

1. Course Number and Title: ED-501: Education in Global Perspective

2. Credit Hours: 4

3. Course Description

The course is designed to help develop the understanding, insights and competency of the learners in a global perspective. Through acquainting them with successful education practices, contemporary educational events, trends and issues, challenges and education system of selected countries. Through this course the learners will be able to develop skills and generate ideas to adopt pragmatic changes ensuring quality education in Bangladesh.

4. Course objectives

The objectives are to help learners to:

- a. acquaint with the contemporary educational events, trends, reforms and innovations across the globe.
- b. recognize the diversity of educational development and challenges in the world.
- c. acquire the skills of adapting successful practices in the areas of andragogy, pedagogy, management, curriculum and assessment.
- d. introduce to the educational activities of some selected organisations locally and globally.
- e. acquaint with the contemporary education systems and developments in the field of education of some selected countries.
- f. acquire the skills of collecting and compiling information, preparing and presenting reports and searching out the lessons to be learnt from other practices.

**5. Course Content
Hours**

Contact

Unit-1: Conceptualizing Educational Change in Global Perspective

5

Learning Outcomes

At the end of this unit learners will be able to-

- a. describe the concept of global change
- b. explain the relationship between global change and education
- c. analyze the implications of recent trends of global change into education

Content:

- Historic milestones (pre-modern,, modernism, colonialism, postmodernism, globalization)
- Relationship between global change and education
- Globalization: Global education, International education

Unit-2: Global declarations and national commitments

5

Learning Outcomes

At the end of this unit learners will be able to-

- a. describe different international declarations on education
- b. review different global and national declarations
- c. examine implications of global and national commitments in Bangladesh context

Content:

- UN-UHRC, UN-CRC, EFA, DFA, CEDAW, Salamanca, UNCRPD, Delor's Commission, SDGs, Policy-borrowing
- Constitution of Bangladesh, Education Commissions (1972-----2010), 5-year Plans, CPEA, Draft Education Act, NEP 2010, Child Policy, Gender Policy, Person with Disabilities Right and Protection Act, NDD Act, Vision 2041, Delta plan

Unit-3: Global and National Progress in Education

5

Learning Outcomes

At the end of this unit learners will be able to-

- a. identify and describe Global and National Progress Indicators in Education
- b. compare and contrast global and national education progress

Content:

- International Educational Progress: UNESCO-GMR, WB's Report, ADB's Report, UNDP-HDI Report, SGD's Progress Report, OECD (PISA), TIMSS, UNICEF-WCR, SAARC, GCED
- Global Citizenship Education (GCED)- Values, Principles, Implementation Strategies
- Internationalization of Education: Concept, Criteria, Politics
- Higher Education Ranking: Ranking organizations, criteria, impact, politics and status of education in Bangladesh and challenges, Higher education strategic plan in BD
- National Educational Progress: Review of Various Reports (ASPR, BANBEIS's Planning Commission, PEDP, SESIP, CAMPE-Education Watch, CPD, TIB), Current Status of Education in Bangladesh etc, Competencies and skill framework

Unit-4: Paradigm Shift in Educational Practices

5

Learning Outcomes

At the end of this unit learners will be able to-

- a. analyze the recent trends of educational changes
- b. identify change factors that can be replicated in Bangladesh context

Content:

- Innovation in Pedagogy and Andragogy
- Shift in T-L: Participatory and Interactive Teaching Learning Education Management (PBM, PMM), Assessment, Personalized learning
- Monitoring and Mentoring
- Quality Education: concept, indicators, qualification framework, status, challenges
- 21st century framework

Unit-5: Organizations working on Education

5

Learning Outcomes

At the end of this unit learners will be able to-

- a. describe and compare operational models of different leading organizations working in the field of education
- b. identify good and best practices that can be scaled up in Bangladesh context

Content:

UNICEF, UNESCO, DfID, JICA, Plan Bangladesh, Save the Children, USAid, AusAid, ILO, EU, CIDA, SIDA, British Council, BRAC, CAMPE, GE, JC, A2i

Unit-6: Successful Education Practices in Selected Countries

5

Learning Outcomes

At the end of this unit learners will be able to-

- a. describe and compare the education system of different countries
- b. identify unique model/s for adaptation in Bangladesh

Content:

- Asia : India, Bhutan, Singapore, Sri Lanka, Japan, Hong Kong, Malaysia, China
- Europe : UK, Finland, Norway
- North America : USA, Canada
- Africa : South Africa
- Australia : Australia, NZ

Unit-7 Global Connection in Education

5

Learning Outcomes

At the end of this unit learners will be able to-

- a. conduct research in collaborative approach
- b. find suitable scholarship and research fund
- c. network through ICT and professional forum
- d. prepare proposal for educational research

Content:

- Career in Education
- HE Scholarships and fund
- Collaborative research initiatives
- Networking through ICT (LinkedIn, FB, Youtube, Academia, Research Gateway etc.)
- Education Research/ Proposal Development

6. Instructional Strategies

- a. Lecture
- b. Group work
- c. Organization visit
- d. Document review
- e. Presentation
- f. Proposal development

7. Assessment

Marks (%)

- a. One In-course examination 10
- b. Students' analytical and reflective work 40
(combination of at least two of tasks (i) assignment, (ii) project, (iii) term paper, (iv) presentation, (v) review paper, (vi) field work)
- c. Course final Examination (MCQ+Essay Type) 10+40= 50

8. Recommended Books, Journals and Reports

1. UNESCO (1996), Learning: The Treasure Within, Report of the International Commission on Education for the Twenty-first Century, Paris
2. UNESCO (2000), শিখন: অন্তর্নিহিত সম্পদ, একবিংশ শতাব্দীর শিক্ষা বিষয়ে ইউনেস্কোর আন্তর্জাতিক কমিশনের প্রতিবেদনের বাংলা অনুবাদ, ঢাকা।
3. Unicef, The State of the World Children (latest issue), Unicef House, USA

4. UNDP, Human Resource Development Report (latest).
5. UNESCO, Education for all: The Quality Imperative (latest), Paris.
6. UNESCO, World Education Reports.
7. Sen, A. (2006). Identity and Violence: Illusion of Destiny, Penguin Group.
8. World Bank, Reports on Education and World Development Reports.
9. Reports of different organizations on Educational Practices.
10. Cumming, W,K, McGinn, N.F. (1997), International Handbook of Education and Developments: Preparing School, Students and Nations for the 21st Century, Oxford (UK): Pergamon.
11. Carnoy, M (1999), Globalisation and education reform: What planners need to know, UNESCO/IIEP, Paris.
12. UNESCO, Education for all: The Quality Imperative, 2004. IIEP/Paris.
13. UNESCO, Global Monitoring Report Education for all, UNESCO/IIEP, Paris..
১৪. শিক্ষা মন্ত্রণালয় (২০১০) জাতীয় শিক্ষানীতি, ঢাকা-২০১০।
15. United Nations – 21st century skills framework
16. UNESCO, GCED Documents.
17. Related Websites.

1. Course Number and Title: ED-504: Methods and Techniques of Educational Research

2. Credit Hour: 4

3. Course Description

This course is designed to assist learners for expanding their knowledge and skills in educational research with an in-depth understanding and practical experiences. The course discusses well-known theories and practices related to researching educational problems. This facilitates students' ability for selecting appropriate research problem, developing research tools, selecting appropriate strategies for collecting, processing, analyzing and interpreting findings. The out of classroom activities include designing and conducting a small scale study followed by a report submission.

4. Course objectives

The objectives are to help learners to:

- a. to assist students in understanding the terminology and methodology of educational research.
- b. to help students appreciate the importance of carefully planned, well executed, and systematically reported educational research.
- c. to provide students with experiences necessary for developing skills in the various aspects of collecting, interpreting and reporting data following quantitative and qualitative approaches.
- d. to provide students experiences necessary for carrying out a study independently in a particular field of education.
- e. to help them acquiring skills for writing research report.

5. Course Content Hours

Contact

Unit-1: Philosophical Worldviews in Research

5

Learning Outcomes

At the end of this unit the learners will be able to –

- a. identify the nature of philosophical views of research
- b. select appropriate philosophical vies for their study

Content:

- Major philosophical worldviews/research paradigms: (i) Positivism/Post-positivism; (ii) Interpretivism/constructivism; (iii) Advocacy/participatory; and (iv) Pragmatism
- Essential elements of a worldview: ontology; epistemology, axiology and so on.
- Role of worldviews in educational research
- Applying worldviews for selecting educational research designs

Unit-2: Developing Theoretical and Conceptual Framework of a Research

5

Learning Outcomes

At the end of this unit the learners will be able to –

- a. identify the theoretical and conceptual framework of a study
- b. develop any theoretical and conceptual framework for their study

Content:

- Meaning of Theoretical and Conceptual framework
- Importance and use of Theoretical and Conceptual framework
- Examples from real world research

Unit-3: The Selection of Research Design for Educational research **5**

Learning Outcomes

At the end of this unit the learners will be able to –

- a. identify a researchable problem in education
- b. select appropriate research design for their study with justification.

Content:

- Recapitulate research designs
- Identify real world educational problem
- Select appropriate research design with justification
- Complexity in selecting research design

Unit-4: Sample and Sampling **5**

Learning Outcomes

At the end of this unit the learners will be able to –

- a. estimate appropriate sample size for their study
- b. use appropriate sampling technique for selecting a sample

Content:

- Recapitulate the concept of sample and sampling
- Sample size estimation with using statistical formula
- Select appropriate sampling techniques (quantitative and qualitative research) with justification
- Complexity in selecting sampling techniques

Unit-5: Construct Research Tools **5**

Learning Outcomes

At the end of this unit the learners will be able to –

- a. select appropriate data collection tool/s for quantitative data
- b. select appropriate data collection tool/s for qualitative data.

Content:

- Questionnaire: Nature, types, purpose, construction, scopes and limitations
- Interview: Nature, types, purpose, construction, scopes and limitations
- Observation: Nature, types, purpose, construction, scopes and limitations
- Scales: Nature, types, purpose, construction, scopes and limitations
 - Likert Scales
 - Thurston Scales
- Psychological tests: Nature, types, purpose, construction, scopes and limitations
- Focus Group Discussion: Nature, purpose, construction, scopes and limitations, conduction
- Sociometry: Nature, purpose, construction, scopes and limitations
- Validity, reliability and usefulness of tools

Unit-6: Validity and Reliability of Results in Quantitative, Qualitative and Mixed Research **5**

Learning Outcomes

At the end of this unit the learners will be able to –

- a. measure validity and reliability of quantitative data
- b. measure validity and reliability of qualitative data.

Content:

- Validity issues in the research design
- Causal Relationships
- Internal and External validity for quantitative, qualitative and mixed research

Unit-7: Analyzing the Data: Descriptive and Inferential Statistics **5**

Learning Outcomes

At the end of this unit the learners will be able to –

- a. analyze quantitative data using statistical techniques
- b. test hypothesis using appropriate test.

Content:

- Concept of analysis with examples from practical data
 - Univariate: Types, scope and computation
 - Bivariate: Types, scope and computation
 - Multivariate: Types, scope and computation
- Use of descriptive statistics: frequency distribution; measures of central tendency and variation; shape of distribution- symmetric and asymmetric
- Bivariate data analysis: simple correlation, scatter plot – displaying correlation between two variables; product moment method
- Simple and multiple linear regression analysis: concept and use
- Regression model: concept and use
- Use of inferential statistics: (a) Point estimation (hypothesis testing) and (b) interval estimation
 - (a) Test of hypothesis: (i) Parametric tests: t-test, Z-test, F-test; (ii) Non-parametric test: Chi-Square test and others;
 - (b) Confidence interval: concept and use

Unit-8: Data Interpretation of Qualitative and Quantitative Data **5**

Learning Outcomes

At the end of this unit the learners will be able to-

- a. interpret quantitative results;
- b. interpret qualitative results.

Content:

- Concept of data interpretation and its importance
- Quantitative data interpretation with examples
- Qualitative data interpretation with examples

Unit-9: Writing the Research Report **5**

Learning Outcomes

At the end of this unit the learners will be able to –

- a. format a research report following particular style
- b. evaluate a research report.

Content:

- Importance of reporting research results
- Format of research report: (i) Various aspects of a report, (ii) Different chapters, (iii) Pagination, (iv) Tables and figures, (v) Writing style and language, (vi) Referencing
- Evaluating a research report: Purpose of evaluation; Guidelines and checklist for evaluating a research report

6. Instructional Strategies

- a. Lecture and classroom interaction
- b. Group discussion
- c. Guided study: Read and evaluate research articles
- d. Case studies
- e. Field work
- f. Library work and students participation in the class

7. Assessment

Marks (%)

- | | |
|---|-----------|
| a. One In-course examination | 10 |
| b. Students' analytical and reflective work
(combination of at least two of tasks (i) assignment, (ii) project,
(iii) term paper, (iv) presentation, (v) review paper, (vi) field work) | 40 |
| c. Course final Examination (MCQ+Essay Type) | 10+40= 50 |

8. Recommended Books, Journals and Reports

1. Ary, D., Jacobs, L. C., & Sorensen, C. (2010). *Introduction to research in education (8th ed.)*. California: Wadsworth.
2. Bell, J. (2005). *Doing your research project: A guide for first time researchers in education, health and social science*. England: Open University Press.
3. Best, J. W., & Kahn, J. V. (2006), *Research in Education*, New Delhi: Prentice Hall.
4. Carr, W. L., & Kemmis, S. (1986). *Becoming critical: Education, knowledge and action research*. London: Flamer.
5. Creswell, J. W. (2014). *Research design: Qualitative, quantitative and mixed methods approaches*. Boston: Pearson
6. Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating qualitative and quantitative research*. Boston: Pearson.
7. Flick, UWE. (2009). *An Introduction to Qualitative Research*. London: Sage.
8. Fraenkel, J. R., & Wallen, N.E. (2009). *How to design and evaluate research in education*. New York: McGraw-Hill.
9. Gall, M. D., Gall, J.P., & Borg, W. R. (2007). *Educational research: An introduction*. New York Allyn and Becon.
10. Gay, L. R., Mills, G. E. & Airasian, P. (2012). *Educational research: Competencies for analysis and applications (10th ed.)*. Boston: Pearson.
11. Gay, L. R., & Airasian, P. (2003). *Educational Research: Competencies for Analysis and Applications*. New Jersey: Merrill Prentice Hall.
12. Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105-117). Thousand Oaks, CA: Sage.

13. Johnson, B., & Christensen, L. (2014). *Educational Research: Quantitative, Qualitative, and Mixed approaches*. Los Angeles: SAGE Publications, Inc.
14. Kemmis, S., McTaggart, R., Retallick, J. (2004). *The Action Research Planner*. Pakistan: Aga Khan University
15. Kothary, C. R. (2005). *Research Methodology*, New Delhi: New Age International Publishers.
16. McMillan, J. H. (2012). *Educational Research: Fundamentals for the Consumer* (6th ed.). Boston, MA: Pearson.
17. Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage Publications.

Articles

18. Alase, A. (2017). The interpretative phenomenological analysis (IPA): A guide to a good qualitative research approach. *International Journal of Education & Literacy Studies*, 5(2), 112-131. Available at: <http://dx.doi.org/10.7575/aiac.ijels.v.5n.2p.9>.
19. Aliyu, A. A., Singhry, I. M., Adamu, H. & Abubakar, M. M. (2015). Ontology, epistemology and axiology in quantitative and qualitative research: Elucidation of the research philosophical misconception. *Mediterranean Publications & Research International on New Direction and Uncommon*, 2(1). Available at: <https://www.researchgate.net/publication/318721927>.
20. Doyle, L., Brady, AM, & Byrne, G. (2016). An overview of mixed methods research – revisited. *Journal of Research in Nursing*, 21(8), 623-635. DOI: 10.1177/1744987116674257.
21. Doyle, L., Brady, AM, & Byrne, G. (2009). An overview of mixed methods research. *International Journal of Research in Nursing*, 14(2), 175-185. DOI: 10.1177/1744987108093962.
22. Kivunja, C. & Kuyini, A. B. (2017). Understanding and applying research paradigms in educational contexts. *International Journal of Higher Education*, 6(5), 9-19. Available at: <http://dx.doi.org/10.5539/elt.v5n9p9>.

1. **Course Number and Title: SMTE-541: Science, Mathematics and Technology Education: Trends and Issues**

2. **Credit Hours: 4**

3. **Course Description**

This course is designed with a view to acquaint that the students will be able to identify and understand the trends of science and Mathematics education both in world and in particular Bangladesh. In reference to issues for Science Mathematics and Technology education students will also be able to understand how investigation, assessment, learning with peers, class duration, large class size and controversial issues in teaching become issues from the implementation perspectives. Finally this course will also help students to identify challenges and ways of overcome regarding all issues mentioned above.

4. **Course objectives**

The objectives are to help learners to:

- a. help learners understand, identify and analysis the trends in Science, Mathematics and Technology Education in world and Bangladesh perspectives.
- b. make students comprehend and competent in the concepts, differences, scopes, trends, issues and important aspects of investigation and practical work in Science and Mathematics.
- c. help students comprehend the concepts, different approaches and other aspects focusing on major views and make them competent in analyzing assessment systems in Science, Mathematics and Technology Education.
- d. acquaint students understand in working with peers and make it effective for their own learning in line with constructivist teaching approach.
- e. make students understand with benefit and problems with learning in large classes.
- f. Help students comprehend with challenges of class duration in terms of new innovations in science and Mathematics education.
- g. Help students critique and reflect upon the use, consideration and application of controversial issues in science education.

5. **Course Content**

Contact

Hours

Unit-1: Trends in Science Mathematics and Technology Education

7

Learning Outcomes

At the end of this unit learners will be able to-

- a. Analyze the trends in Science Mathematics and Technology Education in worldwide
- b. Analyze the trends science mathematics and technology education in developing countries
- c. Analyze the trends science mathematics and technology education

Content:

- Trends in Science Education: Science, Technology and Society (STS); Science for All; Scientific Literacy; Humanistic Science Education
- Trends in Mathematics Education
- Trends in Technology Education
- Science Mathematics and Technology Education in developing countries
- Science Technology Engineering and Mathematics Education (STEM)

- Trends in SMTE in Bangladesh.

Unit-2: Investigating in Science and Mathematics Practical Work

4

Learning Outcomes

At the end of this unit learners will be able to-

- Explain the aims and types practical in SMT education
- Analyze the science investigation process in Bangladesh
- Identify the factors affecting investigating in SMT education
- Identify the challenges and ways to overcome science investigation in Bangladesh

Content:

- Aims of Practical work in Science, Mathematics and Technology Education
- Different types of Practical works; Concept of Investigation
- Model of Science Investigation Process and its uses for Bangladesh context
- Level of openness in investigation, Investigation Planner sheet
- Factors affecting investigating in Science
- Reasons for shifting from recipe style towards open investigation
- Current practice and Bangladesh
- Challenges and ways to overcome while implementing science investigation in Bangladesh

Unit-3: Assessment in Science Mathematics and Technology Learning

4

Learning Outcomes

At the end of this unit learners will be able to-

- Explain the relationships between teaching, learning and assessment both from behaviorist and constructivist View in SMT education
- Explain why, what and how do we assess SMT learning
- Analyze the current assessment systems in SMT education in Bangladesh

Content:

- Concept of Assessment
- Relationships between Teaching, Learning and Assessment: Behaviorist and Constructivist View
- Students Approach to learning-Deep, surface and Achievement approach
- SMT perspectives: Why do We Assess - Assessment for Learning; Assessment as Learning and Assessment of Learning
- What should be assessed? How should we Assess-Projects, Portfolios, Marking Schemes, Rubrics and Checklist for Psychomotor and Affective Learning
- Characteristics of Quality Assessment-Fairness and Equity
- Current assessment systems in Science, Mathematics and Technology Education in Bangladesh

Unit-4: Learning with Peers in SMTE

4

Learning Outcomes

At the end of this unit learners will be able to-

- Explain the importance and approaches of group work in SMT education
- Analyze factors in Group work for SMT education context
- Identify Challenges and ways of overcome for group works in SMT education

- d. Develop Model group work for SMT education in Bangladesh Situation

Content:

- Importance of group work in SMTE, Group work and constructivist teaching in SMTE
- Different Approaches in group work, Factors affecting in Group work, Students' role in Group work
- Social and Cognitive development through Learning with peers in SMTE; Group Skills Evaluation sheet
- Group work and SMTE context in Bangladesh
- Challenges, ways of overcome and developing Model for in Bangladesh Situation

Unit-5: Teaching SMT in large classes

3

Learning Outcomes

At the end of this unit learners will be able to-

- a. Explain the concept of large for SMT education
- b. Identify the Advantages and Problems in Teaching SMT in Large class size
- c. Explain the principles and strategies of Teaching SMT in Large Class size
- d. Identify the challenges and ways of improvement of Teaching SMT in Large Class size

Content:

- Concept of large class size; Advantages and Problems in Teaching SMT in Large class size
- Principles and Strategies of Teaching in Large Class- Affective, Management, Pedagogical
- Bangladesh Context and Teaching SMT in Large Class Size
- Challenges and ways of improvement.

Unit-6: Class Duration

2

Learning Outcomes

At the end of this unit learners will be able to-

- a. Explain the concept of class duration for SMT education
- b. Analyze how current practice of class duration contradict with the Innovation in SMT education
- c. Explain the concept of topic load and its relation with class duration
- d. Identify the challenges and ways of overcomes of class duration policy for SMT education in Bangladesh.

Content:

- Concept of Class Duration in national and International contexts- SMT education perspectives
- Class Duration vs Innovation in Science and Mathematics Education
- Concept of Cognitive/Topic Load and its relation with Class duration
- Class Duration policy and its challenges and ways of overcomes for Bangladesh Perspectives

Unit-7: Controversial Issue in Science Education

3

Learning Outcomes

At the end of this unit learners will be able to-

- a. Explain the Concept of Controversial issue in science education
- b. Justify the for using controversial issues in science teaching
- c. Identify the role and responsibilities of the science teachers in teaching Controversial issue
- d. Analyze the practical considerations and application for Bangladesh and International Perspectives

Contents:

- Concept of Controversial issue
- Justification for using controversial issues in science teaching
- The role and responsibility of the teacher
- Practical considerations and application for Bangladesh and International Perspectives.

Unit-8: Science, Religion, and Literacy

4

- a. Science and religion: what is at stake?
- b. Science, religion, and constructivism: constructing and understanding reality
- c. The conflict between science and religion: a discussion on the possibilities for settlement
- d. The relationship between science and religion in the education of science teachers
- e. Science and religion: implications for science education to help students achieve scientific literacy

6. Instructional Strategies

- a. Regular attendance
- b. Group discussion
- c. Reading
- a. Library work
- b. Students' participation in the class

7. Assessment

Marks (%)

- a. One In-course examination 10
- b. Students' analytical and reflective work 40
(combination of at least two of tasks (i) assignment, (ii) project, (iii) term paper, (iv) presentation, (v) review paper, (vi) field work)
- c. Course final Examination (MCQ+Essay Type) 10+40= 50

8. Recommended Books, Journals and Reports

1. Rennie, L.J., Goodrum, D., & Hacking, M. (2001), Science teaching and learning in Australian schools: Results of a national study. *Research in Science Education*, 31, 455-498.
2. Gott, R., & Duggan, S. (1996). Practical work: Its role in the understanding of evidence in science. *International Journal of Science Education*, 18(7), 791-805.
3. Hackling, M.W., & Fairbrother, R. (1996). Helping students to do open investigation in science. *Australian Science Teachers Journal*, 42(4), 26-33.
4. Hodson, D. (1990). A critical look at practical work in school science. *School Science Review*, 70, 33-40.

5. Staer, H., Goodrum, D., & Hackling, M. (1995, July). *High school laboratory work in Western Australia: Openness to inquiry*. Paper presented at the 26th annual conference of the Australasian Science Education Research Association, Bendigo, Victoria.
6. An extract from: Black, P. J. (1993). *Formative and summative assessment by teachers*. *Studies in Science Education*, 21, 49-77.
7. Bell, B., & Cowie, B. (1997). *Formative assessment and science education: Summary report of the Learning in Science Project (Assessment)* (pp. 30-54). Hamilton: Centre for Science, Mathematics and Technology Education Research, University of Waikato.
8. Hackling, M.W. (2002). Assessment of primary students scientific literacy. *Investigating*, 18(3), 6-7.
9. Krueger, B., & Wallace, J. (1996). Portfolio assessment: Possibilities and pointers for practice. *Australian Science Journal*, 42(1), 26-29.
10. Blumenfeld, P. C., Marx, R.W., Soloway, E., & Krajcik, J. (1996). Learning with peers: From small group cooperation to collaborative communities. *Educational Researcher*, 25(8), 37-40.
11. Kempa, R. F., & Ayob, A. (1995). Learning from group work in science. *International Journal of Science Education*, 17(6), 743-754.
12. Richmond, G., & Striley, J. (1996). Making meaning in classrooms: Social processes in small-group discourse and scientific knowledge building. *Journal of Research in Science Teaching*, 33(8), 839-858.
13. G. Venville and V. Dawson (Eds.) (2012), *The Art of Teaching Science: For middle and secondary school* (2nd ed.) Sydney: Allen & Unwin.
14. F. Rahman (Eds.) (2007), *Teacher's World: Journal of Education and Research*, 30-31.
15. A. H. Latif (Eds.) (2015), *Bangladesh Education Journal*, 14(1).
16. S. K. Abell and N. G. Lederman (Eds.) (2007), *Handbook of: Research on Science Education*. New York: Routledge.
17. Hackling, M. W. (2003). *Current Issues in Science Education: Guide* Western Australia: Edith Cowan University.
18. Hackling, M. W. (2003). *Current Issues in Science Education: Reader* Western Australia: Edith Cowan University.
19. Earl, L. and Katz, S. (2006). Rethinking Classroom Assessment with Purpose in Mind: assessment for learning, assessment as learning, assessment of learning.
20. Tobin, K (2010): *Issues of our time: Science, religion, and literacy*, Springer: York

1. **Course Number and Title: SMTE-542: Science, Mathematics, Technology Education and Human Resource**

Development

2. **Credit Hours: 4**

3. **Course Description**

This course is designed with a view to provide an understanding to students about how science mathematics and technology education contribute to human resource development of a country. This course will also guide to analyze science and technology policy both for selected developed and developing countries and reflect on Bangladesh science and technology policy. This course also helps students comprehend with different aspect like gender, teacher belief, teacher development issues which contributes SMT teachers to develop as a human resource.

4. **Course objectives**

The objective are to help learners to:

- a. help to identify the role of science mathematics and technology education in human resource development.
- b. help to identify national and international perspectives, policy models and issues for investigation regarding human resource development.
- c. understand perspectives from developed and developing countries to reflect on science and technology policy of Bangladesh.
- d. acquaint students with gender and teacher belief for science mathematics and technology education.
- e. help students to understand current trends in teacher training for science mathematics and technology education.

5. **Course Content**
Hours

Contact

Unit-1: Human Resource Development in Science Mathematics and Technology Education

2

Learning Outcomes

At the end of this unit learners will be able to-

- a. Explain the Dimensions & Indicators of Human Development Index (HDI)
- b. Analyze the role of SMT education in increasing HDI

Content:

- Concept of Development
- Human Resource and Human Resource Development
- Human Development Index- Dimensions & Indicators
- Life expectancy at Birth
- Mean years of schooling, Expected year of schooling
- GNI; Role of SMTE education in increasing HDI

Unit-2: Science Education & Development

4

Learning Outcomes

At the end of this unit learners will be able to-

- a. Explain the relationship between SMT education

- b. Analyze policy model for economic development by SMT education
- c. Identify the issues for investigation for development through science education

Content:

- Science education and development
- National and International Perspectives
- Policy Model for economic development by science education
- Issues for Investigation for development through science education.

Unit-3: Analyze Science and Technology Policy

5

Learning Outcomes

At the end of this unit learners will be able to-

- a. Analyze Science & Technology policy of Developing and Developed countries
- b. Evaluate Bangladesh Science & Technology policy
- c. Identify challenges and suggestions for effective Science and Technology Policy for Bangladesh Context.

Content:

- Analyzing Science & Technology policy of Developing and Developed countries
- Compare and contrast with Bangladesh Science & Technology policy
- Challenges and suggestions for effective Science and Technology Policy for Bangladesh Context.

Unit-4: Gender in Science and Mathematics Education

4

Learning Outcomes

At the end of this unit learners will be able to-

- a. Explain the Knowledge, Attitude and Practice in different gender issues for SMT education
- b. Analyze the participation and performance for SMT education in Bangladesh and world context
- c. Analyze gender aspects in SMT Curriculum, Instruction and Assessment
- d. Identify gender issues from socio-cultural perspectives in SMT education
- e. Explain the role of SMT teachers in gender issues
- f. Identify gender issues in SMT education research

Content:

- Knowledge, Attitude and Practice in different gender issues
- Participation and performance- Bangladesh and world trends
- Gender aspects in Curriculum, Instruction and Assessment
- Role of teachers in gender issues
- Gender issues from socio-cultural perspectives
- Gender issues in science education research

Unit-5: Teacher belief in Science and Mathematics education

2

Learning Outcomes

At the end of this unit learners will be able to-

- a. Explain the concept and types of teacher belief

- b. Analyze the importance of working with Teacher Belief in SMT Education using teacher belief scale
- c. Identify challenges and ways of overcome regarding teacher belief for SMT educational reform

Content:

- Concept of Teacher Belief
- Types-Self efficacy and outcome expectancy
- Importance of working with Teacher Belief in Particular science and Mathematics Education
- Challenges and ways of overcome for educational reform over Teacher belief

Unit-6: Science and Mathematics Teacher’s Pedagogical Content Knowledge (PCK) 3

Learning Outcomes

At the end of this unit learners will be able to-

- a. Explain the concept and factors in capturing and representing Pedagogical Content Knowledge (PCK)
- b. Develop framework for representing concrete examples of PCK- CoRe (Content Representation) and PaP-eRs (Pedagogical and Professional Experience Repertories)
- c. Construct and Use CoRe and PaP-eRs for SMT education
- d. Identify challenges and ways of overcome for using CoRe and PaP-eRs for Bangladesh Context

Content:

- Concept of Pedagogical Content Knowledge (PCK)- An academic construct
- Shaping Factors in capturing and representing PCK
- Framework for representing concrete examples of PCK- CoRe (Content Representation) and PaP-eRs (Pedagogical and Professional Experience Repertories)
- Constructing and Using CoRe and PaP-eRs, Challenges and ways of Overcome for Bangladesh Context

Unit-7: Teachers’ Development in Science Mathematics and Technology Education 04

Learning Outcomes

At the end of this unit learners will be able to-

- a. Differentiate between the Concept of Professional Development (PD) and Professional Learning (PL);
- b. Explain the emergency of encouraging PL for Bangladesh Context for SMT Education Context
- c. Critically analyze the role of Professional Learning Community (PLC) in promoting PL for SMT education context and Role of Lesson Study as a Tools of PLC for Bangladesh SMT education context
- d. Determine the challenges and ways of overcomes for effective SMT teacher education in Bangladesh

Content:

- Concept of Professional Development (PD) and Professional Learning (PL)
- Differences between PL and PD
- How PD and PL are Linked to each other

- Emergency of encouraging PL for Bangladesh Context for Science, Mathematics and Technology Education Context
- Role of Professional Learning Community (PLC) in promoting PL for SMTE context, Role of Lesson Study as a Tools of PLC for Bangladesh Context
- Challenges and ways of overcome for effective science Mathematics and technology teacher education in Bangladesh.

6. Instructional Strategies

- Lecture
- Group discussion
- Reading
- Presentation
- Library work and
- Students' participation in the class

7. Assessment	Marks (%)
a. One In-course examination	10
b. Students' analytical and reflective work (combination of at least two of tasks (i) assignment, (ii) project, (iii) term paper, (iv) presentation, (v) review paper, (vi) field work)	40
c. Course final Examination (MCQ+Essay Type)	10+40= 50

8. Recommended Books, Journals and Reports

- Gott, R., & Duggan, S. (1996). Practical work: Its role in the understanding of evidence in science. *International Journal of Science Education*, 18(7), 791-805.
- A. H. Latif (Eds.) (2015), *Bangladesh Education Journal*, 14(1).
- S. K. Abell and N. G. Lederman (Eds.) (2007), *Handbook of: Research on Science Education*. New York: Routledge.
- Hackling, M. W. (2003). *Current Issues in Science Education: Guide* Western Australia: Edith Cowan University.
- Hackling, M. W. (2003). *Current Issues in Science Education: Reader* Western Australia: Edith Cowan University.
- Earl, L. and Katz, S. (2006). Rethinking Classroom Assessment with Purpose in Mind: assessment for learning, assessment as learning, assessment of learning.

1. Course No. and Title: SMTE-543: Curriculum Development in Science, Mathematics and Technology Education

2. Credit Hours: 4

3. Course Description

The course is designed with a view to providing learners with a comprehensive understanding about the principles and process of developing Science, Mathematics and Technology curricula. This course includes nature of Science, Mathematics and Technology, aims of teaching these subjects and considerations in selecting and organizing objectives, content, teaching-learning activities and assessment techniques for Science, Mathematics and Technology in schools. This course also includes critical analyses of different Science, Mathematics and Technology curricula in Bangladesh as well as curricula in developing and developed countries.

4. Course objectives

The objectives are to help learners to:

- a. develop a clear idea on nature and interrelations among Science, Mathematics and Technology.
- b. analyze aims of teaching Science, Mathematics and Technology.
- c. apply considerations in selecting and organizing objectives, content, teaching-learning activities and assessment techniques for Science, Mathematics and Technology in schools.
- d. critically analyze different Science, Mathematics and Technology curricula in Bangladesh.
- e. evaluate curricula in developing and developed countries.

**5. Course Contents
Hours**

Contact

Unit-1: Foundations of Science, Mathematics and Technology curricula 10

Learning Outcomes

At the end of this unit learners will be able to-

- a. analyze influences on three levels of science, Mathematics and Technology curricula
- b. explain how Nature of Science, Nature of Scientific inquiry, Nature of Mathematics and Mathematical Inquiry, Nature of Technology and Engineering affect development of SMT curricula

Content:

- Concept of Curriculum, Major elements of a curriculum
- Nature of Science and Scientific Inquiry
- Nature of Mathematics
- Nature of Technology and Engineering
- Influences on three levels of Science, Mathematics and Technology curricula

Unit-2: Development of Science, Mathematics and Technology curricula 10

Learning Outcomes

At the end of this unit learners will be able to-

- a. Identify considerations in selecting objectives, learning outcomes, content and learning experiences for Science, Mathematics and Technology curricula
- b. Apply pedagogical principles to select learning objectives and outcome for SMT curricula
- c. Apply pedagogical principles to organize content in preparing SMT curricula
- d. Analyze different assessment framework and select appropriate assessment strategies and tools for assessing science learning
- e. Evaluate SMT curricula

Content:

- Common steps in curriculum development process
- Aims of Science, Mathematics and Technology education – primary, secondary and tertiary level
- Considerations in selecting objectives, learning outcomes, content and learning experiences for Science, Mathematics and Technology curricula
- Organizing content of Science, Mathematics and Technology curricula: Scopes and sequence of content
- Integration in Science, Mathematics and Technology curricula – within, between and beyond subjects.
- Selection of appropriate assessment strategies and tools for assessing science learning – Analyzing NCTB assessment framework, PISA and TIMSS framework
- Evaluation of Science, Mathematics and Technology curricula

Unit-3: Critical analyses of Science, Mathematics and Technology curricula in different levels of education in Bangladesh **10**

Learning Outcomes

At the end of this unit learners will be able to-

- a. Critically analyze the structure and emphases/focus SMT curricula in Bangladesh at different levels

Content:

- Science, Mathematics and Technology curricula in primary and pre-primary education
- Science, Mathematics and Technology curricula in secondary education
- Science, Mathematics and Technology curricula in tertiary education
- Science, Mathematics and Technology curricula in teacher education: DPed, B Ed, B Ed (Honors)

Unit-4: Analyzing Science, Mathematics and Technology curricula in developing and developed countries

10

Learning Outcomes

At the end of this unit learners will be able to-

- a. Analyze and Compare SMT curricula from selected developing and developed countries

- b. Discuss recent advancement in SMT curricula

Content:

- Science, Mathematics and Technology curricula from selected developing countries
- Science, Mathematics and Technology curricula in selected developed countries
- Comparison of SMT curricula from selected developing and developed countries
- STEM curricula- feasibility and challenges in implementation in Bangladesh context

6. Instructional Strategies

- Discussion, Lectures, Assignment, Presentation, Group work

7. Assessment

Marks (%)

- | | |
|---|-----------|
| a. One In-course examination | 10 |
| b. Students' analytical and reflective work
(combination of at least two of tasks (i) assignment, (ii) project,
(iii) term paper, (iv) presentation, (v) review paper, (vi) field work) | 40 |
| c. Course final Examination (MCQ+Essay Type) | 10+40= 50 |

8. Recommended Books, Journals and Reports

1. American Association for the Advancement of Science [AAAS], (1990). *Science for all American Online*, retrieved at <http://www.project2061.org/publications/sfaa/online/sfaatoc.htm>
2. Hassard, J. (2005), *The Art of Teaching Science: Inquiry and Innovation in Middle School and High School*, New York: Oxford University Press
3. Nicholls, A., & Nicholls, A.H. (1978). *Developing a curriculum: A practice guide*. London: George Allen & Unwin.
4. Peters, J. M. & Stout, D. L. (Eds.), *Science in Elementary Education: Methods, Concepts, and Inquiries*. Upper saddle river: Pearson, Merrill, and Prentice Hall.
5. Venville, G. & Dawson, V. (Eds). (2004). *The Art of Teaching Science*, Crows Nest: Allen & Unwin.
6. Venville, G. & Dawson, V (Eds). (2007). *The Art of Teaching Primary Science*, Crows Nest: Allen & Unwin.
7. Venville, G. & Dawson, V. (Eds). (2012). *The Art of Teaching Science for middle and secondary schools (2nd Edition)*, Sydney: Allen & Unwin.
৮. রহমান, এস এম হাফিজুর, সিদ্দিকী, মোহাম্মদ নূরে আলম, জলিল, মো: আবদুল, ইব্রাহীম, মুফতি মো: (২০১৪), প্রাথমিক বিজ্ঞান: বিষয় জ্ঞান ও শিক্ষণ বিজ্ঞান, ময়মনসিংহ: জাতীয় প্রাথমিক শিক্ষা একাডেমী
৯. জাতীয় শিক্ষাক্রম ও পাঠ্যপুস্তক বোর্ড (২০১৩), জাতীয় শিক্ষাক্রম ২০১২ (ষষ্ঠ-দ্বাদশ), ঢাকা: জাতীয় শিক্ষাক্রম ও পাঠ্য পুস্তক বোর্ড
১০. জাতীয় শিক্ষাক্রম ও পাঠ্য পুস্তক বোর্ড (২০১৩), প্রাথমিক স্তরের শিক্ষাক্রম ২০১২ - প্রাথমিক বিজ্ঞান, ঢাকা: জাতীয় শিক্ষাক্রম ও পাঠ্য পুস্তক বোর্ড