algorithm for image processing algorithms such as object recognition, object tracking, feature matching, image fusion, and super-resolution reconstruction. Image enhancement improves the overall image and local contrast. Specifically, image enhancement algorithm not only improves the contrast of the whole image, but also enhances the local details of the image. Noise should be avoided during image enhancement. Noise in the image enhancement process is also enlarged, thus image quality is affected. Furthermore, enhanced image should have a good visual effect. Thus enhanced image should be consistent with the visual characteristics of the human eye. Image enhancement algorithm should have good real-time performance without obvious time delay.

Histogram equalization (HE) algorithm is the most basic image enhancement algorithm. Its principle is simple and easy to implement with good real-time. The histogram equalization algorithm achieves the purpose of increasing the dynamic range of the image and improves the contrast of the image by satisfying the probability density function (PDF) of the image grayscale in the form of approximately uniform distribution [12-14]. There are several improved algorithms based on histogram algorithm. They have their own characteristics. For example, Double Histogram Equalization (BBHE) algorithm, which solves the problem of uneven brightness in the enhanced image local area [15]. Exact histogram equalization [20] considers image enhancement as an ill-posed problem and replaces classical histogram equalization with direct verification of human visual models. Equal area double histogram equalization DSIHE algorithm and the two-dimensional spatial information entropy histogram equalization (SEHE) algorithm make the enhanced image that has the maximum information entropy and solve the problem of loss of image detail information caused by histogram equalization algorithm [16-19]. Maximum brightness double histogram equalization (MMBEBHE) algorithm ensures the least mean value error between the enhanced image and the original image [17]. LMHE algorithm based on logarithm function mapping makes the enhanced image more in line with the human eye visual characteristics [18].

Spectral clustering algorithm can be generalized as the following steps: (1) constructing a similarity matrix W; (2) constructing a Laplacian matrix L according to the similarity matrix W; (3) decomposing L matrix and selecting eigenvectors to produce a feature space; and (4) applying K-means algorithm in feature space to output clustering results. The main advantages of spectral clustering algorithm only need the similarity matrix between data, so it is very effective for clustering sparse data. Traditional clustering algorithm such as K-Means is hard to achieve. In addition, due to the use of dimensionality reduction, the complexity in processing high-dimensional data clustering is better than the traditional clustering algorithm.

Spectral clustering algorithms have the advantage of a wide range of data with different applications. Clustering analysis based on pixels and their features is a very feasible for image segmentation. Therefore, this paper attempts to apply the spectral clustering algorithm to MRI image segmentation. The image clustering based on spectral clustering method is studied in this paper from the improvement of image contrast as a preliminary step to the application in MR image segmentation, especially in the segmentation of multiple inhomogeneous tissues of MR brain image. Finally, the experimental results are given and analyzed and compared.

3 Proposed Method

The proposed framework is summarized in Figure 1. It is seen that the proposed method contains two steps. Original MR image is fed into image enhancement by the collaborative learning based technology [11]. Different tissue regions of enhanced image are easy to be divided into segments. It is then segmented by spectral clustering algorithm for producing the final segmentation result. Image enhancement and segmentation are sequentially combined to form the proposed method.

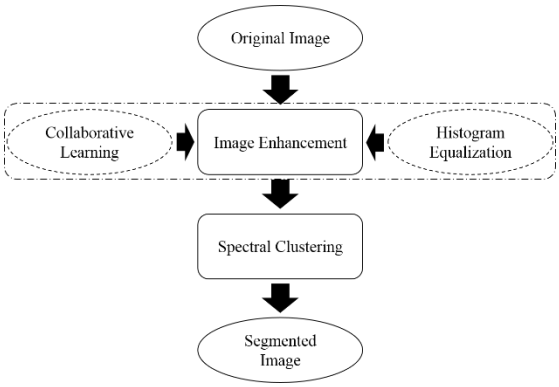


Figure 1. Framework of the 2-step MR image segmentation method.

The proposed image enhancement algorithm comes from collaborative learning of knowledge creation community [11]. The use of collaborative learning helps determine the final gray level of each pixel from multiple perspectives. It does not limit the gray level of each pixel in the context of the local window. This section describes the strategy for setting the gray level of each pixel based on local and global information. Each local window of the original image is randomly sampled for local histogram equalization. Note that both of each local window's center and size are randomly sampled, so that details of local information can be detected and identified. Integrated enhancement method refers to a combination of multiple image enhancers to obtain better results. The integrated model of multiple enhancement local windows has a more generalization ability. This is similar to learning ensemble method. The idea of learning ensemble is to integrate several single classifiers to determine the final classification by some combination of the classification results of multiple classifiers in order to achieve more than a single classifier performance. If a single classifier is compared to a single decision maker, the ensemble approach of learning is equivalent to multiple decision makers which make a joint decision. For training multiple models, the voting method may be used for the classification problem. The category with the largest number of votes may be selected as the final classification. For the regression problem, the mean value may be used as the final result. In this image enhancement technique, final grey values of pixels are calculated by averaging the mean values of multiple local enhanced window images. MR image are enhanced by this algorithm to differentiate tissue regions obviously. More details of the collaborative learning based image enhancement can be seen in the reference [11].

After MR image is enhanced, a spectral clustering algorithm is applied on enhanced image for segmentation, as shown in Figure 1. For the enhanced MR image I_E, all pixel values are given by $P = \{p_1, p_2, \dots, p_n\}$, which is divided into C classes corresponding to C homogeneous regions in final segmentation result. A similarity matrix is calculated as

$$A_{ij} = \begin{cases} e^{-d^2(p_i \cdot p_j)/\sigma^2}, i \neq j \\ 0 \qquad\qquad\quad , i = j \end{cases} \tag{1}$$

, where $d(p_i \cdot p_j)$ represents distance between two pixels and σ is a scale parameter. Then, a Laplacian matrix is constructed by

$$L = D^{-1/2} A D^{-1/2} \tag{2}$$

, where *D* is a diagonal matrix with $D_{ii} \sum_{j=1}^{n} A_{ij}$. The *C* largest eigenvalues of the Laplacian matrix *L*. These *C* largest eigenvalues are corresponding to $\lambda_1 \geq \lambda_2 \geq \cdots \geq \lambda_C$. The corresponding eigenvectors $x_1, x_2, \ldots, x_C$ are used to build a matrix $X = [x_1, x_2, \ldots, x_C]$. Each row of the matrix *X* is normalized as follows.

$$Y_{ij} = X_{ij} / \left(\sum_j x_{ij}^2 \right)^{1/2} \tag{3}$$

Each row of the matrix *Y* is considered as a data point. The *k*-means clustering is applied data points $y_1, y_2, \ldots, y_C$ to obtain the final *C* homogeneous regions of final segmentation result.

If the final clustering dimension is very high, the spectral clustering will not run at the very best speed and the final clustering result will not be good due to the insufficient dimensionality reduction. In addition, the clustering effect depends on the similarity matrix, and the final clustering results obtained by different similarity matrix may be very different in the final segmentation result.

4 Experimental Results

Two MR brain images are used for performance evaluation. Both MR images are fully sampled and reconstructed by fast Fourier transform. The first brain image is T1 weighted as shown in Figure 2. Contrast between tissues of white matter, grey matter, and CSF is low in the T1 weighted brain image. Spectral clustering algorithm is applied on original MR brain image with low contrast. It is seen that boundaries between white matter and grey matter cannot be identified, so that both tissues are not able to be separated and segmented. Both of exact histogram equalization based image enhancement and the collaborative learning based image enhancement have been used for enhancing original T1 weighted MR brain image. Contrast is enhanced among white matter, grey matter, and CSF tissues. The collaborative learning based image enhancement has better performance than exact histogram equalization [20] enhanced image. After segmentation of spectral clustering, exact histogram equalization enhanced image cannot be segmented accurately at the bottom of the image. It is seen that contrast between white matter and grey matter is low. Therefore, right boundaries is difficult to be identified and segmentation is inaccurate. On the other hand, segmentation on collaborative learning enhanced image is more accurate than segmentations of original image and exact histogram equalization enhanced image.

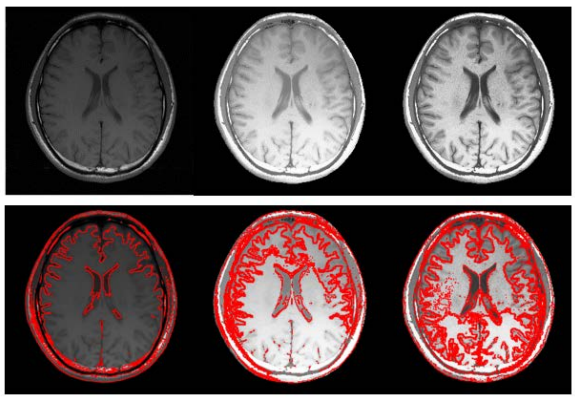


Figure 2. Three images on the first row presents T1 weighted MR brain image (left) with exact histogram equalization based image enhancement (middle) and collaborative learning based image enhancement (right). Spectral clustering based image segmentation is applied on three images of the first row. T1 weighted MR brain image segmentation (left), exact histogram equalization enhanced image.

The second brain image is T12 weighted as shown in Figure 3. Contrast between tissues of white matter, grey matter, and CSF is also low in the T2 weighted brain image. Spectral clustering algorithm is applied on original MR brain image with low contrast. It is seen that boundaries between white matter and grey matter is hard to be identified, so that both tissues are not separated and segmented accurately. Both of exact histogram equalization based image enhancement and the collaborative learning based image enhancement have been used for enhancing original T2 weighted MR brain image. Contrast is enhanced among white matter, grey matter, and CSF tissues. The collaborative learning based image enhancement has also better performance than exact histogram equalization enhanced image. After segmentation of spectral clustering, exact histogram equalization enhanced image cannot be segmented accurately, which is similar to T1 weighted image. It is seen that contrast between white matter and grey matter is low. Therefore, right boundaries is difficult to be identified and segmentation is inaccurate. However, segmentation on collaborative learning enhanced image is more accurate than segmentations of original image and exact histogram equalization enhanced image.

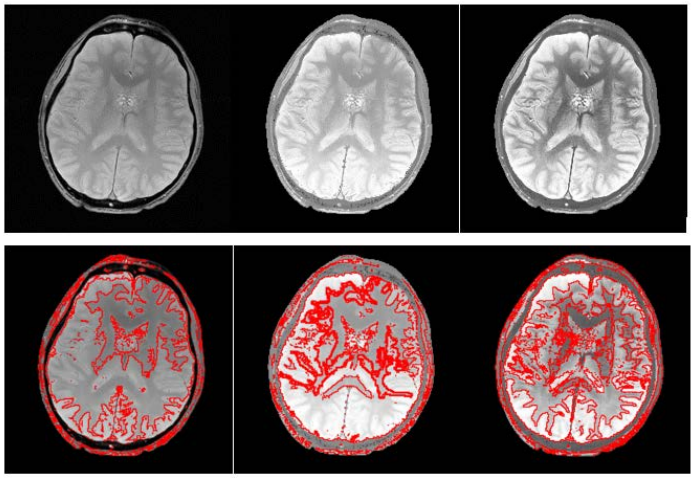


Figure 3. Three images on the first row presents T2 weighted MR brain image (left) with exact histogram equalization based image enhancement (middle) and collaborative learning based image enhancement (right). Spectral clustering based image segmentation is applied on three images of the first row. T1 weighted MR brain image segmentation (left), exact histogram equalization enhanced image segmentation (middle), and the collaborative learning enhanced image segmentation (right) are presented on the second row.

In spectral clustering image segmentation algorithm, the construction of similarity matrix is the key to the proposed segmentation method. The similarity matrix affects the segmentation result directly. However, if the parameters involved in the construction of similarity matrix are not defined properly, inaccurate segmentation results may be produced. Massive data operations leading to the problem of low segmentation efficiency remains to be further resolved.

5 Conclusion

In summary, a MR image segmentation method is proposed in the paper. Since MR image contrast is determined by multiple factors during imaging process, low contrast image usually causes inaccurate segmentation result. The proposed method is composed of two steps: preliminary image enhancement and spectral clustering of different types of tissues. Enhanced image based segmentation achieve higher accuracy in compared to segmentation without pixel value enhancement. Experimental results of several MR images illustrate that the proposed segmentation method is able to divide inhomogeneous tissue regions accurately.

REFERENCES

[1] Haacke, E.M., et al., *Magnetic resonance imaging: physical principles and sequence design*. Wiley-Liss, 1999.

[2] El-Baz, A., et al., *Biomedical image segmentation: advances and trends*. CRC Press, 2016.

[3] Stark J.A., *Adaptive image contrast enhancement using generalizations of histogram equalization*. Image Processing, IEEE Transactions on, 2000. 9(5): p. 889-896.

[4] Ibrahim, H., et al., *Brightness preserving dynamic histogram equalization for image contrast enhancement.* Consumer Electronics, IEEE Transactions on, 2007. 53(4): p. 1752-1758.

[5] Jen, T.C., *Image contrast enhancement based on intensity-pair distribution.* Image Processing, International Conference on, 2005.

[6] Tao, J., et al., *Normalized cuts and image segmentation.* Pattern Analysis and Machine Intelligence, IEEE Transactions on, 2000. 22(8): p. 888-905.

[7] Tao, V., et al., *Color image segmentation based on mean shift and normalized cuts*. Systems, Man, and Cybernetics - Part B: Cybernetics, IEEE Transactions on, 2007. 37(5): p. 1382-1388.

[8] Comaniciu, D., et al., *Mean shift: a robust approach toward feature space analysis*. Pattern Analysis and Machine Intelligence, IEEE Transactions on, 2002. 24(5): p. 603-619.

[9] Fowlkes C., et al., *Spectral grouping using the Nystrom method*. Pattern Analysis and Machine Intelligence, IEEE Transactions on, 2004. 26(2): p. 214-225.

[10] Keuchel J., et at., *Efficient graph cuts for unsupervised image segmentation using probabilistic sampling and SVD-based approaximation*. Statistical and Computational theories of Vision, Computer Vision, International Conference on, 2003.

[11] Chang, Y., et al., *Using collaborative learning for image contrast enhancement.* Pattern Recognition, International Conference on, 2008.

[12] Zimmerman, J.B., *An evaluation of the effectiveness of adaptive histogram equalization for contrast enhancement.* Medical Imaging, IEEE Transactions on, 1988. 7(4): p. 304-312.

[13] Wang, Q., et al., *Fast image/video contrast enhancement based on weighted threshold histogram equalization*. Consumer Electronics, IEEE Transactions on, 2007. 53(2): p. 757-764.

[14] Yang, S., et al., *Constrast enhancement using histogram equalization with bin underflow and bin overflow* . Image Processing, International Conference on, 2003.

[15] Kim, Y., *Contrast enhancement using brightness preserving bi-histogram equalization*. Consumer Electronics, IEEE Transactions on, 2007. 43(1): p. 1-8.

[16] Wang, Y., *Image enhancement based on equal area dualistic sub-image histogram equalization method*. Consumer Electronics, IEEE Transactions on, 2007. 45(1): p. 68-75.

[17] Chen, S., et al. *Minimum mean brightness error bi-histogram equalization in contrast enhancement*. Consumer Electronics, IEEE Transactions on, 2003. 49(4): p. 1310-1319.

[18] Kim, W.K., et al., *Contrast enhancement using histogram equalization based on logarithmic mapping*. Optical Engineering, 2012. 51(6): p. 1-10.

[19] Celik, T., *Spatial entropy-based global and local image contrast enhancement.* Image Processing, IEEE Transactions on, 2014. 23(12): p. 5298-5308.

[20] Coltuc, D., et al., Exact histogram specification. Image Processing, IEEE Transactions on, 2006. 15(5): p. 1143-1152.

AIVP ADVANCES IN IMAGE AND VIDEO PROCESSING
SOCIETY FOR SCIENCE AND EDUCATION UNITED KINGDOM
VOLUME 6, ISSUE 1
ISSN 2054-7412

A Logic Circuit Simulation for Choosing a Group or a Question using Register and Encoder

Lianly Rompis
Electrical Engineering Study Program, Faculty of Engineering,
Universitas Katolik De La Salle Manado;
lrompis@unikadelasalle.ac.id

ABSTRACT

Besides learning and working individually, normally people also interact in a group. A teacher or manager will divide and put several persons in groups, and mostly the group arrangement will be organized according to some classifications. This is quite different when people are dealing with a specific game or quiz. The participants will be asked to choose their own group or question in random order. Using the basic concept of digital system and electronic workbench 5.12 software, a logic circuit could be designed to build a circuit simulation consists of register and encoder which can be used to choose a group or a question randomly. The methods being used are study literature, analysis, design, and simulation. The result shows a desired output, a logic circuit for choosing a group or a question can be built using register and encoder logic components. Once a group or a question has been chosen, it cannot be chosen and displayed again.

Keywords: Choosing a Group; Choosing a Question; Logic Circuit Simulation; Register; Decoder.

1 Introduction

People sometimes do social interactions in daily works or learning. Generally the most fun interactions are quiz and game. When people are dealing with a specific game or quiz, they will be asked to choose their own group or question in a random order. Developing the basic concept of digital system we have learned and applying electronic workbench 5.12 software, we can try to build a simple and fun logic circuit simulation consists of main components: register and encoder, which can be used to choose a group or a question randomly. Once a group or a question has been chosen, it cannot be chosen and displayed again.

2 Methods

Learning from several methodologies from [8], the methodology being used for this research mainly to understand the basic concept and combine the functions of shift register and encoder, to derive a new and simple form of designing a counter.

3 Basic Theories

3.1 Synchronous Counter

Synchronous Counter is a type of sequential logic circuit functions for counting binary information, which clock input of all the flip-flop components are connected together and triggered by the input pulses. Thus, all the flip-flops would change state simultaneously, in parallel [1,2,6,7]. The number of

DOI: 10.14738/aivp.61.4156
Publication Date: 03rd Feb, 2018
URL: http://dx.doi.org/10.14738/aivp.61.4156

bit depends on number of flip-flop being used. For example, in Figure 1, to have a design output values in 3-bit length, the number of flip-flop that we used is 3 (three) also. The bit-sequences are given in Table 1.

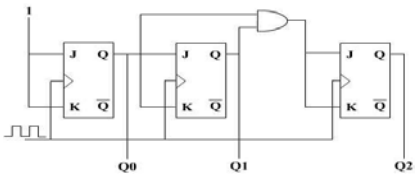


Figure 1. 3-bit synchronous counter

Table 1. The bit sequence of 3-bit synchronous counter

FF2	FF1	FF0
0	0	0
0	0	1
0	1	0
0	1	1
1	0	0
1	0	1
1	1	0
1	1	1

3.2 Shift Register

Shift register is another type of sequential logic circuit, mainly for storing digital data. They are a group of flip-flops, usually D-FF, connected in a loop so that the output from one flip-flop becomes the input of the next flip-flop, and so on [1,2,5]. All the flip-flops are driven by a common clock, and all are set or reset simultaneously. This is shown in Figure 2.

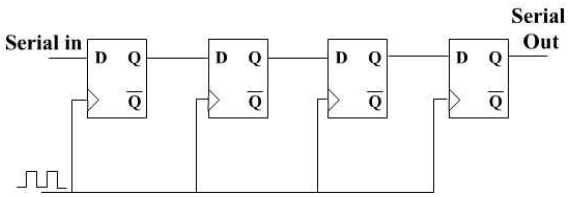


Figure 2. Right shift register

3.3 Encoder

Encoder is a type of combinational logic circuit, mostly used in data encoding. The design for encoder comes from logic gate circuits. It has an input of 2^nlines and output n lines as being referred in [1,2,3,4].

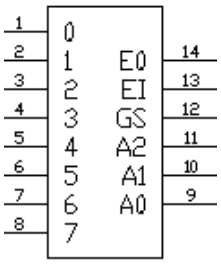


Figure 3. Encoder 8-to-3

A simple form of low-active encoder is shown in Figure 3. The outputs will activate a binary number combination based on the active input and priority. To understand how a priority encoder works, there is a characteristic table being given in Table 2. If logic 1 is given to more than one input of priority encoder, the output will read the highest input level, and transfer it as a combination of output.

Table 2. Tuth table of a priority encoder

INPUTS				OUTPUTS	
D0	D1	D2	D3	A	B
1	0	0	0	0	0
0	1	0	0	0	1
0	0	1	0	1	0
0	0	0	1	1	1
x	1	0	0	0	1
x	x	1	0	1	0
x	x	x	1	1	1

4 Analysis and Design

4.1 Analysis

A right shift register has a very simple form like the circuit diagram in Figure 2. It functions a serial input. The binary input will come from the left side, and shifted to the right. Every clock cycle will shift one bit to the right. We can add as many flip-flops as we need, according to our design, as explained in [2,3,5]. What will happen if we try to modify the right shift register circuit by adding an XNOR gate? With this circuit connection, the LED light will light one by one each cycle: 100, 010, 001, 100, … etc. The related logic circuit is shown in Figure 4.

Table 3. Tuth table of an xnor gate

INPUTS		OUTPUT
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

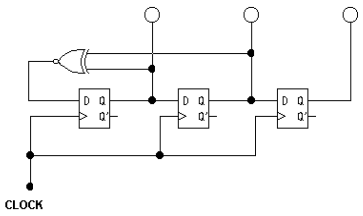


Figure 4. Right shift register with an xnor gate

At an initial condition, the outputs of all Flip-flops are 0s and will turn into 1s if the inputs are 1s. From the circuit we can see that Q_1=0 and Q_2=0, being an input for XNOR Gate. The output of Xnor gate will give logic 1, so input D will become 1. The next clock cycle will set the output of Q_1=1, and followed by Q_2=1 again in the next cyle. When Q_1 was changing into 1s, Xnor gate will give an output of 0s, turn D

into 0s once again. The next cycle will give an output of Q_1=0, and so on. These happen continuously and build a same loop of function.

4.2 Design

In my research, the output of right shift register is connected as an input for encoder to build a synchronous counter 1-3, as shown in figure 5.

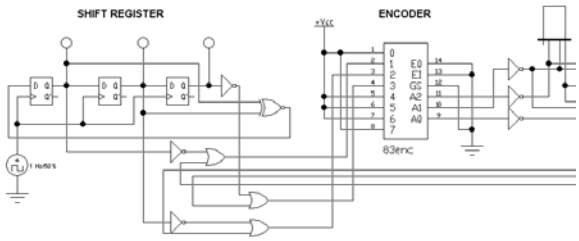
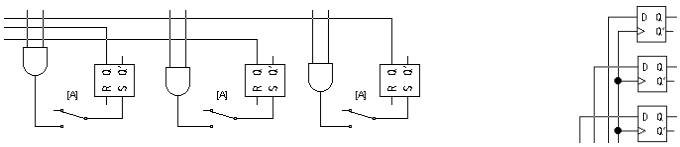


Figure 5. Synchronous counter with shift register and encoder

Each output of D FFs is connected to the correspond number in encoder. The output will display 1 to 3 continuously.

To choose a group or number, we must use a switch. Once a group or a question has been chosen, it cannot be chosen and displayed again, so we will need a component to lock the number being chosen so it will not display again in the counter output. In here an R-S latch has been used for that function, and a D latch is used to display the picked up group or question.



(a) (b)

Figure 6. (a) Switch and (b) D-latch

5 Simulation

Now we can try to connect all the logic parts and integrate them together to build the logic circuit for a quiz or a game. From the simulations using software Electronic Workbench 5.12, the circuit works well and gives the right output. The synchronous counter displays a number between 1 to 3. A participant needs to push the button switch to pick up a group or question from the counter. When the switch already selects the number, the counter will start to count again without the number already chosen or displayed. Now it is the next participant turn to push the button switch and select from the rest of numbers. In this simulation, I used a 1 Hz clock in order to be able to follow the counter display.

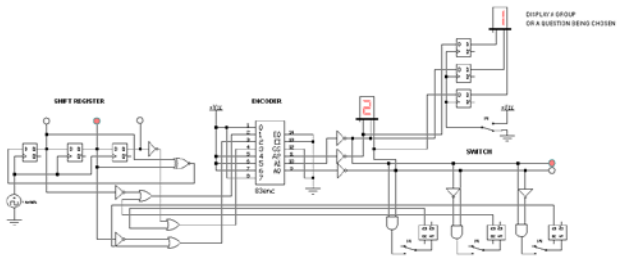


Figure 7. First Simulation shows that group/question 1 is being chosen from loop counter (1 to 3)

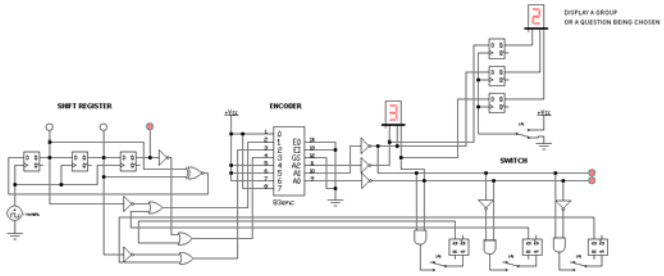


Figure 8. Second Simulation shows that group/question 2 is being chosen from loop counter (2 and 3)

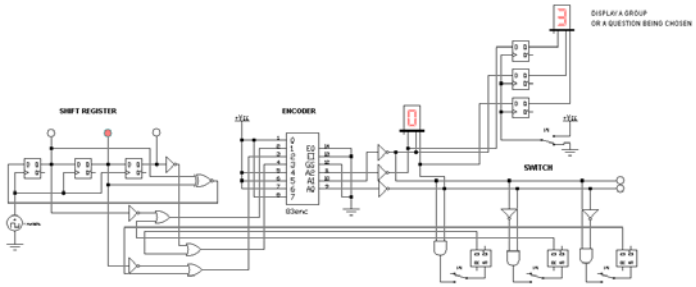


Figure 9. Third Simulation shows that the only option left is being chosen: group/question 3

6 Conclusion

Using Register and Encoder, we can build a logic circuit simulation for choosing a group or a question. Uniquely, once a group or a question being selected by a participant, it cannot be selected or displayed anymore by other participants. That is why it will be fun to use this simulation for a game or a quiz. The logic circuit simulation only used a low frequency clock so we could see the changes shown by the counter. It must be upgraded into a high frequency clock so participants cannot see the numbers and randomly can select one of them. For this purpose, a simple modification shall be made to synchronize the counter and the button. Hopefully this research outcome will be useful for learning digital system in the future.

REFERENCES

[1] Malvino, A., *Elektronika Komputer Digital.* Jakarta: Penerbit Erlangga, 1988.

[2] Cavanagh, *Digital Computer Arithmatic Design and Implementation.* McGraw Hill, 1985.

[3] Holdsworth, *Digital Logic Design.* Busterworth, 1982.

[4] Tokheim, R., *Prinsip-Prinsip Digital.* Jakarta: Penerbit Erlangga, 1996.

[5] Budiharto, W., Elektronika Digital dan Mikroprosesor. Yogyakarta: Penerbit ANDI, 2005.

[6] All About Circuits, "Synchronous Counters", All About Circuits.com, 2012. Source: http://www.allaboutcircuits.com/vol_4/chpt_11/3.html

[7] Rompis, L., *Designing Synchronous Binary Counter.* Jurnal Lasallian Universitas Katolik De la Salle Manado, 2005. 4(2):

[8] Sangadji, E. dan Sopiah, *Metodologi Penelitian: Pendekatan Praktis dalam Penelitian*. Yogyakarta: Penerbit ANDI, 2010.

AIVP ADVANCES IN IMAGE AND VIDEO PROCESSING
SOCIETY FOR SCIENCE AND EDUCATION UNITED KINGDOM
VOLUME 6, ISSUE 1
ISSN 2054-7412

Participatory Management of Muscles Strengthening of Core Stability and Lower Extremity to Reduce of Premenstrual Syndrome

Hartono Diono
Akademi Kebidanan Graha-Mandiri Cilacap, Indonesia
hartonoygmc@yahoo.com

ABSTRACT

Competence to reduce of premenstrual syndrome must be have each student, so physically and psychologically able to do activities Tridharma Colleges well. One of the efforts that can reduce of premenstrual syndrome is doing muscles strengthening of core stability and lower extremity. The purpose of the research to prove that participatory management model of muscles strengthening of core stability and lower extremity can reduce of premenstrual syndrome for students of Cilacap Graha-Mandiri Midwifery Academy, in Central Java. The research used was pre-experimental quantitative research design with form of One-Group Pretest-Postest Design. The results of t-test of significance of the score obtained related 0.000 < 0.05, or t_{count} = 16.741 > t_{table} α 0.05, df 34 = 2.031; therefore H_0 is rejected and H_a is accepted. It's meaning Participatory management model of muscles strengthening of core stability and lower extremity can reduce of premenstrual syndrome for students of Cilacap Graha-Mandiri Midwifery Academy, in Central Java. Conclusion, participatory management model of muscles strengthening of core stability and lower extremity can reduce of premenstrual syndrome for students of Cilacap Graha-Mandiri Midwifery Academy, in Central Java.

Keywords: Core Stability; Lower Extremity; Muscles Strengthening; Participatory Management Model; Premenstrual Syndrome.

1 Introduction

Premenstrual syndrome are symptomes felt by a women on one or two weeks ahead of a major impact on menstrual function of physical and social functions like breast discomfort, abdominal pain, bloating, headache, fatique, depression, anger, and anxiety [1]. Menstruation is an indicator of sexual maturity in young women, therefore required an effort reduce the accompanying syndrome. Mentruation is a natural process associated with cycle reproductive in women and young women. This is not a desease, but if management is not done appropriately will produce health problems relating to the social, cultural and religious practices. Pain during menstrual periods (dysmenorrhea) often accompanies medically in explanation. Study in New Zealand that at the time of the menstrual pain reported 53 % occur in women aged 16-54 with 12 % reported pain which requires absence from school or work[2].

Formulation of the problem in this research is: What is the participatory management model of muscle strengthening of core stability and lower extremity can reduce of premenstrual syndrome for students of Cilacap Graha Mandiri Midwifery Academy, in Central Java? Meaning of muscles

DOI: 10.14738/aivp.61.4157
Publication Date: 03rd Feb, 2018
URL: http://dx.doi.org/10.14738/aivp.61.4157

strengthening to produce a high muscle endurance in performing the activity and is resistant to fatique. This can be achieved with the use oxygen. Slow-twitch muscle fibers assotiated with aerobic work, small power and survive in the long term, resistance to fatique. Aerobic exercise is conducted in the presence of oxygen at the intensity of the submaximal during a specific time period.

Research with the title The relationship between excercise and premenstrual syndrome, obtained results that regular physical exercise and sustainability can be made effective in preventing premenstrual syndrome [3]. Research with the title Effect of home based stretching exercise and menstrual care on primary dysmenorrhea and premenstruai symptome among adolescent girls, it was concluded that the use of stretching exercises combined with reguler menstrual treatment will be effective to reduce the intensity of the pain and dysmenorrhea on premenstrual symptome [4]. Research with title Effect of yoga exercise on premenstrual symptome among female in Taiwan, it was concluded the participation of women employees in the form of yoga exercise intervention reported that yoga exercise can reduce premenstrual syndrome and can improve the health of women employees [5]. Research in a summary of his research explains that stregthening the core has a strong theory base to prevention of low back pain, as shown by the clinic users widely. Studies have shown that this program can help decrease pain and improve function in patients with disorders of the low back pain [6]. That core stability providing some advantage against the musculoskeletal system, so the finesse and the maintenance of core stability became a major concern for physical therapist, athletic trainers, and musculoskeletal reseachers. Core stability is the ability of the lumbo-pelvic hip complex to prevent buckling and refund the balance after disturbance. The existence of a clear relationship between the activity of the muscles of the trunk and the lower extremity movement [7].

A good core stability is the use of the right muscles at the right time at the right intensity to control trunk appropriately for movement of the body, the upper extremity and the lower extremity. The muscles of the body consist of stabiliser (local muscles) and movement (global muscles). The deep stabilising muscles form as muscular cylinder to support of the spine and the pelvis. The main deep stabilising muscles are the transversus abdominis, pelvic floor, multifidus and diaphragm. The deep stabiliser muscles work together as a unit to hold of the trunk stable. While global muscles for move of the body, the upper extremity and the lower extremity.

Every student in the process of participatory management model for muscles strengthening of the core stability and lower extremity must be active involvement since the planning, organizing and coordinating, and evaluating. Participatory management is the process of subordinate partisipation (as members) in taking decisions together wit the superiors in an organization. The decisions taken in the participatory management better than the decisions taken individually, because in the participatory management can make decisions that can be widely accepted [8]. Research results the importance of understanding the participatory management in creating job satisfaction for employees of the public administration. In summary of this research, that prticipatory management can increse job satisfaction for the employees of the public administration [9]. Human resources development is framework to develop skills, knowledge, learning new theory, and concept of the new behavior [10]. To achieve the goal that has been set in the participatory management, then needed a proper management through planning, organizing, coordinating, and controlling. The principle of participatory management are: (1) based on trained, used to find the way out this needs; (2) used to impart new knowledge, new skills and also to build their awarness; (3) responsible for their learning, because participation in the entire process of training appreciated.

2 Research Methods

The research method used was pre-experimental quantitative research design with a form of One-Group Pretest-Postest Design. It is sait pre-experimental design, because there is still external variables that effect on the formation of the dependent variable. So the results of experiments in the form of the dependent variable is not solely affected by the independent variable, due to the absence of control variables and samples were not selected at random [11]. The population of this research is the whole of students (35 student) on 2017 at Cilacap Graha-Mandiri Midwifery Academy, in Central Java. So this reseach is not taking samples but use the whole population.

O_1 X O_2

O_1: Pretest values (before muscles strengthening)

O_2: Postest values (after muscles strengthening)

The instruments used to data collection is an instrument of assesment of physical and psychologocal state of the premenstrual syndrome before and after muscle trengthening of core stability and lower exttremity. Instrument in the form of Likertz scale, by score 5 when the answer is very fit, by score 4 if the answer is match, by score 3 if the answer is less appropriate, by score 2 when the answer is not appropriate, and by score 1 when answer is not very appropriate. The instrument has been validity and reliability test. The validity test using internal validity by use the analysis of grain, that correlate to the score of each grain with a total score. The grain has positive correlation with total score as well as a high correlation, suggesting that these grains have a high validity. The requirement set a valid value when the correlation score grains with a total score r = 0.3; grain which have r less than 0.3 is declared invalid, so it can't be used to data collection [12]. Test the reliability of the instrumen is carried out by internal consistency, Cronbach's Alpha. The instrument has reliable when score Cronbach's Alpha greater than 0.60 [12].

The data collection is the primary data collection techniques, with using questionaries. A questionaire given to the respondents to conducts an assesment of physical and psychological changes leading up to menstruation. The questionaire is given twice, i.e prior to the strengthening of the muscle of the core stability and lower extremity. After doing muscle strengthening for five weeks conducted an assesment against for premenstrual syndrome.

Two different test sample data interval, needed normality data with the Chi Squared, with SPSS computing. The value of the Chi Square count compared to the Chi Squared table. When the price of the Chi Squared count less than or equel to (≤) Chi Squared table, this data is normal distrution, and when the Chi Squared count larger (>) Chi Squared table, this data is not normal distrution. Comparisons of two samples related data assesment of premenstrual syndrome before and after muscles strengthening of core stability and lower extremity, was done with technique Paired Sample t-test.

3 Results and Discussion

Validity and reliability test of data collection instruments of premenstrual syndrome is as follows. Instrument for respondent in 31 young women who are not included in this research respondent. The entire item instruments meets the requirements of test validity with this score (Pearson Correlation) ≥ 0.3. Reliability test obtained score Cronbach's Alpha of 0.726. This means that the whole matter of

items declared valid and reliable to be used for data collection of premenstrual syndrome for stuudent of Cilacap Graha-Mandiri Midwifery Academy, in Central Java.

Results of the data assesment of premenstrual syndrome before and after muscles strengthening of core stability and lower exteremity by participatory management model for 35 student at Cilacap Graha-Mandiri Midwifery Academy, in Central Java as follow. Test normality data of premenstrual syndrome before muscles strengthening obtained a score of Chi-square count = 7.686 < Chi-square table with α 0.05 df 5 = 11.070; this means that the data is normal distribution. Test normality data of premenstrual syndrome after muscles strengthening obtained a score of Chi-square count = 9.114 < Chi-square table with α 0.05 df 7 = 14.067; this means that the data is normal distribution.

The results of t-test of related, that participatory management model of muscles strengthening of core stability and lower extremity obtained score significance 0.000 < 0.05, or t_{count} (= 16.714) > t_{table} α 0.05 with df 34 (= 2.031); therefore H_0 is rejected and H_a is accepted. That meaning participatory management model of muscles strengthening of core stability and lower extremity can reduce of premenstrual syndrome for students at Cilacap Graha-Mandiri Midwifery Academy, in Central Java.

Table: Paired Samples Test

	Paired Differences				
	95% Confidence Interval of the Difference				
	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1 Before–After Strengthening Exercises (Participatory Management Model)	3.71441	4.74273	16.714	34	.000

Competence to reduce of premenstrual syndrome should be owned each student at Cilacap Graha-Mandiri Midwifery Academy, in Central Java. So, students have high productivity and high quality in implementation of college tridharma. Participatory management model of muscles strengthening is the process of muscles reinforcement with the active participation of students since in the planning, organizing, actuating, and controlling by self-evaluation. Participatory management model of muscles strengthening is the process of reinforcement the muscle with participants participation actively, since planning, organizing, actuating, and controlling through self-evaluation. The principles of participatory training is centered on the participants, used to impart new knowledge and skills, and is responsible for the results of their studies [10]. Each participant be active, have a high motivation and commitment to drive itself into the leaners who are responsible for the results of their studies, so as to achive the prescribed competence. This in in line with the results of reseach conducted [8,9], participatory management that can make decisions and that can be widely accepted and can be increase job satisfaction.

“Pain is an unpleasant sensory and emotional experience. State is frequently associated with tissue damage or potential tissue damage, although pain can be experienced independently of tissue damage [13]”. Muscles strengthening of core stability will have impact on high durabilty in maintaining postural control, so that it is able to control the gestures and motion control of upper and lower extremity well. Postural muscle contraction (core stability) that are synergically with contraction of lower muscle extremity will help the circulatory system of blood veins of the lower extremity, abdominal and pelvic cavum into the heart circulation. The circulation of blood (venous) means transportation of the remains of the metabolism and the rest of inflamation such as menstruation that

occurs at the endometrium (uterus) to be transported went into circulation the veins leading to the heart of the well. Instead, the organ of the abdominal cavum and pelvic cavum (including uterus) will gain arterial blood circulation to get the needed metabolic materials needs. The state thus means the pain that accompanies menstruation will be reduced.

The results of such as reseach are in line and strengthen the results of reseach that has been done by the following reseachers. (1) the relationship between exercise and premensrual syndrome, obtained results tha regular physicsl exercise and sustainability can be made effective in preventing premenstrual syndrome [3]. (2) research with titleEffect of home based stretyching exercise and menstrual care on primary dysmenorrhea and premenstrual synptomes among adolescent gilrs, in their conclusion that the use of stretching exercises that combined with regular menstrual treatment will be effective to reduce the intensity of the pain and dysmenorrhea on premenstrual symptoms [4]. (3) reseach with title Effect of yoga exercise on premenstrual symptoms among female employees in Taiwan. In conclusion, the participation of women employees in the form of yoga exercise intervention reported that yoga exercise can reduce premenstrual syndrome and an improve the health of women employees [5]. (4) In summary of their research explain that strengthening the core has a strong base of theory in reinforcement and prevention of low back pain, as well as on suffering musculoskeletal as shown by the clinic users of widely. Stidies have shown that this program can help decrease pain an improve function in patients with disorders of the low back pain [6]. (5) explain that core stability providing some advantage against the musculoskeletal system, so the finess and the maintenance of core stability became a major concern for physical therapist, athletic trainers, and musculoskeletal researchers. Core stability is the ability of the lumbo-pelvic hip complex to the prevent buckling and refund the balance after disturbance. The existence of the trunk and the lower extremity movement. The drop in the core stability can be as predisposing the onset of trauma on the lower extremity [7].

4 Conclusion

Based on the results and analysis of the data, it can be concluded that participatory management model of muscles strengthening of core stability and lower extremity can reduce of premenstrual syndrome for students on 2017 at Cilacap Graha-Mandiri Midwifery Academy, in Cntral Java.

The implication, the student has competence reduce to premenstrual syndrome will use the physical capacity and capability in carrying out its current status tridharma colleges so that it will have superior quality productivity.

Recomendation, for Cilacap Graha-Mandiri Midwifery Academy, Central Java, through the study program to implementation of the participatory management model of muscles strengthening of core stability and lower exttremity for all of the students, so each of student have high quality in implementation of tridharma colleges.

Hartono was born in Yogyakarta, May 12, 1953. He joined the Bachelor Study Program Guidance and Counseling in Semarang State University, Indonesia in 2000. Then he continued Graduate Study Program Guidance and Counseling in Semarang State University, Indonesia in 2002. He subsequently majored bachelor of applied science on a course of physiotherapy at Surakarta Muhammadiyah University, Indonesia in 2009. The last is Philosophy Doctor in Educational Management at Semarang State University, Indonesia in 2016. He worked as a school teacher teaching health nurses from 1994 to 2001. And then as a lecturer at Cilacap Graha-Mandiri Midwifery Academy, in Central Java, Indonesia since 2001.

REFERENCES

[1] Ramadani, M. 2012. Premenstrual Syndrome (PMS). *Jurnal Kesehatan Masyarakat, September 2012-Maret 2013, Vol. 7, No.1.* [On-line] Diunduh j*urnal.fkm.unand.ac.id/index.php/jkma/article/view/103/109*

[2] House, S., Thérèse M., & Sue C. 2012. *Menstrual Hygiene Matters: a resource for improving menstrual hygiene around the world.* First Edition. Water Aid. [On-line] Diunduh: www.wateraid.org/~/media/Files/Global/MHM%20files/Compiled_LR.pdf

[3] Safarzadeh, A. Sadegh, Z., Saeedeh R. Y. 206. *The relationship between Exercise and premenstrual syndrome.* [On-line] Diunduh www.ijmrhs.com/.../the-relationship-between-exercise-and-premenstrual-syndrome.pd

[4] Aboushady, R.M-N., Tawheda M. K. El-s. 2016. Effect of Home based Stretching Exercises and Menstrual Care on Primary Dysmenorrhea and Premenstrual Symptoms among Adolescent Girls. *IOSR Journal of Nursing and Health Science (IOSR-JNHS) e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 5, Issue 2 Ver. IV (Mar. - Apr. 2016), PP 10-17* [On-line] Diunduh: www.iosrjournals.org/iosr-jnhs/papers/vol5-issue2/Version- 4/B0502041017.pdf

[5] Tsai, S-T. 2016. Effect of Yoga Exercise on Premenstrual Symptoms among Female Employees in Taiwan. *Int. J. Environ. Res. Public Health.* 13, 721; doi:10.3390/ijerph13070721 [On-line] Diunduh www.mdpi.com/journal/ijerph

[6] Akuthota, V., , Andrea, F., Tamara, M., Michael, F. *2008. Core stability exercise principles.* Curr. Sports Med. Rep., Vol. 7, No. 1, pp. 39Y44. [On-line] Diunduh: V Akuthota, A Ferreiro, T Moore… - Current sports medicine …, 2008 - journals.lww.com

[7] Willson, J.D., Christopher, P. D., Mary, L. I., and Irene, McC. D. 2014. Core Stability and Its Relationship to Lower Extremity Function and Injury. *The Journal of the American Academy of Orthopaedic Surgeons.* DOI: 10.5435/00124635-200509000-00005

[8] Shagholi, R., Reza A., Ali A. M. 2011. *New Approach in Participatory Management, Concepts and Applications.* [On-line] Diunduh: www.sciencedirect.com/science/article/pii/S1877042811002618 Procedia Social and Behavioral Sciences 15 (2011) 251–255

[9] *Stefanovska-Petkovska*, M., *Marjan B., Vesna V. S. 2014. The role of participatory management in fostering job satisfaction among public administration employees.* [On-line] Diunduh https://www.msm.nl/resources/uploads/2014/09/MSM-WP2014-27.pdf *Tanggal 23 September 2017*

[10] Hartono, 2016. Pengembangan Model Pelatihan Partisipatif Penulisan Artikel Ilmiah Hasil Penelitian bagi Para Dosen pada Program diploma Kebidanan pada Perguruan Tinggi Swasta di Jawa Tengah. *Disertasi*. Semarang: Program Pascasarjana Universitas Negeri Semarang.

[11] Sugiyono. 2010. *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D.* Bandung: CV Alfabeta

[12] Sugiyono. 2013. *Metode Penelitian Manajemen*. Bandung: CV Alfabeta

[13] Lundy-Ekman, Laurie. 2013. *Neuroscience: Fundamental for Rehabilitations, Fourth Edition* ISBN: 978-1-4557-0643-3 United States of America: Saunders, an imprint of Elsevier Inc.

A Logic Circuit Simulation for Choosing a Group or a Question using Register and Encoder

Lianly Rompis
Electrical Engineering Study Program, Faculty of Engineering, Universitas Katolik De La Salle Manado;
lrompis@unikadelasalle.ac.id

ABSTRACT

Besides learning and working individually, normally people also interact in a group. A teacher or manager will divide and put several persons in groups, and mostly the group arrangement will be organized according to some classifications. This is quite different when people are dealing with a specific game or quiz. The participants will be asked to choose their own group or question in random order. Using the basic concept of digital system and electronic workbench 5.12 software, a logic circuit could be designed to build a circuit simulation consists of register and encoder which can be used to choose a group or a question randomly. The methods being used are study literature, analysis, design, and simulation. The result shows a desired output, a logic circuit for choosing a group or a question can be built using register and encoder logic components. Once a group or a question has been chosen, it cannot be chosen and displayed again.

Keywords: Choosing a Group; Choosing a Question; Logic Circuit Simulation; Register; Decoder.

1 Introduction

People sometimes do social interactions in daily works or learning. Generally the most fun interactions are quiz and game. When people are dealing with a specific game or quiz, they will be asked to choose their own group or question in a random order. Developing the basic concept of digital system we have learned and applying electronic workbench 5.12 software, we can try to build a simple and fun logic circuit simulation consists of main components: register and encoder, which can be used to choose a group or a question randomly. Once a group or a question has been chosen, it cannot be chosen and displayed again.

2 Methods

Learning from several methodologies from [8], the methodology being used for this research mainly to understand the basic concept and combine the functions of shift register and encoder, to derive a new and simple form of designing a counter.

3 Basic Theories

3.1 Synchronous Counter

Synchronous Counter is a type of sequential logic circuit functions for counting binary information, which clock input of all the flip-flop components are connected together and triggered by the input pulses. Thus, all the flip-flops would change state simultaneously, in parallel [1,2,6,7]. The number of bit depends on number of flip-flop being used. For example, in Figure 1, to have a design output values in 3-bit length, the number of flip-flop that we used is 3 (three) also. The bit-sequences are given in Table 1.

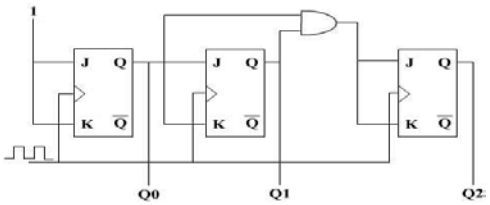


Figure 1. 3-bit synchronous counter

Table 1. The bit sequence of 3-bit synchronous counter

FF2	FF1	FF0
0	0	0
0	0	1
0	1	0
0	1	1
1	0	0
1	0	1
1	1	0
1	1	1

3.2 Shift Register

Shift register is another type of sequential logic circuit, mainly for storing digital data. They are a group of flip-flops, usually D-FF, connected in a loop so that the output from one flip-flop becomes the input of the next flip-flop, and so on [1,2,5]. All the flip-flops are driven by a common clock, and all are set or reset simultaneously. This is shown in Figure 2.

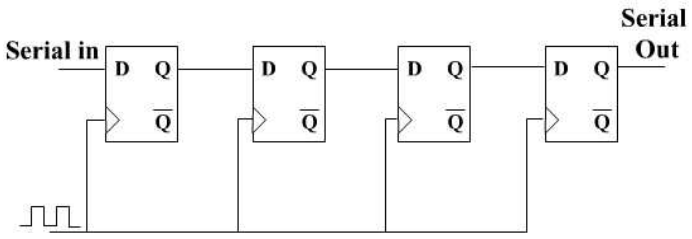


Figure 2. Right shift register

3.3 Encoder

Encoder is a type of combinational logic circuit, mostly used in data encoding. The design for encoder comes from logic gate circuits. It has an input of 2nlines and output n lines as being referred in [1,2,3,4].

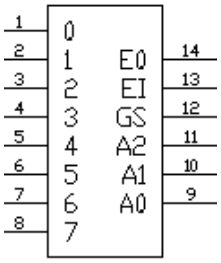


Figure 3. Encoder 8-to-3

A simple form of low-active encoder is shown in Figure 3. The outputs will activate a binary number combination based on the active input and priority. To understand how a priority encoder works, there is a characteristic table being given in Table 2. If logic 1 is given to more than one input of priority encoder, the output will read the highest input level, and transfer it as a combination of output.

Table 2. Tuth table of a priority encoder

INPUTS				OUTPUTS	
D0	D1	D2	D3	A	B
1	0	0	0	0	0
0	1	0	0	0	1
0	0	1	0	1	0
0	0	0	1	1	1
x	1	0	0	0	1
x	x	1	0	1	0
x	x	x	1	1	1

4 Analysis and Design

4.1 Analysis

A right shift register has a very simple form like the circuit diagram in Figure 2. It functions a serial input. The binary input will come from the left side, and shifted to the right. Every clock cycle will shift one bit to the right. We can add as many flip-flops as we need, according to our design, as explained in [2,3,5]. What will happen if we try to modify the right shift register circuit by adding an XNOR gate? With this circuit connection, the LED light will light one by one each cycle: 100, 010, 001, 100, … etc. The related logic circuit is shown in Figure 4.

Table 3. Tuth table of an xnor gate

INPUTS		OUTPUT
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

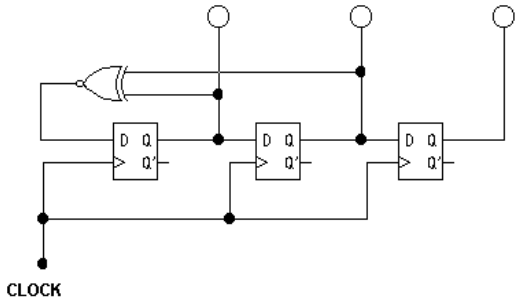


Figure 4. Right shift register with an xnor gate

At an initial condition, the outputs of all Flip-flops are 0s and will turn into 1s if the inputs are 1s. From the circuit we can see that Q_1=0 and Q_2=0, being an input for XNOR Gate. The output of Xnor gate will give logic 1, so input D will become 1. The next clock cycle will set the output of Q_1=1, and followed by Q_2=1 again in the next cyle. When Q_1 was changing into 1s, Xnor gate will give an output of 0s, turn D into 0s once again. The next cycle will give an output of Q_1=0, and so on. These happen continuously and build a same loop of function.

4.2 Design

In my research, the output of right shift register is connected as an input for encoder to build a synchronous counter 1-3, as shown in figure 5.

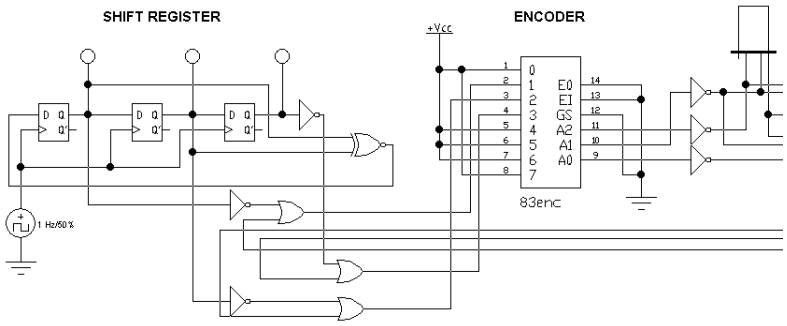
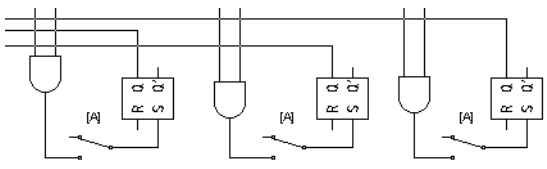


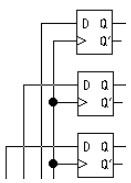
Figure 5. Synchronous counter with shift register and encoder

Each output of D FFs is connected to the correspond number in encoder. The output will display 1 to 3 continuously.

To choose a group or number, we must use a switch. Once a group or a question has been chosen, it cannot be chosen and displayed again, so we will need a component to lock the number being chosen so it will not display again in the counter output. In here an R-S latch has been used for that function, and a D latch is used to display the picked up group or question.



(b)



(b)

Figure 6. (a) Switch and (b) D-latch

5 Simulation

Now we can try to connect all the logic parts and integrate them together to build the logic circuit for a quiz or a game. From the simulations using software Electronic Workbench 5.12, the circuit works well and gives the right output. The synchronous counter displays a number between 1 to 3. A participant needs to push the button switch to pick up a group or question from the counter. When the switch already selects the number, the counter will start to count again without the number already chosen or displayed. Now it is the next participant turn to push the button switch and select from the rest of numbers. In this simulation, I used a 1 Hz clock in order to be able to follow the counter display.

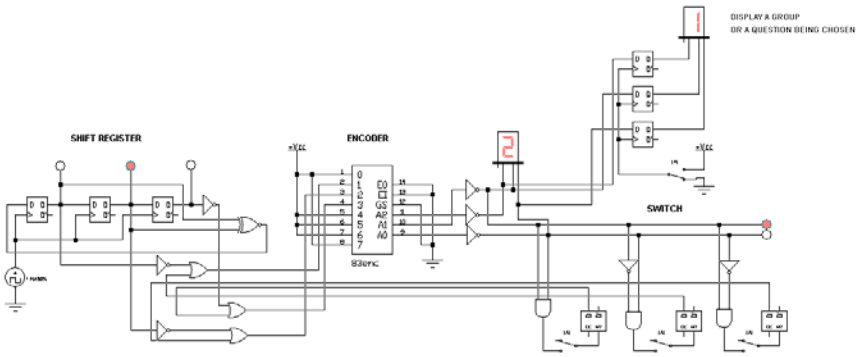


Figure 7. First Simulation shows that group/question 1 is being chosen from loop counter (1 to 3)

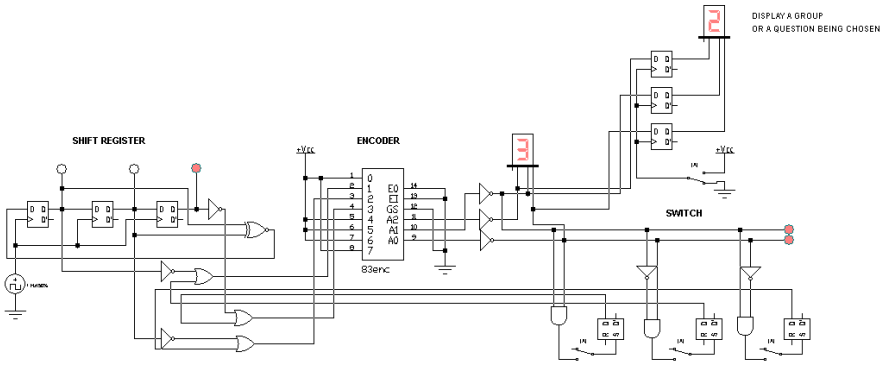


Figure 8. Second Simulation shows that group/question 2 is being chosen from loop counter (2 and 3)

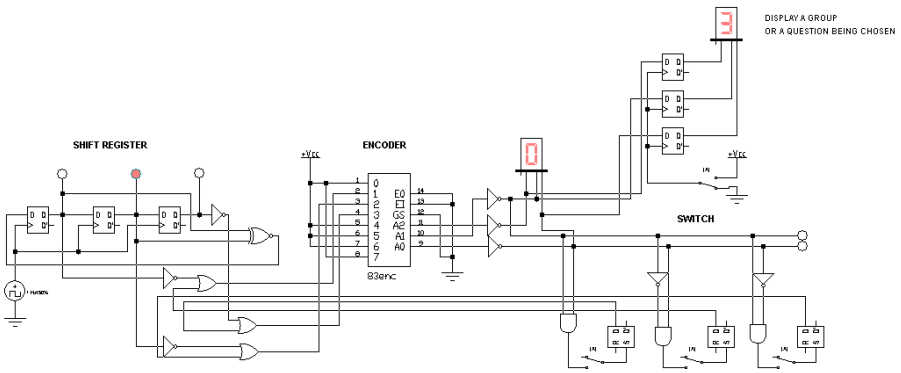


Figure 9. Third Simulation shows that the only option left is being chosen: group/question 3

6 Conclusion

Using Register and Encoder, we can build a logic circuit simulation for choosing a group or a question. Uniquely, once a group or a question being selected by a participant, it cannot be selected or displayed anymore by other participants. That is why it will be fun to use this simulation for a game or a quiz. The logic circuit simulation only used a low frequency clock so we could see the changes shown by the counter. It must be upgraded into a high frequency clock so participants cannot see the numbers and randomly can select one of them. For this purpose, a simple modification shall be made to synchronize the counter and the button. Hopefully this research outcome will be useful for learning digital system in the future.

REFERENCES

[1]. Malvino, A., *Elektronika Komputer Digital.* Jakarta: Penerbit Erlangga, 1988.

[2]. Cavanagh, *Digital Computer Arithmatic Design and Implementation.* McGraw Hill, 1985.

[3]. Holdsworth, *Digital Logic Design.* Busterworth, 1982.

[4]. Tokheim, R., *Prinsip-Prinsip Digital.* Jakarta: Penerbit Erlangga, 1996.

[5]. Budiharto, W., Elektronika Digital dan Mikroprosesor. Yogyakarta: Penerbit ANDI, 2005.

[6]. All About Circuits, "Synchronous Counters", All About Circuits.com, 2012.

Source: *http://www.allaboutcircuits.com/vol_4/chpt_11/3.html*

[7]. Rompis, L., *Designing Synchronous Binary Counter.* Jurnal Lasallian Universitas Katolik De la Salle Manado, 2005. 4(2):

[8]. Sangadji, E. dan Sopiah, *Metodologi Penelitian: Pendekatan Praktis dalam Penelitian*. Yogyakarta: Penerbit ANDI, 2010.

AIVP ADVANCES IN IMAGE AND VIDEO PROCESSING
SOCIETY FOR SCIENCE AND EDUCATION UNITED KINGDOM
VOLUME 6, ISSUE 1
ISSN 2054-7412

Participatory Management of Muscles Strengthening of Core Stability and Lower Extremity to Reduce of Premenstrual Syndrome

Hartono Diono
Akademi Kebidanan Graha-Mandiri Cilacap, Indonesia
hartonoygmc@yahoo.com

ABSTRACT

Competence to reduce of premenstrual syndrome must be have each student, so physically and psychologically able to do activities Tridharma Colleges well. One of the efforts that can reduce of premenstrual syndrome is doing muscles strengthening of core stability and lower extremity. The purpose of the research to prove that participatory management model of muscles strengthening of core stability and lower extremity can reduce of premenstrual syndrome for students of Cilacap Graha-Mandiri Midwifery Academy, in Central Java. The research used was pre-experimental quantitative research design with form of One-Group Pretest-Postest Design. The results of t-test of significance of the score obtained related 0.000 < 0.05, or t_{count} = 16.741 > t_{table} α 0.05, df 34 = 2.031; therefore H_0 is rejected and H_a is accepted. It's meaning Participatory management model of muscles strengthening of core stability and lower extremity can reduce of premenstrual syndrome for students of Cilacap Graha-Mandiri Midwifery Academy, in Central Java. Conclusion, participatory management model of muscles strengthening of core stability and lower extremity can reduce of premenstrual syndrome for students of Cilacap Graha-Mandiri Midwifery Academy, in Central Java.

Keywords: Core Stability; Lower Extremity; Muscles Strengthening; Participatory Management Model; Premenstrual Syndrome.

1 Introduction

Premenstrual syndrome are symptomes felt by a women on one or two weeks ahead of a major impact on menstrual function of physical and social functions like breast discomfort, abdominal pain, bloating, headache, fatique, depression, anger, and anxiety [1]. Menstruation is an indicator of sexual maturity in young women, therefore required an effort reduce the accompanying syndrome. Mentruation is a natural process associated with cycle reproductive in women and young women. This is not a desease, but if management is not done appropriately will produce health problems relating to the social, cultural and religious practices. Pain during menstrual periods (dysmenorrhea) often accompanies medically in explanation. Study in New Zealand that at the time of the menstrual pain reported 53 % occur in women aged 16-54 with 12 % reported pain which requires absence from school or work[2].

Formulation of the problem in this research is: What is the participatory management model of muscle strengthening of core stability and lower extremity can reduce of premenstrual syndrome for students of Cilacap Graha Mandiri Midwifery Academy, in Central Java? Meaning of muscles strengthening to produce a high muscle endurance in performing the activity and is resistant to fatique. This can be achieved with the use oxygen. Slow-twitch muscle fibers assotiated with aerobic

DOI: 10.14738/aivp.61.4157
Publication Date: 03rd Feb, 2018
URL: http://dx.doi.org/10.14738/aivp.61.4157

work, small power and survive in the long term, resistance to fatique. Aerobic exercise is conducted in the presence of oxygen at the intensity of the submaximal during a specific time period.

Research with the title The relationship between excercise and premenstrual syndrome, obtained results that regular physical exercise and sustainability can be made effective in preventing premenstrual syndrome [3]. Research with the title Effect of home based stretching exercise and menstrual care on primary dysmenorrhea and premenstruai symptome among adolescent girls, it was concluded that the use of stretching exercises combined with reguler menstrual treatment will be effective to reduce the intensity of the pain and dysmenorrhea on premenstrual symptome [4]. Research with title Effect of yoga exercise on premenstrual symptome among female in Taiwan, it was concluded the participation of women employees in the form of yoga exercise intervention reported that yoga exercise can reduce premenstrual syndrome and can improve the health of women employees [5]. Research in a summary of his research explains that stregthening the core has a strong theory base to prevention of low back pain, as shown by the clinic users widely. Studies have shown that this program can help decrease pain and improve function in patients with disorders of the low back pain [6]. That core stability providing some advantage against the musculoskeletal system, so the finesse and the maintenance of core stability became a major concern for physical therapist, athletic trainers, and musculoskeletal reseachers. Core stability is the ability of the lumbo-pelvic hip complex to prevent buckling and refund the balance after disturbance. The existence of a clear relationship between the activity of the muscles of the trunk and the lower extremity movement [7].

A good core stability is the use of the right muscles at the right time at the right intensity to control trunk appropriately for movement of the body, the upper extremity and the lower extremity. The muscles of the body consist of stabiliser (local muscles) and movement (global muscles). The deep stabilising muscles form as muscular cylinder to support of the spine and the pelvis. The main deep stabilising muscles are the transversus abdominis, pelvic floor, multifidus and diaphragm. The deep stabiliser muscles work together as a unit to hold of the trunk stable. While global muscles for move of the body, the upper extremity and the lower extremity.

Every student in the process of participatory management model for muscles strengthening of the core stability and lower extremity must be active involvement since the planning, organizing and coordinating, and evaluating. Participatory management is the process of subordinate partisipation (as members) in taking decisions together wit the superiors in an organization. The decisions taken in the participatory management better than the decisions taken individually, because in the participatory management can make decisions that can be widely accepted [8]. Research results the importance of understanding the participatory management in creating job satisfaction for employees of the public administration. In summary of this research, that prticipatory management can increse job satisfaction for the employees of the public administration [9]. Human resources development is framework to develop skills, knowledge, learning new theory, and concept of the new behavior [10]. To achieve the goal that has been set in the participatory management, then needed a proper management through planning, organizing, coordinating, and controlling. The principle of participatory management are: (1) based on trained, used to find the way out this needs; (2) used to impart new knowledge, new skills and also to build their awarness; (3) responsible for their learning, because participation in the entire process of training appreciated.

2 Research Methods

The research method used was pre-experimental quantitative research design with a form of One-Group Pretest-Postest Design. It is sait pre-experimental design, because there is still external variables that effect on the formation of the dependent variable. So the results of experiments in the form of the dependent variable is not solely affected by the independent variable, due to the absence of control variables and samples were not selected at random [11]. The population of this research is the whole of students (35 student) on 2017 at Cilacap Graha-Mandiri Midwifery Academy, in Central Java. So this reseach is not taking samples but use the whole population.

$$O_1 \; X \; O_2$$

O_1: Pretest values (before muscles strengthening)
O_2: Postest values (after muscles strengthening)

The instruments used to data collection is an instrument of assesment of physical and psychologocal state of the premenstrual syndrome before and after muscle trengthening of core stability and lower exttremity. Instrument in the form of Likertz scale, by score 5 when the answer is very fit, by score 4 if the answer is match, by score 3 if the answer is less appropriate, by score 2 when the answer is not appropriate, and by score 1 when answer is not very appropriate. The instrument has been validity and reliability test. The validity test using internal validity by use the analysis of grain, that correlate to the score of each grain with a total score. The grain has positive correlation with total score as well as a high correlation, suggesting that these grains have a high validity. The requirement set a valid value when the correlation score grains with a total score r = 0.3; grain which have r less than 0.3 is declared invalid, so it can't be used to data collection [12]. Test the reliability of the instrumen is carried out by internal consistency, Cronbach's Alpha. The instrument has reliable when score Cronbach's Alpha greater than 0.60 [12].

The data collection is the primary data collection techniques, with using questionaries. A questionaire given to the respondents to conducts an assesment of physical and psychological changes leading up to menstruation. The questionaire is given twice, i.e prior to the strengthening of the muscle of the core stability and lower extremity. After doing muscle strengthening for five weeks conducted an assesment against for premenstrual syndrome.

Two different test sample data interval, needed normality data with the Chi Squared, with SPSS computing. The value of the Chi Square count compared to the Chi Squared table. When the price of the Chi Squared count less than or equel to (≤) Chi Squared table, this data is normal distrution, and when the Chi Squared count larger (>) Chi Squared table, this data is not normal distrution. Comparisons of two samples related data assesment of premenstrual syndrome before and after muscles strengthening of core stability and lower extremity, was done with technique Paired Sample t-test.

3 Results and Discussion

Validity and reliability test of data collection instruments of premenstrual syndrome is as follows. Instrument for respondent in 31 young women who are not included in this research respondent. The entire item instruments meets the requirements of test validity with this score (Pearson Correlation) ≥ 0.3. Reliability test obtained score Cronbach's Alpha of 0.726. This means that the whole matter of items declared valid and reliable to be used for data collection of premenstrual syndrome for stuudent of Cilacap Graha-Mandiri Midwifery Academy, in Central Java.

Results of the data assesment of premenstrual syndrome before and after muscles strengthening of core stability and lower exteremity by participatory management model for 35 student at Cilacap Graha-Mandiri Midwifery Academy, in Central Java as follow. Test normality data of premenstrual syndrome before muscles strengthening obtained a score of Chi-square count = 7.686 < Chi-square table with α 0.05 df 5 = 11.070; this means that the data is normal distribution. Test normality data of premenstrual syndrome after muscles strengthening obtained a score of Chi-square count = 9.114 < Chi-square table with α 0.05 df 7 = 14.067; this means that the data is normal distribution.

The results of t-test of related, that participatory management model of muscles strengthening of core stability and lower extremity obtained score significance 0.000 < 0.05, or t_{count} (= 16.714) > t_{table} α 0.05 with df 34 (= 2.031); therefore H_0 is rejected and H_a is accepted. That meaning participatory management model of muscles strengthening of core stability and lower extremity can reduce of premenstrual syndrome for students at Cilacap Graha-Mandiri Midwifery Academy, in Central Java.

Table: Paired Samples Test

	Paired Differences				
	95% Confidence Interval of the Difference				
	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1 Before–After Strengthening Exercises (Participatory Management Model)	3.71441	4.74273	16.714	34	.000

Competence to reduce of premenstrual syndrome should be owned each student at Cilacap Graha-Mandiri Midwifery Academy, in Central Java. So, students have high productivity and high quality in implementation of college tridharma. Participatory management model of muscles strengthening is the process of muscles reinforcement with the active participation of students since in the planning, organizing, actuating, and controlling by self-evaluation. Participatory management model of muscles strengthening is the process of reinforcement the muscle with participants participation actively, since planning, organizing, actuating, and controlling through self-evaluation. The principles of participatory training is centered on the participants, used to impart new knowledge and skills, and is responsible for the results of their studies [10]. Each participant be active, have a high motivation and commitment to drive itself into the leaners who are responsible for the results of their studies, so as to achive the prescribed competence. This in in line with the results of reseach conducted [8,9], participatory management that can make decisions and that can be widely accepted and can be increase job satisfaction.

“Pain is an unpleasant sensory and emotional experience. State is frequently associated with tissue damage or potential tissue damage, although pain can be experienced independently of tissue damage [13]”. Muscles strengthening of core stability will have impact on high durabilty in maintaining postural control, so that it is able to control the gestures and motion control of upper and lower extremity well. Postural muscle contraction (core stability) that are synergically with contraction of lower muscle extremity will help the circulatory system of blood veins of the lower extremity, abdominal and pelvic cavum into the heart circulation. The circulation of blood (venous) means transportation of the remains of the metabolism and the rest of inflamation such as menstruation that occurs at the endometrium (uterus) to be transported went into circulation the veins leading to the heart of the well. Instead, the organ of the abdominal cavum and pelvic cavum (including uterus) will

gain arterial blood circulation to get the needed metabolic materials needs. The state thus means the pain that accompanies menstruation will be reduced.

The results of such as reseach are in line and strengthen the results of reseach that has been done by the following reseachers. (1) the relationship between exercise and premensrual syndrome, obtained results tha regular physicsl exercise and sustainability can be made effective in preventing premenstrual syndrome [3]. (2) research with titleEffect of home based stretyching exercise and menstrual care on primary dysmenorrhea and premenstrual synptomes among adolescent gilrs, in their conclusion that the use of stretching exercises that combined with regular menstrual treatment will be effective to reduce the intensity of the pain and dysmenorrhea on premenstrual symptoms [4]. (3) reseach with title Effect of yoga exercise on premenstrual symptoms among female employees in Taiwan. In conclusion, the participation of women employees in the form of yoga exercise intervention reported that yoga exercise can reduce premenstrual syndrome and an improve the health of women employees [5]. (4) In summary of their research explain that strengthening the core has a strong base of theory in reinforcement and prevention of low back pain, as well as on suffering musculoskeletal as shown by the clinic users of widely. Stidies have shown that this program can help decrease pain an improve function in patients with disorders of the low back pain [6]. (5) explain that core stability providing some advantage against the musculoskeletal system, so the finess and the maintenance of core stability became a major concern for physical therapist, athletic trainers, and musculoskeletal researchers. Core stability is the ability of the lumbo-pelvic hip complex to the prevent buckling and refund the balance after disturbance. The existence of the trunk and the lower extremity movement. The drop in the core stability can be as predisposing the onset of trauma on the lower extremity [7].

4 Conclusion

Based on the results and analysis of the data, it can be concluded that participatory management model of muscles strengthening of core stability and lower extremity can reduce of premenstrual syndrome for students on 2017 at Cilacap Graha-Mandiri Midwifery Academy, in Cntral Java.

The implication, the student has competence reduce to premenstrual syndrome will use the physical capacity and capability in carrying out its current status tridharma colleges so that it will have superior quality productivity.

Recomendation, for Cilacap Graha-Mandiri Midwifery Academy, Central Java, through the study program to implementation of the participatory management model of muscles strengthening of core stability and lower exttremity for all of the students, so each of student have high quality in implementation of tridharma colleges.

REFERENCES

[1] Ramadani, M. 2012. Premenstrual Syndrome (PMS). *Jurnal Kesehatan Masyarakat, September 2012-Maret 2013, Vol. 7, No.1.* [On-line] Diunduh j*urnal.fkm.unand.ac.id/index.php/jkma/article/view/103/109*

[2] House, S., Thérèse M., & Sue C. 2012. *Menstrual Hygiene Matters: a resource for improving menstrual hygiene around the world.* First Edition. Water Aid. [On-line] Diunduh: www.wateraid.org/~/media/Files/Global/MHM%20files/Compiled_LR.pdf

[3] Safarzadeh, A. Sadegh, Z., Saeedeh R. Y. 206. *The relationship between Exercise and premenstrual syndrome.* [On-line] Diunduh www.ijmrhs.com/.../the-relationship-between-exercise-and-premenstrual-syndrome.pd

[4] Aboushady, R.M-N., Tawheda M. K. El-s. 2016. Effect of Home based Stretching Exercises and Menstrual Care on Primary Dysmenorrhea and Premenstrual Symptoms among Adolescent Girls. *IOSR Journal of Nursing and Health Science (IOSR-JNHS) e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 5, Issue 2 Ver. IV (Mar. - Apr. 2016), PP 10-17* [On-line] Diunduh: www.iosrjournals.org/iosr-jnhs/papers/vol5-issue2/Version- 4/B0502041017.pdf

[5] Tsai, S-T. 2016. Effect of Yoga Exercise on Premenstrual Symptoms among Female Employees in Taiwan. *Int. J. Environ. Res. Public Health.* 13, 721; doi:10.3390/ijerph13070721 [On-line] Diunduh www.mdpi.com/journal/ijerph

[6] Akuthota, V., , Andrea, F., Tamara, M., Michael, F. *2008. Core stability exercise principles.* Curr. Sports Med. Rep., Vol. 7, No. 1, pp. 39Y44. [On-line] Diunduh: V Akuthota, A Ferreiro, T Moore… - Current sports medicine …, 2008 - journals.lww.com

[7] Willson, J.D., Christopher, P. D., Mary, L. I., and Irene, McC. D. 2014. Core Stability and Its Relationship to Lower Extremity Function and Injury. *The Journal of the American Academy of Orthopaedic Surgeons.* DOI: 10.5435/00124635-200509000-00005

[8] Shagholi, R., Reza A., Ali A. M. 2011. *New Approach in Participatory Management, Concepts and Applications.* [On-line] Diunduh: www.sciencedirect.com/science/article/pii/S1877042811002618 Procedia Social and Behavioral Sciences 15 (2011) 251–255

[9] Stefanovska-Petkovska, M., *Marjan B., Vesna V. S. 2014. The role of participatory management in fostering job satisfaction among public administration employees.* [On-line] Diunduh https://www.msm.nl/resources/uploads/2014/09/MSM-WP2014-27.pdf *Tanggal 23 September 2017*

[10] Hartono, 2016. Pengembangan Model Pelatihan Partisipatif Penulisan Artikel Ilmiah Hasil Penelitian bagi Para Dosen pada Program diploma Kebidanan pada Perguruan Tinggi Swasta di Jawa Tengah. *Disertasi*. Semarang: Program Pascasarjana Universitas Negeri Semarang.

[11] Sugiyono. 2010. *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D.* Bandung: CV Alfabeta

[12] Sugiyono. 2013. *Metode Penelitian Manajemen*. Bandung: CV Alfabeta

[13] Lundy-Ekman, Laurie. 2013. *Neuroscience: Fundamental for Rehabilitations, Fourth Edition* ISBN: 978-1-4557-0643-3 United States of America: Saunders, an imprint of Elsevier Inc.